



*Empowered lives.
Resilient nations.*



COMMUNITY-BASED ACTION IN SMALL ISLAND DEVELOPING STATES

Best Practices from the Equator Initiative



EQUATOR  INITIATIVE



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This publication is a companion piece to *Island Innovations—UNDP and GEF: Leveraging Environment and Energy for the Sustainable Development of SIDS*, a joint UNDP and GEF (Global Environment Facility) book launched at the Third International Conference on Small Island Developing States, 2014.

Equator Initiative

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Cite as:

United Nations Development Programme. 2014. Community-Based Action In Small Island Developing States: Best Practices from the Equator Initiative. New York, NY: UNDP.

Cover photos:

Top: Sea turtle returns to the ocean after laying her eggs in Comoros. Photo: Mohéli Marine Park
Bottom: Community member practices sustainable oyster harvesting in the Marshall Islands. Photo: Namdrik Atoll Local Resources Committee
Back page: Community members develop management plan in Fiji. Photo: Sisi Initiative

Published by:

United Nations Development Programme, 304 East 45th Street New York, NY 10017
September 2014
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Printed in the United States

The Equator Initiative gratefully acknowledges the leadership of Eileen de Ravin, as well as the generous support of its partners.



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FOREWORD



Magdy Martínez-Solimán
Director, a.i, UNDP Bureau for Policy and Programme Support

Since 2002 the Equator Initiative has held a spotlight on outstanding community based initiatives in biodiversity conservation and poverty reduction. The Equator Prize has been pivotal in positioning and raising the profile of these indigenous and local communities in the international arena. More than 150 case studies have documented the innovative practices and solutions applied by the prize winners in sustainably managing and protecting their environment while ensuring the livelihoods of women and men, families and communities, across the globe.

The Third International Conference on Small Island Developing States (SIDS) provides a unique opportunity to highlight the issues of these countries that are characterized by their remoteness and small size. They remain a special case for sustainable development due to their vulnerability to climactic threats and economic shocks.

The conference seeks to identify new opportunities for the sustainable development of SIDS and the means of addressing them. “The sustainable development of Small Island Developing States through genuine and durable partnerships” has been recognized as the overarching theme of the conference.

Partnerships with the United Nations, governments, academic and research institutions, and civil society organizations have been at the core of the Equator Initiative’s development model. Working with partners is critical for outreach, knowledge transfer, and sustainability. The impact the Equator Initiative has had is a direct result of the commitment of its partners.

The following publication features fourteen case studies from small island developing states from the Caribbean, the Atlantic Ocean, the Indian Ocean, and the Pacific Ocean. The stories range from conserving marine resources and endangered species to initiatives in ecotourism, reforestation and network development. Community self-sufficiency and resilience in the face of threats are the common threads.

A clear message emerges that indigenous and local communities around the world are on the frontlines of sustainable development, working to advance innovative solutions that work for both people and nature. These communities secure their economic and social well-being through maintaining healthy ecosystems and conserving biodiversity.

The Equator Initiative was in Mauritius at the UN Conference on Small Islands in 2005. Now managing WIN, the World Network of Indigenous and Local Community Land and Sea Managers, the Equator Initiative and partners are at SIDS 2014 ready to support communities to stand for their rights to manage their environments, conserve their knowledge, and safeguard their future.

INTRODUCTION



Gerald Miles
Vice President, Global Development, Rare

Communities and islands ... two of the most important building blocks in the future we want – in a future that is inclusive, sustainable and resilient. Their health and well-being will be the litmus test for success.

The past 12 years of the Equator Initiative have surfaced local leaders in Small Island Developing States (SIDS) that are without doubt the global champions we need for sustainable development – for our global community as well as for the future of islands.

The priorities of SIDS and their policy agenda have changed little over the past 20 years. When the sustainable development for SIDS was quietly introduced to Chapter 17 of Agenda 21 – in 1992 – there was some surprise, but little resistance. This was at a time when many SIDS were without environment units let alone Ministers responsible for the portfolio, and climate change was just emerging as a significant global threat. While some of the institutional capacity in SIDS was still being built, island communities were able to tell the stories, provide the anecdotal evidence of changing environments – of climate change itself – that over the subsequent years have been confirmed by science. The strong sense of self-reliance was as evident then as it is today.

In Barbados, at the first SIDS Conference in 1994, it was clear that SIDS were prepared to take action themselves. Building on the long history of local innovation and simple necessity to deal with issues as they were presented, the Barbados Program of Action spelt out the national action islanders would take themselves. The response at the regional level was constructive – outlining how their own intergovernmental infrastructure and local partners would share lessons, solve collective problems, and help mobilize technical and financial support – and lastly, the support of the international community called for to help respond to the increasing vulnerability of SIDS.

This partnership between SIDS and the international community, some 20 years ago, reflects one of the most important lessons of community innovation surfaced by the Equator Initiative and others over the over the past decade – “partnerships matter”. Today, as it becomes increasingly difficult to reach political agreement at a global level, we have realised how important it is to draw on local leadership and how the different roles and capacities at national, regional and international levels need to be harnessed more effectively. The theme of SIDS 2014 is one of enduring partnerships and it speaks to the power and impact of local action. We have the opportunity now to find ways to scale the innovation that exists and to learn from local leadership through a wide range of platforms such as the World Network of Indigenous and Local Community Land and Sea Managers.

The challenge of sustainable development in Small Island Developing States remains as globally significant today as it has been for the past 20 years. What is different today is the inspiring response to this challenge we find in the Equator Prize winners from SIDS. Rare, as a proud partner of the Equator Initiative, sees these champions – that represent so many more – as essential to the future of both SIDS and any global vision for sustainable development.

These first responders for sustainable development are brought to life in this publication. Read on!

ACKNOWLEDGEMENTS



Eileen de Ravin
Manager, Equator Initiative

First and foremost I would like to recognize the small island communities for their exceptional work and commitment to environmental protection and sustainable livelihoods. I thank the Equator Initiative partners for their enduring support. In particular, thanks go to Gerald Miles from Rare for his contribution to this publication.

Special thanks go to Celia Mahung, Will Maheia, Renato Delgado, Sakiusa “Saki” Patrick Fong, Toni Parras, Miliana Ravuso, Mattlan Zackhras, Patterson Shed, Eugene Joseph, Jerry Wana, Reuben Wak, and Kevin Mores for their personal contributions to these case studies.

Many thanks to Joseph Corcoran Editor-In-Chief of the case study series for his tireless work on this important project.

I’d like to extend my thanks to Madgy Martínez-Solimán and Nik Sekhran for their support. Many thanks to Alejandra Pero for her coordination and commitment to the indigenous and local communities around the world.



CASE STUDIES



TOLEDO INSTITUTE FOR DEVELOPMENT AND ENVIRONMENT (TIDE)

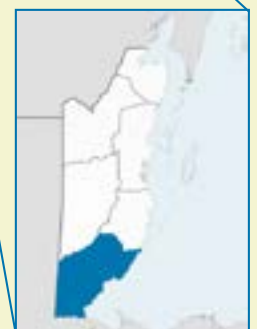
Belize



PROJECT SUMMARY

Toledo Institute for Development and Environment (TIDE) partners with local communities to promote sustainable income generation and co-management of both forest and marine resources in the Maya Mountain Marine Corridor, a conservation area covering approximately 739,650 acres of land and the equivalent of 100,000 acres of sea.

From its volunteer-led beginning, TIDE has grown to include about 30 full-time staff members. The organization works with communities across three main program areas: education and outreach, resource protection, and research and monitoring. Additionally, TIDE has established an ecotourism venture to provide revenue for its work and to support the development of alternative livelihoods for community members. The group also organizes activities such as beach clean-ups and community fire management training, with a target audience comprising 12 coastal and inland communities, for a total of more than 10,000 people.



Background and Context



The Toledo Institute for Development and Environment (TIDE) promotes sustainable income generation and the participatory co-management and protection of local natural resources within the Maya Mountain Marine Corridor (MMMC) in southern Belize. This award-winning organization co-manages the Port Honduras Marine Reserve in cooperation with the Fisheries Department, the Payne's Creek National Park in cooperation with the Forest Department, and approximately 30,000 acres of private land under the Tropical Forest Conservation Act.

A mosaic of landscapes and cultures

Belize's Maya Mountain Marine Corridor is a biologically significant area that encompasses approximately 739,650 acres of land and the equivalent of 100,000 acres of sea. It includes more than 43 distinct ecosystems that support threatened species, fulfill human needs, and contribute to natural disaster mitigation and climate change adaptation. This corridor connects tropical rainforest and pine savannas with mangroves and small, offshore islands known as cayes and includes seven intact watersheds that flow into coastal wetlands and marine waters to an offshore barrier reef, which is second in size only to Australia's Great Barrier Reef. The corridor is composed of a number of protected areas that provide shelter to many of Central America's endangered species, including jaguars, tapirs, sea turtles, crocodiles and the largest population of West Indian manatees in the world.

TIDE works in part of this corridor, the Toledo District, which is Belize's poorest and least developed region and has the highest unemployment rate in the country. Until recently, local people relied heavily on subsistence agriculture, hunting and fishing for livelihoods. However, a combination of overfishing, little or no enforcement of fishing regulations, and harmful fishing methods brought about a sharp decline in fish populations, while agricultural activities and gravel mining encroached on forest habitats. It was the near disappearance of the manatee that finally galvanized the

community into action and led to TIDE's foundation in 1997. Initially conceived as a grassroots initiative to respond to unsustainable resource use, TIDE has since been actively involved in the implementation of conservation plans and in the development of income-generating alternatives for local residents.

The local community was instrumental in obtaining legal status for the marine reserve, a process that began with community members collecting biological data to demonstrate the decline of resources and the degradation of ecosystems. With TIDE's help, they lobbied for the area to be made into a reserve, collecting hundreds of signatures in support of the establishment of a reserve and sending them to the Minister for Fishing. These efforts were met with considerable opposition from commercial fisheries, but the Belizean government endorsed the proposal and formally adopted the Port Honduras Marine Reserve in January 2000. Shortly thereafter, TIDE was granted co-management authority over the reserve and acquired three boats for use in its marine patrols and other conservation work. In 2004, TIDE signed a co-management agreement with the Forestry Department for Payne's Creek National Park and more recently, has begun to manage newly acquired private lands on the Rio Grande River and between Golden Stream and Deep River.

The Port Honduras Marine Reserve consists of 160 square miles of coastal waters recognized for their high biodiversity, with a robust belt of unaltered mangroves and sandy coasts that provide a critical link between terrestrial and marine ecosystems. These crystal clear Caribbean waters are home to endangered and vulnerable species. Approximately 4,500 people live in adjacent communities, with additional fishing pressure stemming from poachers. The reserve encompasses estuaries near shore communities and extends to protect fringing reefs. There are over 100 small, mangrove-fringed cayes and benthic habitats comprised of soft-bottom seagrass beds, reefal banks and fringing reefs, which are unique to the country. The reserve forms one of the most important fish nurseries in the Caribbean and is an ideal habitat for the endangered West Indian manatee. TIDE

rangers patrol the reserve to ensure compliance with regulations and to reduce environmental threats, such as the use of gill nets, illegal fishing, over-fishing and the catching of under-sized fish.

Payne's Creek National Park covers 36,420 acres in southern Belize - north to the Deep River Forest Reserve, east to Monkey River, the Caribbean Sea and Punta Negra, south to Port Honduras, and west to the bank of the Deep River. This national park protects hypersaline, saline, brackish, and freshwater habitats, mangroves, broadleaf forest and savannah. The ecosystems are a matrix of broadleaf forest, short grass and pine savannah, and herbaceous and mangrove swamps. The park provides direct protection for a great diversity of species, at least 22 of which are endangered or vulnerable. These include the manatee, goliath grouper, howler monkey, white ibis, jabiru stork and yellow-headed parrot, in addition to Belize's five species of cat - jaguar, ocelot, margay, puma, and jaguarondi. Three hundred species of bird live or winter in the park. Within the park's boundaries, archaeologists have uncovered four ancient Mayan sites, now submerged under water in the Y'cacos lagoon, adding a cultural element to the protection of this land. Wild fires are the most severe threat faced by Payne's Creek National Park; yearly fires impede young pine regeneration and destroy the nesting sites of yellow-headed parrots, sparrows and black-throated bobwhites.

Conservation on land and at sea

In addition to wildfires, forests in the Toledo region of Belize face further threats, including the newly-constructed Southern Highway of Belize which provides access to once remote areas, and deforestation through the expansion of agriculture and logging operations. With the help of the Nature Conservancy, TIDE began to purchase strategic parcels of land in the Maya Mountain Marine Corridor to secure them from unsustainable development and currently manages approximately 30,000 acres of such lands. The majority of TIDE's private lands are located on the banks of the Rio Grande River, a riparian corridor where visitors can catch glimpses of the endangered West Indian manatee and hicatee turtle. TIDE rangers patrol more than twenty miles of coastal forest land and over thirty miles of riverfront in these areas. In this way, TIDE's private protected lands are successfully contributing to the conservation of a biological corridor that links other protected areas in the Toledo District.

From its volunteer-led beginning, TIDE has grown to include about 30 full-time staff members, including 8 administrative staff, 9 rangers, and several marine and terrestrial biologists. TIDE involves community members in decision-making through participation on

advisory boards which are made up of residents from the buffer zones. Furthermore, the organization's Board of Directors includes fishers, a farmer, a tour guide operator, a community worker, a teacher, and the dean of the local university. TIDE also works cooperatively with government officials and has extensive links with the academic community in Belize and abroad. Additionally, the organization has succeeded in building partnerships within the private sector, especially through its for-profit tourism arm, TIDE Tours, which contracts many of its tourism services to small, local businesses. The target population for all of TIDE's activities and outreach is 12 coastal and inland communities, for a total of more than 10,000 people.



“This guy is having an argument with the ranger, saying if we take his net how is he going to live? He’s got his family to feed and it’s difficult for us from the conservation point to just come and take away their nets without providing an alternative.”

Will Maheia, TIDE

Key Activities and Innovations



TIDE's three main program areas are education and outreach, resource protection, and research and monitoring. Additionally, TIDE has established an ecotourism venture to provide revenue for its three main activities and to support alternative livelihoods for community members. TIDE also organizes other activities such as beach clean-ups and community fire management training.

Education and Outreach

TIDE's environmental education and outreach program is designed to increase public awareness of the Maya Mountain Marine Corridor and foster appreciation, ownership and pride among stakeholders. Through meetings, discussions, radio shows and several annual activities, TIDE aims to promote sustainable resource use in the protected areas managed by the organization as well as in the buffer zones. This program engages young people in conservation and environmental issues by directly supplementing their science and social studies curricula. TIDE also conducts house visits in the buffer communities and employs an education and outreach coordinator who visits over 50 households a year in six communities, reaching more than 360 people. The coordinator also visits primary schools and delivers presentations to over 1,000 students. So far, the house visits have proven an effective outreach tool, as resource users are more open to engaging in discussion in the comfort of their own homes.

An important component of the environmental education and outreach program is the TIDE Freshwater Cup. Recognizing the need to transform the communities into sustainable partners for environmental initiatives and using a sport of enormous popularity, TIDE established the Freshwater Cup Environmental Football League in order to promote environmental action at the community level. In order to participate, students are required to organize environmental projects. Past participants have engaged in clean-ups of rivers, coasts and dumpsites and have given presentations at their schools.

The Fish Fest is another annual event which usually begins with an early morning fishing tournament in the Port Honduras Marine Reserve and includes a series of traditional activities such as coconut husking, cast net throwing, kayak and cycle races and a volleyball tournament. In 2010, the tournament promoted sustainable fishing of the fin fish species and sport fishing. There is an annual Youth Conservation Competition in which young people compete for associate degree scholarships by making stage presentations on environmental themes. The competition allows audience members to learn about environmental issues and the work of participating organizations.

TIDE has hosted a summer camp for six consecutive years with a different theme each year. In 2010, the theme was "The Importance of Biodiversity." A total of 140 children from Punta Gorda and neighboring communities participated. Thirty facilitators, including university and high school students, teachers and three international volunteers, assisted with the camp. The aim of this annual camp is to encourage children to understand the concept of biodiversity and its role and importance within the environment, with an emphasis on the terrestrial and marine ecosystems found within the corridor. Additionally, one of TIDE's terrestrial biologists developed an Introduction to Bird Watching course that has been conducted for school children in Punta Gorda and TIDE staff. TIDE also offers field trips during which local children are taken out to coral reefs and protected areas. The aim is to get children interested in the protection of their local natural resources so that they will become community stewards one day.

Resource Protection

The second area of work, resource protection, refers to TIDE's ongoing co-management of the Port Honduras Marine Reserve, the Payne's Creek National Park and TIDE Private Protected Lands. TIDE employs several full-time park and marine rangers who live at the ranger

station during their two-week shifts. TIDE's management of the Port Honduras Marine Reserve is widely recognized as a successful example of community-based co-management. The marine rangers are the primary authority in the Marine Reserve and routinely inspect local fishers for their licenses and to make sure their catches are within seasonal legal limits. TIDE rangers also serve as sources of information and education, as the rangers use each inspection as an opportunity to tell the fishers about ongoing and seasonal regulations and also about the importance of their compliance with those regulations.

Research and Monitoring

The third program refers to TIDE's year-round biological research and monitoring of the reserves. Ongoing research activities carried out by TIDE track changes in resource populations, community compositions and the health of ecosystems over time. Regular data collection in both marine and terrestrial sites allows any changes or fluctuations from baseline trends to be identified and further investigated. For the marine data collection project, activities include monthly water quality assessment, underwater lobster and conch visual surveys, mangrove and seagrass monitoring, and coral and fish surveys. In order to measure water quality, marine biologists record temperature, salinity, turbidity, and dissolved oxygen levels, all of which have an impact on biodiversity prosperity and survival. Another important aspect of this program is fish stock assessment, for which TIDE has over two years of quality data. Additionally, biologists examine coral for signs of bleaching and collect samples of sediment and seagrass, which are also monitored for data regarding species, percentage cover, density, canopy height, grazing and flowers. Assessments of turtle nesting sites and mangroves are also undertaken on a regular basis.

The terrestrial research and monitoring program collects data on biodiversity within the forests and savannahs of the TIDE Private Protected Lands (TPPL) and Payne's Creek National Park (PCNP), and allows for an understanding of how bird and mammal species impact the management of protected areas. Four biodiversity transects have been established in the lowland broadleaf rainforest and mixed-pine forest ecosystems to identify bird and mammal species and track changes in their numbers over time. These results have been used to inform conservation plans based on the abundance of bird and mammal species in different parts of the protected areas. In the future, TIDE plans to increase the size of transect areas in order to reflect a greater range of habitats and to include amphibians in its monitoring activities.

Developing ecotourism to diversify livelihoods

An additional area in which TIDE works is ecotourism. TIDE Tours was established in 1999 in order to promote ecotourism in the Toledo District. Its primary objectives are to provide profitable, alternative economic opportunities to local residents and to generate funding for TIDE's conservation work. In order to achieve these goals, TIDE Tours works to give community members the necessary skills to

work in the ecotourism industry by providing capacity-building workshops such as microenterprise training as well as a popular tour guide certification course. As a result of this project, TIDE Tours has assisted a number of former fishers to move into more sustainable and profitable employment as tour guides. TIDE Tours also serves as a tour operator, providing a range of activities such as snorkeling and trips to Mayan archeological sites, inland caves and waterfalls.

Innovative approaches to conservation

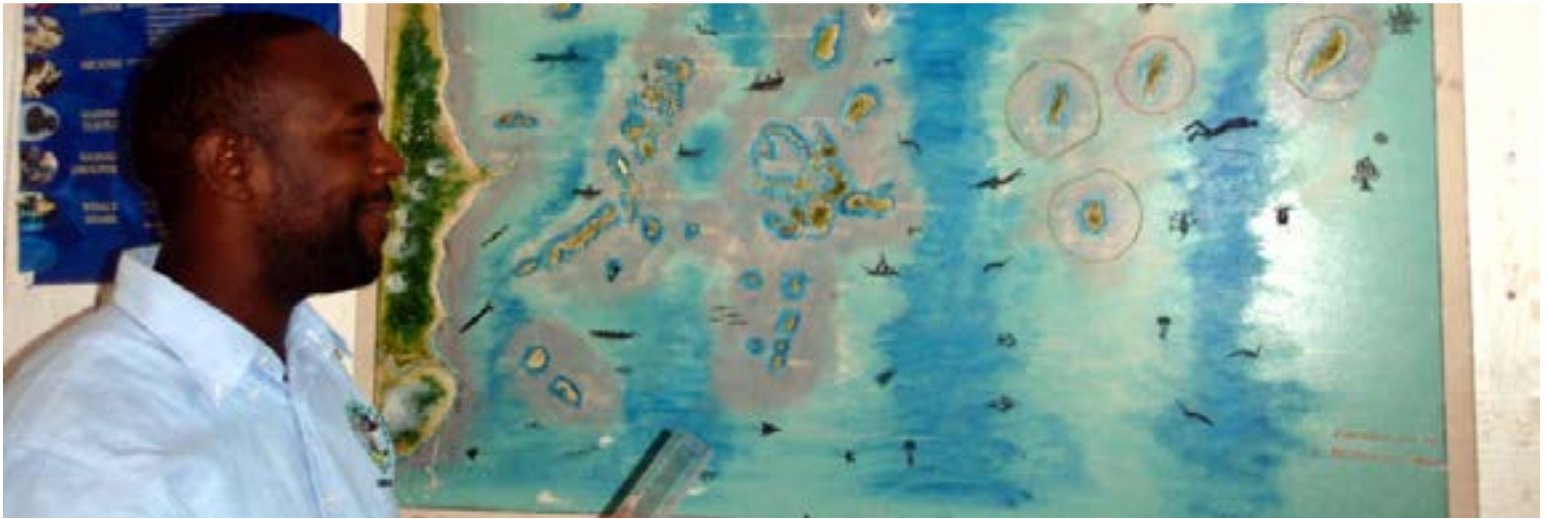
TIDE takes a holistic approach to conservation by ensuring the connectivity of the Maya Mountain Marine Corridor, thereby protecting marine and freshwater ecosystems which are highly dependent on terrestrial activities. Since the highlands of this corridor receive over twelve feet of rainfall each year, the runoff creates waterways that feed into the lowland and marine ecosystems. TIDE acutely understands that any ecological disturbance in one part of the corridor has an impact on the wellbeing of flora and fauna in other areas, and has been recognized internationally as the single most important actor working toward the protection of this corridor, investing large amounts of political and financial capital into the purchase of strategic parcels of private lands.

TIDE also uses a number of innovative methods in its education and outreach program. The scholarship competition for youth and the various sports tournaments are examples of creative and dynamic ways through which TIDE engages the local communities. Innovative programs include a scholarship fund for children whose parents agree to stop using unsustainable fishing and farming methods and a net exchange program that allows fishers to trade gillnets for more environmentally sensitive equipment.

TIDE has been quick to make use of new technologies, especially social media tools, in its outreach, as well as hosting a local radio program to educate listeners about environmental conservation efforts and activities. TIDE has successfully wielded these communication tools in order to influence and empower communities. TIDE also demonstrates a high level of knowledge sharing with local people, making an effort to share up-to-date biological research at regular community meetings.

TIDE's newest success is the Community Stewards Program which provides training and support to community members to enhance their stewardship and collaborative work with TIDE. The program has been in place since early 2009 when 15 community stewards from seven communities were identified to take part in trainings on marine and terrestrial ecosystems, the environmental laws of Belize, computer skills, communication skills and outboard engine maintenance. Through knowledge exchange visits, the stewards have been able to add new skills to their foundation of knowledge, promoting fuller and more effective participation in conservation activities. The stewards have played an important role in motivating others to gain a greater understanding of the protected areas and the need for sustainable resource use.

Impacts



BIODIVERSITY IMPACTS

The million-acre Maya Mountain Marine Corridor forms a significant portion of the Mesoamerican Biological Corridor. Traditional threats to this corridor include hunting and fishing, climate variability, land clearance for agriculture, coastal development, population growth, coral diseases, the pet trade and wildfires. Through the implementation of its comprehensive community conservation plan and through the purchase of large tracts of private land, TIDE ensures the connectivity and protection of this mountain-to-sea corridor, thus safeguarding marine and terrestrial ecosystems as well as the endangered species that migrate freely from the mountainous areas to coastal lowlands for food and breeding, such as jaguars (*Panthera onca*), peccaries (*Pecari tajacu*) and ocelots (*Leopardus pardalis*).

TIDE's ongoing education program and daily patrols have resulted in the effective elimination of illegal fishing and hunting in the protected areas that they co-manage. TIDE has almost eradicated the killing of West Indian manatees (*Trichechus manatus*) in the Gulf of Honduras, as seen by the disappearance of manatee meat from public markets. Rangers have also observed a decrease in the hunting of endangered and game species including the yellow-headed parrot (*Amazona oratrix*), the white-lipped peccary (*Tayassu pecari*), and the great curassow (*Crax rubra*) within the protected areas, which may be attributed to TIDE's dedication to informing communities about hunting laws and regulations within and outside the protected areas.

Viable populations of marine species within the Port Honduras Marine Reserve have also been maintained through the effective zoning of the Reserve into 'general use', 'conservation' (no take) and 'preservation' (no entry) zones. The introduction of managed access fisheries has also helped to address overfishing. For example, in order to increase population numbers of spiny lobsters (*Panulirus argus*), an important commercial species in Belize, TIDE enforces a closed season between February 15th and June 14th every year.

TIDE has also achieved significant success in terms of forest restoration and wildfire control. Understanding the role of fire in local ecosystems—fire is required for pine regeneration, for example—TIDE rangers, field staff and volunteers use prescribed burns and a method called "black-lining" in strategic places within the Payne's Creek National Park to control the location and size of forest fires. These controlled burns are used to reduce the fuel load, prevent the spread of wild fires and stimulate seed germination. TIDE also has a riparian reforestation project with the goals of preventing further clearing of the legally established 66 foot setback along rivers and restoring riparian areas that had previously been cleared, endeavors which have helped to improve water quality and maintain freshwater biodiversity. In order to achieve these goals, TIDE collaborated with community groups in targeted villages to establish nurseries for riparian and fruit trees, the saplings of which are then given to farmers to reforest their own land along the Rio Grande river bank. The species targeted for reforestation are cotton (*Gossypium hirsutum*), fig (*Ficus carica*), mahogany (*Swietenia macrophylla*), cedar (*Cupressus lusitanica*), mammee apple (*Mammea americana*), and inga (*Inga feuillei*). To date, approximately 50 per cent of the riparian areas of San Pedro Columbia and San Miguel have been reforested with over 5,000 seedlings.

[Building a biodiversity data bank](#)

TIDE also involves local university students (from University of Belize-Toledo) in the collection and identification of medicinal plants for the organization's botanical garden. A number of students have assisted TIDE staff in biodiversity data collection and have established a baseline for species monitoring in order to gauge management effectiveness.

Each month, TIDE rangers collect data on bird sightings, visiting each transect at dawn to maximize the number of sightings. Findings indicate that the diversity of birds and mammals is not

consistent throughout the protected areas. More mature forests with abundant supplies of fruiting trees support higher numbers of birds and mammals. Over 97 species of bird were observed, including the migratory blue-grey gnatcatcher (*Polioptila caerulea*), the American redstart (*Setophaga ruticilla*) and the worm-eating warbler (*Helminthos vermivorus*), as well as rarer species such as the violet sabre-wing (*Campylopterus hemileucurus*).

In addition, an annual 'Christmas Bird Count' is conducted - the most recent year's count was a total of 234 species, including the Ornate Hawk-eagle (*Spizaetus ornatus*), the Painted Bunting (*Passerina ciris*), and the black-and-white owl (*Strix nigrolineata*). Mammal species are also carefully monitored. In 2009, a total of 16 species of mammal were recorded including some at risk of extinction: the Baird's tapir (*Tapirus bairdii*), jaguar (*Panthera onca*), Yucatán black howler monkey (*Alouatta pigra*) and white-lipped peccary (*Tayassu pecari*). There seems to be a relatively healthy population of jaguars (42 recorded sightings), likely due to high numbers of small mammals such as armadillo (*Dasypus novemcinctus*), lowland paca (*Cuniculus paca*) and red-brocket deer (*Mazama americana*). In the pine savannah, the most abundant mammal is the white-tailed deer (51 recorded sightings) and the most abundant bird is the yellow-headed parrot (67 recorded sightings). With these data sets, TIDE will be able to develop more accurate and efficient conservation plans.

Coral monitoring is another important aspect of TIDE's research and monitoring program. The average percentage cover of live coral across sites in the Port Honduras Marine Reserve has increased between 2003 and 2009, indicating an increase in the health of the coral reefs. The average cover of coral increased from less than seven per cent in 2003 to over 16 per cent in 2009, indicating that the marine reserve regulations and zoning have had a positive effect on the benthic cover within the marine reserve. The increase in coral cover has had a positive effect on the other organisms within the marine reserve that rely on the structural complexity of the coral for their habitats.

Improvements to the health of marine ecosystems can be attributed in part to TIDE's role in cracking down on destructive practices such as the use of gillnets which catch indiscriminately and have been responsible for killing large sections of coral reefs and grass beds. Aside from confiscating gillnets when they come across them, TIDE rangers also encourage behavioral change among local fishers by allowing fishers to trade gillnets for more environmentally sensitive equipment. TIDE rangers also play a key role in rescuing endangered animals, for example, bringing injured American crocodiles (*Crocodylus acutus*) to the American Crocodile Education Sanctuary whenever they find them.

SOCIOECONOMIC IMPACTS

TIDE believes that natural resource management cannot be achieved without offering local people sustainable, alternative livelihood opportunities. TIDE's efforts to this end focus on the promotion of ecotourism through its subsidiary company TIDE Tours. Through training and certification programs, TIDE has created opportunities for people who once earned about USD 4,000 per year as fishers to

earn up to USD 15,000 per year as tour guides. In this way, resource-extractive and environmentally-destructive livelihoods are replaced with more profitable alternative economic opportunities, thereby helping to reduce poverty in the protected area buffer zone.

Distributing benefits throughout the community

To date, TIDE has trained more than 50 former fishers and hunters to serve as tourism brokers in fly-fishing, kayaking, scuba diving, snorkeling, and other activities. In order to help these former fishers and loggers become entrepreneurs, TIDE conducts microenterprise training and other workshops to assist community members in acquiring the necessary skills to join the tourism industry. TIDE Tours subcontracts small businesses in the region to provide tour packages, carefully ensuring that it works with as many individuals as possible on a rotating and equitable basis. The organization also assists local tour guides by providing them with access to kayaks, snorkeling gear, and other sports equipment. Another benefit of this program is that former fishers now contact TIDE to report illegal activity, as these tour guides have begun to see gill nets and other harmful fishing methods as threats to their businesses. TIDE Tours also undertakes marketing efforts to promote the Toledo District, actively working to expand tourism in the area while ensuring that benefits accrue to local communities.

In addition to its ecotourism activities, TIDE offers training to other groups of people who depend on the health of ecosystems to sustain their livelihoods. Training is provided in diving, computer and GPS skills, and boat engine maintenance. TIDE's 'community stewards' are examples of those who have benefitted from these trainings. TIDE has also undertaken development projects in its target communities. For example, the organization built a bathroom facility for the Punta Negra Primary School, renovated the Monkey River Tour Guide building and given science supplies to schools in Big Falls and San Miguel.

TIDE also contributes in more direct ways to poverty reduction. With 38 employees, TIDE is the leading employer in Toledo after the government. Occasionally, TIDE uses conservation projects as a way to distribute income directly to community members. For example, more than 80 local people are involved in the riparian reforestation project and earn a stipend of BZD 25 (Belize dollars) per day as compensation.

The TIDE scholarship fund helps children from communities where TIDE works and that buffer the protected areas: Punta Gorda Town, Forest Home, Elridge Ville, Cattle Landing, Monkey River, Punta Negra and Big Falls Village. Throughout the year, the scholarship students volunteer with TIDE and contribute to TIDE Weekend including the Fish Fest and Youth Conservation Competition. The students have assisted with the TIDE Freshwater Cup and have led clean-up campaigns in their own villages, assisted as group leaders in the TIDE Summer Camp, and collected data for the Adaptive Management Program carried out in 2009. Financial assistance allows these scholarship students to attend second- or third-level schools, raising their prospects for a higher standard of living than that of their parents.

Positive effects of TIDE's conversation activities have been felt directly by local communities. As a result of TIDE's monitoring of marine reserve areas, local fishers are benefitting from a rise in the populations of marine resources and are now able to sustainably harvest larger quantities of conch, lobster and several species of fish, which are also major food staples in the area. Additionally, TIDE is supporting the Monkey River Tour Guide Association in a new lobster shade project that will help improve lobster production for 23 fishers involved in the program.

As for gender equality, there has traditionally been a disparity between male and female participation in conservation efforts in the Maya Mountain Marine Corridor. In order to close this gap, TIDE has made a conscious effort to hire women as park rangers, performing the same duties as men. Additionally, the organization facilitates women's entrepreneurial activities by promoting small tourism businesses owned and operated by local women and was the first organization in the region to provide scuba certification to its female employees.

POLICY IMPACTS

It was a result of persistent lobbying on behalf of TIDE that legislation was passed to establish the Port Honduras Marine Reserve and grant co-management authority to TIDE in 2000. Shortly thereafter, the Belize Forestry Department recognized TIDE's continued conservation success and created a co-management agreement for Payne's Creek National Park in 2004. Since then, TIDE has assisted the Belizean government in planning and managing protected areas and has demonstrated leadership in its involvement in the national fire policy, participating actively in all meetings, attending advanced training, and providing training for local communities. In 2009, TIDE received the 'Co-Manager of the Year' award from the Forest Department for outstanding performance in the co-management of Belize's protected areas, specifically Payne's Creek National Park.

Another of TIDE's major policy successes was its role in negotiating the first debt-for-nature swap agreement between the Government of Belize and the Government of the United States in 2001. According to



this plan, the United States government and the Nature Conservancy collectively provided approximately USD 5.5 million toward forest conservation in Belize. In return, the Belizean government issued BZD 7.2 million in obligations to TIDE and other conservation groups for the protection of 23,000 acres of forest. This exchange facilitated the writing off of approximately USD 1.4 million of debt that Belize had held with the US government. TIDE's obligation under the agreement was to purchase 8,000 acres of vulnerable forestlands and to manage the approximately 11,000 acre Golden Stream Corridor Preserve which had been under government control. This agreement enabled TIDE to begin acquiring private lands and building nature trails and other tourism infrastructure. TIDE then held a series of meetings with small communities that had been practicing cultivation in some of these private holdings. The meetings were used to address the land issues and management issues, with the ultimate goal of phasing out the use of the land and developing alternative activities for the farmers.

TIDE is currently serving a two-year term as chair of the Belize National Spawning Aggregation Working Group. This working group is a coalition of seven non-governmental organizations (NGOs) which was established in July 2001 in response to a nationwide survey of spawning aggregations of the Nassau grouper that revealed very low numbers of spawning fish. In 2002, the Working Group successfully advocated for the protection of eleven of the Nassau grouper spawning sites and for the introduction of a four-month closed season.

Past policy impacts include TIDE's cofounding in 1996 of the Tri-National Alliance for Conservation of the Gulf of Honduras (TRIGOH), a joint project of Guatemalan, Honduran and Belizean NGOs, as well as the organization's partnership in the Caribbean Regional Environment Program (CREP) - a 13 country, USD 9 million European Union project which was designed to strengthen regional cooperation and build greater awareness of environmental issues in the Caribbean Forum of African, Caribbean and Pacific States (CARIFORUM).



Sustainability and Replication



SUSTAINABILITY

TIDE measures its sustainability not only in financial terms but also in terms of community participation. The organization believes that as long as the buffer communities are committed to protecting their natural resources the project will be sustainable. This is one reason why TIDE devotes a large amount of its programming to education and outreach and attempts to get schoolchildren involved and interested in environmental causes from an early age. Through the Community Stewards program and its other education and outreach programs, TIDE has succeeded in obtaining a high degree of community participation by raising awareness among local people of environmental issues.

In addition to receiving support from a large number of international donors, TIDE also ensures its financial sustainability through ecotourism activities. TIDE Tours was founded as an earned-income venture to generate financial support for TIDE's education and outreach programs and to provide job opportunities to local communities, as TIDE believes that providing alternative livelihood opportunities is a critical component of sustainability.

REPLICATION

Helping local people to understand the multiform value of biodiversity conservation is one way in which TIDE hopes to spread its message to other nearby communities. In fact, TIDE owes much of its success to its ability to disseminate environmental information and research to wide and varied audiences.

TIDE's fly-fishing training and certification program was so successful that conservation NGOs in Costa Rica, Guatemala and Honduras requested the organization's help in setting up similar programs.

TIDE has also initiated its own learning exchanges, hosting and sponsoring TIDE staff and community members' participation in multi-country workshops on sustainable fishing and community-based reserve management. Examples of international exchanges include peer-to-peer exchanges with Guatemalan fishers and other protected areas. In 2009, TIDE's community stewards and several staff members took part in a particularly successful exchange with the Foundation for Ecological Development and Conservation (*Fundación para el Ecodesarrollo y la Conservación - FUNDAECO*), a community-based organization in Eastern Guatemala which works to conserve the Gulf of Honduras including the Cerro San Gil Protected Area.



PARTNERS

Since its inception in 1997, TIDE has collaborated with many local, national and international organizations in order to work more effectively toward its conservation and socioeconomic goals. In particular, TIDE maintains fruitful working relationships with Belizean government entities such as the Forest and Fisheries departments, the local police department, the Belize Defense Force and the Belize Coast Guard.

At the beginning of its conservation activities, TIDE worked closely with The Nature Conservancy to negotiate the first 'Debt-for-Nature' swap in Belize. Since then, The Nature Conservancy has provided assistance to TIDE in the form of scientific expertise, finances, management skills, and promotion and awareness. Rainforest Alliance has also helped to raise funds for TIDE's private lands through its 'Adopt a Rainforest' campaign.

With financial assistance from the Massachusetts Audubon Society, TIDE was able to quickly schedule upgrades and repairs to the solar energy system at the Abalone Caye Ranger Station. This ranger station, with its visitor center and surveillance tower, is home to

TIDE rangers while they are on duty in the Port Honduras Marine Reserve as well as to scientists, interns and volunteers conducting monitoring and research.

TIDE's community-based partners include the Southern Alliance for Grassroots Empowerment, the Punta Negra Sea Gals Cooperative, the Monkey River Tour Guide Association, and the Southern Environmental Association. Additionally, TIDE shares its conservation goals and vision with the Belize Zoo, Programme for Belize, Ya'axche Conservation Trust and the Belize Audubon Society.

TIDE also has a close relationship with other organizations operating in the region, including Protected Areas Conservation Trust, the MesoAmerican Reef Fund, Oak Foundation, The Summit Foundation, USAID's Regional Environmental Program for Central America (PROARCA), Fundación AVINA, Wildlife Conservation Society, Conservation International, and many more.

TIDE also received grants from the UNDP-GEF Small Grants Program (2004-2010) in order to launch and expand its community stewards program.



“We can still boast that many of the natural resources of Southern Belize are still intact. However, if we do not stop and think about how human actions negatively impact our environment, all this natural wealth of ours could be lost forever”

Celia Mahung, TIDE



PROJECT SUMMARY

Cruzinha da Garça is one of the most important nesting grounds for sea turtles in Cape Verde. The Community Marine Association of Cruzinha da Garça seeks to develop alternative forms of local marine resource use to conserve this endangered species. The project is part of a regional initiative that involves fishing communities in the conservation of marine turtles and their habitat. Conservation and sustainable livelihoods work extends to the islands of São Nicolau, Santo Antao and Sao Vicente.

The association protects spawning loggerhead sea turtles in their natural habitats through beach monitoring, protecting the nesting grounds of the loggerhead sea turtles, and guarding against sand extraction and resulting habitat loss. The local population is engaged in data collection on both species and population growth and is involved in the development of ecotourism ventures.



Background and Context



The community of Cruzinha da Garça

The northwest coast of the island of Santo Antão—the most northwest island in the Cape Verde archipelago—has one of the highest rates of marine biodiversity in Cape Verde. The coastal marine habitat is rich in fishery resources; it is home to a significant population of cetaceans and is the area of breeding, feeding and growth of five species of sea turtles: loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and Olive Ridley (*Lepidochelys olivacea*). Of the latter, the zone is of particular national importance as a nesting site for the loggerhead sea turtle.

One community on the coast of Santo Antão, Cruzinha da Garça, is particularly rich in marine resources. It provides fish to the roughly 150,000 residents of Santo Antão and São Vicente islands, what amounts to a third of Cape Verde's national population. Cruzinha da Garça itself has a population of only 274 persons, or 67 families. This impoverished community faces dilapidated housing, poor sanitation and a lack of economic resources and sources of employment. In the absence of local alternatives to secure livelihoods, many community members exert unsustainable pressure on marine biodiversity. The use of explosives for fishing, the hunting of female turtles, and the plundering of turtle eggs directly threaten the survival of important species. The waters surrounding the island house endangered populations of whales and dolphins. The island is also just 60 miles from one of the richest fishing grounds for tuna and deep-sea lobsters in Cape Verde.

The Associação Comunitária Nova Experiência Marítima da Cruzinha da Garça (ACNEMC) was established in 2002 by members of the village of Cruzinha da Garça to combat the unsustainable exploitation of marine life, particularly the sea turtle. The association now consists of 111 members. ACNEMC's mission is to facilitate communication and dialogue between marine resource users, the public, government institutions, and non-governmental organizations active in different

areas of community development. ACNEMC actively strives to conserve and enhance marine biodiversity, while also creating sustainable jobs and sources of income for the local population and raising the quality of life of the region's poorest inhabitants.

Sea turtle conservation

One of the association's primary activities has been a project entitled, "Beauty of the Sea: Conservation of Sea Turtles," which focuses on mobilizing direct community participation in the preservation of marine biodiversity. In response to unrelenting pressure on the fragile marine life on the coast of Santo Antão, the association launched this project in 2006 with the support of the National Institute for Fisheries Development (INDP) and the Municipal Chamber of Ribeira Grande (CMRG). The project emphasizes low-impact ecotourism activities as an economic alternative to fishing techniques which wound or kill sea turtles (such as dynamite fishing) and to the poaching and sale of turtle eggs. This project has found parity with a sister program run by INDP called "Involvement of Fishing Communities in the Conservation of Sea Turtles and their Habitat" which operates in the Barlavento area—São Nicolau, Santo Antão and São Vicente.



Key Activities and Innovations



Raising environmental awareness

ACNEMC undertakes a range of activities which aim to protect the populations of sea turtles which inhabit Cruzinha da Garça coastal waters and beaches. A great deal of emphasis has been placed on awareness-raising amongst the local population as to the threats that face sea turtles as well as economic alternatives to the kinds of activities which have historically placed these populations at risk; namely, dynamite fishing, mature turtle poaching, egg collection, damage to nesting sites, and water pollution.

In particular, ACNEMC has implemented a comprehensive awareness raising campaign targeted specifically at the fisheries sector and those directly involved in marine resource extraction (including local fishermen). The results have been overwhelmingly positive, with the vast majority of community members demonstrating an understanding of the importance of turtle conservation, and the adoption by Cruzinha da Garça of the sea turtle as a flagship symbol.

Between 2006 and 2008, ACNEMC undertook a number of project activities to escalate the protection offered to resident sea turtles. In 2006, the association marked off and enclosed 10 nesting sites. Access to the coastal zone where the sites were located was controlled in order to prevent the poaching of nests and the removal of eggs. The following year, the association received authorization to monitor local beaches for illegal sand extraction activities, which in turn damage sea turtle nests. Importantly, the association was vested with the authority to levy fines of up to USD 350 to transgressors. In 2008, the association undertook a participatory planning process which produced a community-based conservation growth plan. Elements of the plan include creation of a sea turtle nursery, a treatment center for injured sea turtles, and an environmental education centre.

The association also provides specialized training and capacity building support to community members in order to empower their

conservation and livelihoods diversification interventions. Seminars, technical support and field studies are combined to provide new knowledge and on-the-ground know-how. Each class (or seminar) is offered to 30 people over a two week period. Each day of training is split into morning and afternoon sessions: the morning is dedicated to conservation theory, the afternoon to practical implementation of conservation activities. Seminars aim not only to strengthen the technical capacity of community members, but to create linkages with local authorities to encourage the participatory management of coastal resources. Seminar themes include the conservation of marine ecosystems, the biology and lifecycle of sea turtles, identification and marking of sea turtle nests, the safe transfer and protection of sea turtle eggs, and caring for injured sea turtles. Exchange visits and peer-to-peer exchanges are also integral parts of ACNEMC work. Local experts from Cruzinha da Garça have visited, hosted and shared information with other community-led conservation initiatives on the islands of Sal and São Vicente. Additionally, conservation education is mainstreamed into local schools through an education outreach team who involve community youth in association activities.

Going beyond conservation

ACNEMC has also branched into ecotourism activities, targeting a very specific population of tourists interested in environmental education and scientific research. The association receives students (and researchers) interested in turtle observation (between June and October) and whale watching (between March and April, and September and October). Community members sell travel products (crafts, t-shirts, etc) and provide tourism services to visiting researchers. Plans are underway to expand into boat, sport fishing, and scuba diving tours. The association also owns and operates a sustainable fishing vessel called "We Dream." The boat provides direct employment for 12 fishermen in the communities of Cruzinha, Tarrafal and Monte Trigo and is committed to environmentally responsible fishing practices which do not damage marine species or ecosystems.

Above and beyond its core activities, ACNEMC has implemented various projects in conjunction with the Municipal Chamber, the National Program for Fighting Poverty and INDP in the areas of social housing, repair and maintenance of local roads, school transportation services, animal husbandry, fish production, and the marketing of locally harvested products.

ACNEMC represents a unique model of participatory marine resource management that involves communities in the design, planning and implementation of conservation actions. The initiative is the only community-based conservation project in Cape Verde that focuses on the conservation of sea turtles. It is also arguably the most embraced conservation project, which speaks to the power and benefits of community ownership and involvement.



“We would like to see greater political will to protect the environment. Laws and legislation that are based on the knowledge and needs of local fishing communities are essential. Local people must be empowered to protect their natural heritage.”

Renato Delgado, ACNEMC

Impacts



BIODIVERSITY IMPACTS

The most critical and impressive biodiversity impact resulting from association interventions has been the full and complete cessation of sea turtle poaching at nesting sites. As a result, female turtles have been protected, and the survival of a threatened species in the region supported. Four neighboring communities – those of Mocho, Ribeira Alta, Garça and Chã da Igreja – were enlisted to achieve this result. Association outreach teams disseminated conservation information and materials to each community, and subsequently recruited students from local schools to participate in nesting site protection.

One of the main determinants of success in this regard is the support ACNEMC has received from local authorities in banning the extraction of sand on beaches in the region. This has served to protect the integrity of sea turtle habitats. Since 2006, the association has held authority and discretion over the issuance of fines of up to USD 350 for the illegal collection of sand. Owing to ACNEMC interventions, the sand banks and beaches are in the process of recovery, which will have only positive impacts on the number of turtle nests that survive. The association also created a turtle nursery in 2008 in order to combat local levels of sea turtle population growth. The nursery has since overseen the release of 200 sea turtle hatchlings into the sea.

As previously mentioned, environmental education, awareness-raising and research constitute key activities of the association which have in no uncertain terms changed local attitudes towards conservation work and sensitized the local population to the challenges facing sea turtles. The association has worked with local and visiting researchers to improve knowledge of local ecology and to produce scientific data on turtle populations. Local knowledge has been combined with scientific monitoring and evaluation techniques to gain valuable insights into sea turtle nesting sites and spawning areas, particularly between the boundaries of Ponta do Sol, Municipality of Ribeira Grande and Tarrafal de Monte Trigo,

Municipality of Porto Novo. Further insights have been made into the feeding patterns of juvenile hawksbill turtles, the growth patterns of juvenile green turtles, and the migratory corridors of leatherback and Olive Ridley turtles.

SOCIOECONOMIC IMPACTS

Cruzinha da Garça is an isolated fishing community with precious few natural resources. Cape Verde falls within the affected region of Harmattan, a seasonal dry and dusty wind that makes its way across northwestern Africa every year from November to March. As a consequence, Cruzinha da Garça is strongly affected by the advance of desertification and droughts. The winds also hamper fishing during this period, resulting in stoppages to the primary livelihood activity of the local population. Along with these challenging environmental conditions, severe economic marginalization has resulted in the consistent emigration of young people from the island in search of better opportunities. ACNEMC, however, has been instrumental in promoting sea turtle conservation as a potential source of sustainable livelihoods, as well as a course of community identity and pride around which a new conservation economy can be built.

One of the economic impacts of the initiative has been the connection made between the association and visiting researchers. While only representing the beginning of a much larger and more ambitious suite of planned low-impact ecotourism ventures, the provision of travel services and products (food, accommodations, etc.) to scientists visiting the region has offered local fishermen an alternative source of income. Additionally, local youth and women have found short-term employment providing support on research projects. Between 2006 and 2009, these services resulted in over USD 25,000 in incomes paid out to local community members. The association itself also employs community members in the nighttime work of marking and identifying turtles and turtle nests. While this work is often conducted on a voluntary basis, between

2006 and 2009 over USD 2,600 was paid out to community members in the form of stipends.

Awareness-raising on conservation issues, and the subsequent identification of conservation challenges that will require collaborative solutions between neighboring communities, has fostered a sense of common purpose and served to strengthen relationships in the region. This solidarity has been further cemented through peer-to-peer knowledge exchanges and trainings in the communities of Porto Novo, Paul and Monte Trigo. The use of participatory approaches in monitoring and evaluation, education, the promotion of adaptive management tools and awareness-raising have enabled and facilitated the involvement of all community members. The association retains a commitment to increasing the involvement of local women in the initiative, and in particular the number of women in decision-making roles (currently only 10 percent). Youth are regularly employed as volunteers to monitor trails leading to the beaches.

Jobs have also been created for the local population through a national project of the INDP which aims to enhance the capacity of fishing communities to protect sea turtles through participatory action and research, communication, and (in cooperation with local authorities) the monitoring of local beaches. More local jobs will be created in the near future when the association opens its environmental education centre, which will provide habitat restoration services, observation of cetaceans and turtles, and educational tourism services.

POLICY IMPACTS

According to Cape Verde law, the implementation of conservation policy is the responsibility of the General Environmental Administration (DGA), with the responsibility for environmental awareness raising delegated to the municipal level. Cape Verde law, however, contains no provisions, legislation or guidance on community-based action in this field. There exists then a need

to create (legal) space and provide funding mechanisms for the implementation of community-based conservation policy and local, grassroots management of coastal or marine resources, particularly for fishing communities.

ACNMEC is a pioneering local actor in this regard, offering a model of how community-based natural resource management can be carried out and empowered in cooperation with city councils, municipalities, commissions within the Ministry of Environment, and the maritime authority. By focusing on monitoring and evaluation and quantifying the positive impacts of local management techniques, ACNMEC is building a demonstrative case to argue that communities – with adequate support from local authorities and key stakeholders – are best positioned to protect local biodiversity and to transform conservation action into sustainable livelihood solutions. Results-based management has also increased donor interest (both international donors as well as domestic environmental finance channels such as the General Environmental Board and the General Fisheries Board) in funding community-based initiatives in Cape Verde. ACNMEC has been responsible for ushering in a new development paradigm that includes as a necessary component of policy practice the direct participation and involvement of local communities in natural resource management. The association anticipates that this normative shift will change the landscape of environment and development policy in the region, offering a new model of co-management and coordination between relevant stakeholders.

Perhaps the most important policy impact from ACNMEC work – though the outcome must be credited to a wide range of advocacy efforts, of which ACNMEC was an essential contributor – was the passing of Regulatory Decree No. 7/2002 of Dec. 30 which provides for the full protection of sea turtles. The association is currently lobbying for a national program for the protection of sea turtles which would build on the lessons learned from their activities and scale-up conservation safeguards.



Sustainability and Replication



SUSTAINABILITY

The foundation of the association's medium-term financial sustainability is a planned ecotourism program that leverages national and international interest (research and recreational) in the region's biodiversity and endemic flagship species. The program will be anchored to research activities being coordinated by the National Institute for Fisheries Development and the University of Kiel (Germany). The association hopes these activities will generate income within the community from payment for services rendered by the local population for visiting researchers. The program will also be expanded to include low-impact tour, scuba and sports fishing services for the more mainstream ecotourism demographic. In the longer-term, the association plans to establish a regional observatory for sea turtles which will be managed by the community but provide the entire region with information and data on conservation priorities.

REPLICATION

The association is working with fishing communities on the islands of Santo Antão, São Vicente, and São Nicolau in the northwest of Barlavento, which also have important populations of sea turtles. Knowledge exchanges and site visits are being carried out to transfer lessons learned and communicate the experiences, challenges, and successes of ACNMEC. Awareness-raising and environmental education outreach conducted by the association reached these neighboring islands and communities, sensitized the local population to the threats facing sea turtles, and created demand for information and knowledge.

PARTNERS

ACNEMC has a diverse, cross-sector partnership. One important partner, which provided seed money to launch awareness-raising activities, volunteer mobilization and environmental education outreach was the GEF/UNDP-Small Grants Programme (SGP). Another central partner is the National Institute for the Development of Fisheries (INDP). The institute has provided ongoing support in the form of project design, financing, training and technical outreach.

One noteworthy partner has been the Guidance Office of Professional Introduction (GOIP), which has worked with the association to better integrate women into the program. Through this partnership, ACNEMC has provided local women with opportunities for training, professional qualification, and identification of income-generating activities. One of the local women's groups that has emerged from this partnership is in the process of creating a workshop for the production of sweaters that will be sold by a private Brazilian clothing retailer. An additional outcome has been seminars, workshops and outreach campaigns on the issue of domestic violence.

Other partners include: the Municipal Chamber of Ribeira Grande, Santo Antão Island, who provide technical and financial support through their environmental office; the Maritime Port Institute, who assist in beach surveillance activities; IUCN Guinée Bissau, who have supported with a regional environmental education program; Design d'Cor, Mindelo, São Vicente, Cape Verde, who support the development and production of awareness campaign materials; and ADTMA SOS Turtles, who support with training. Research activities are pursued through a scientific partnership between the National Institute of Fisheries Development, the University of Kiel in Germany, the University of East Cuba, and the University of Versailles in France.



MOHÉLI MARINE PARK

Comoros



PROJECT SUMMARY

Between 1998 and 2005, the Comoros island of Mohéli was the setting for an initiative that brought together international organizations and local communities in creating a co-managed marine protected area. The idea was to conserve 404 square kilometres of ocean, home to key marine species such as the coelacanth, humpback whales, dugong and dolphin, while benefiting local livelihoods through ecotourism.

The result, the Mohéli Marine Park, is an ongoing experiment in setting the right conditions for co-managed marine management. Benefit-sharing arrangements and enforcement of harvesting regulations are key issues that have affected the success of the initiative in recent years; early results in increasing live coral cover on the park's reefs and increases in tourism numbers, however, indicate that the park may yet be able to deliver on its promise.



Background and Context



Comoros is an archipelago island nation in the Indian Ocean, located off the eastern coast of Africa, between Madagascar and northeastern Mozambique. The country consists of the four islands in the volcanic Comoros archipelago: Grande Comore, Mohéli, Anjouan, and Mayotte, although the latter is politically administered by France as an overseas department. Comoros was declared independent from France in 1975 and is one of the world's poorest countries: in 2008, almost half the population of 798,000 lived on less than USD 1.25 per day. The islands have inadequate transportation links, few natural resources, and a young and rapidly increasing population, which has been exacerbated in recent decades with an influx of Comorians who were forced to leave Madagascar and Zanzibar.

Environmental degradation and persistent poverty

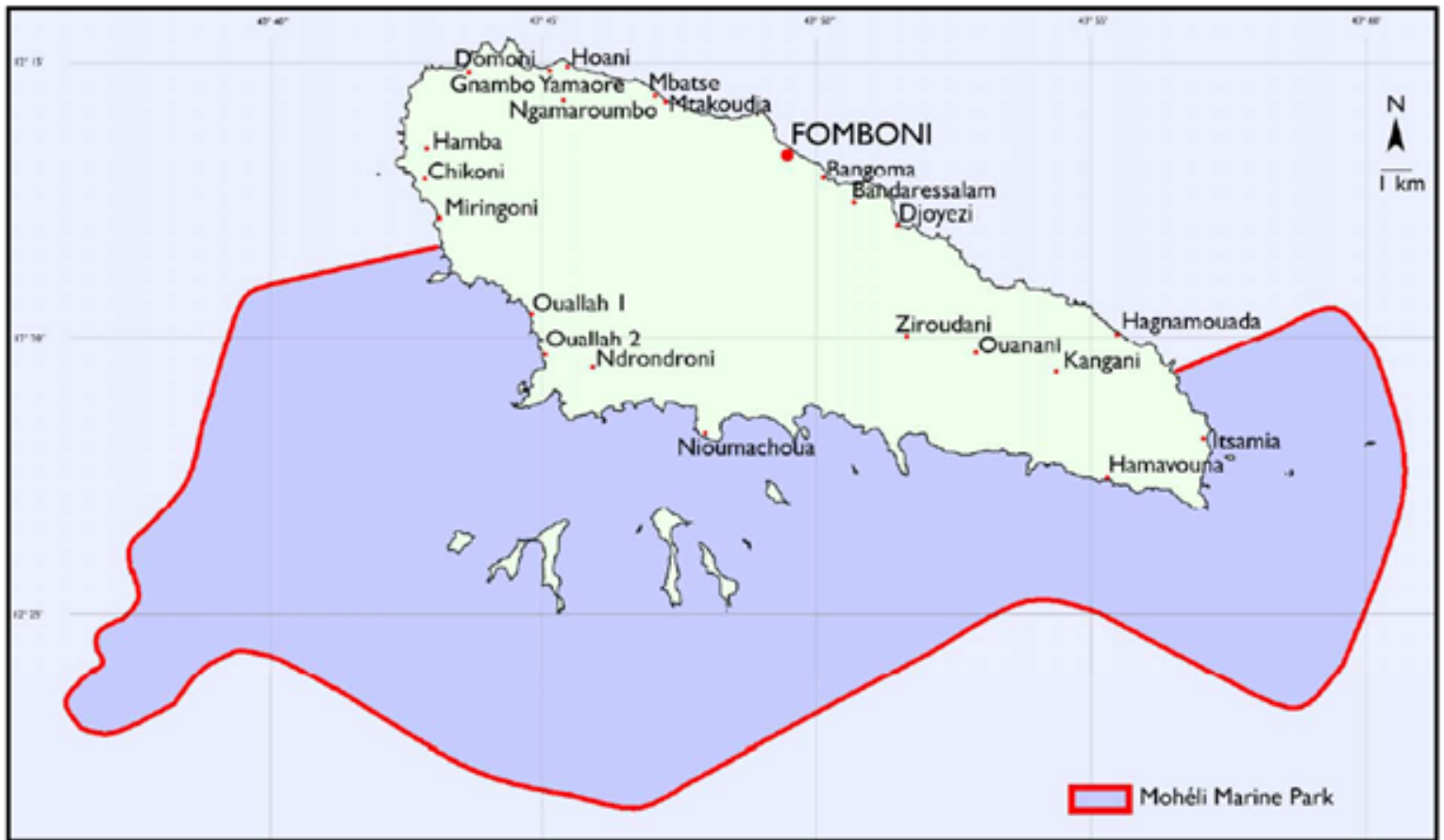
The labour force is characterised by low levels of educational attainment and high unemployment, while the country is heavily dependent on foreign grants and technical assistance. Agriculture, fishing, hunting, and forestry account for 40% of gross domestic product, employ 80% of the labour force, and provide most of the country's exports. An over-reliance on subsistence livelihoods has created a vicious cycle of poverty and resource over-exploitation. Coastal communities on the island of Mohéli, for example, which account for approximately 80% of the island's population of 30,000, use poison and dynamite to maximise short-term fish catches, reducing fish stock in the long run and further contributing to income poverty.

Environmental degradation threatens Mohéli's abundant biological diversity; the island is a tropical paradise, home to more than 500 species of plants, 21 species of birds, and nine species of reptiles. Flagship species for conservation include the endemic Livingstone's Fruit Bat (*Pteropus livingstonii*), a giant bat with a wing span of more than one metre, that numbered only 1,200 individuals in 2003. The beaches are an important nesting ground for green sea turtles, while the waters surrounding it are home to the coelacanth, a rare prehistoric fish with limb-like fins that was thought to be extinct until 1938.



Other key species include humpback whales, dugong, the Spinner dolphin (*Stenella longirostris*) and Bottlenose dolphin (*Tursiops truncatus*), corals, sea cucumbers, and the large gastropod *Turbo marmoratus*. The island is also home to Lake Bundouni, a Ramsar site and the largest body of freshwater in the Comoros, which is a nesting site for hundreds of migratory bird species.

As well as the threats of species extinction, the island's ecosystems have also sustained damage from unsustainable land-use practices. Deforestation, increased agriculture on hillsides due to land shortages, and cattle grazing have resulted in severe soil erosion and runoff that have damaged the island's coral reefs. Overfishing has depleted stocks, while the search for building materials has destroyed mangrove forests and beaches that are essential breeding grounds for turtles. Coral reefs have also suffered bleaching as a result of the warming Indian Ocean.



An international intervention to support local action

In 1998, IUCN, the United Nations Environment Programme and the Comorian government, with funding from the Global Environment Facility and United Nations Development Programme, initiated a five-year project entitled 'Conservation of Biodiversity and Sustainable Development in the Federal Islamic Republic of the Comoros' (typically shortened to 'Project Biodiversity'). This project's most notable achievement was the declaration of the Mohéli Marine Park in 2001. This was the first protected area to be gazetted in the Comoros, and was an attempt to counter the social, economic, and environmental threats of population growth, resource over-exploitation, and poverty by adopting a collaborative and community-based approach to management of the marine resources upon which the islanders' livelihoods depend.

The establishment of the park represented the culmination of a multi-stakeholder process begun in 1993, when the government introduced a National Environmental Policy designed to halt the spiral of environmental degradation. The policy introduced the idea of involving a broad spectrum of parties to marine and coastal management, namely local resource users, non-governmental organisations, government departments, the private sector, and international donors. This was the first time the government had sought to work with local communities in resource management. Consultations were held with coastal villages, aiming to both identify socioeconomic needs and to raise awareness of the need

for conservation.

This process led, in 1995, to the ten communities that make up the southern coast of Mohéli advocating for the designation of their offshore waters as a marine protected area. These communities are home to approximately 10,000 inhabitants. Meetings took place with different stakeholders including fishermen, youth leaders and village elders to discuss collaborative management options for the marine park. The principle of "joint management" guided these consultations, in which communities were encouraged to negotiate and define the respective functions, rights and responsibilities of different stakeholders in the management of the park. Co-management agreements were signed between the Comorian government and each village community detailing the management and regulation of the coastal and marine areas under the direct responsibility of the respective villages.

Parc Marin de Mohéli

Together, these ten community-managed marine reserves are incorporated within the Mohéli Marine Park, which was officially gazetted on 19th April 2001. This Marine Protected Area covers 404km² of ocean extending from the southern coast of the island. The conservation area was chosen for its rich biological diversity, including the presence of key coastal coral and mangrove forest habitats, and endangered marine species such as humpback whales, dugong, and a globally-important nesting site for the endangered green sea turtle.

Key Activities and Innovations



The designation, establishment and management of the Mohéli Marine Park was an important instrument in the Comorian government's sustainable development strategy, providing a range of benefits for fisheries, local economies and the marine environment, such as a safe haven for fish stocks to recover, an alternative source of income for local people through ecotourism, the prevention of further coastal habitat damage, and the maintenance of globally-important biodiversity.

While the management of the park falls within the government's constitutional responsibility, the daily regulation of local coastal areas is devolved to the community level. Regulations concerning marine zoning, boundaries, management, and local access are largely based on consultations with villagers, fishermen, community groups, and resource users in each of the villages that lie within the protected zone. For instance, regulations allow only traditional fishing methods within the park's boundaries, prohibiting the use of fine mesh nets, dynamite fishing, and the destruction of corals. Village committees are mandated to deal with cases of non-compliance, with cases referred to the national judiciary if local solutions cannot be found. UNDP, UNEP and IUCN provided financial support and technical assistance to train community volunteers as "eco-guards", who are responsible for awareness-raising as well as monitoring.

As well as regulating fishing practices, the park management has also sought to develop sustainable livelihood alternatives to marine harvesting. The Comorian government provided co-financing for the development of income-generating activities proposed by village development associations. A community that raised 50% of the cost of a proposed livelihood activity, for example, received a matching investment from the government of 50%. A community that raised 30% of the total cost of its activity, meanwhile, received a matching grant of 30%, and the remaining 40% in an interest-free loan.

A Park Management Committee oversees management of the park. This consists of sixteen individuals, including ten elected

representatives of the member communities, and brings together the government and local communities in a joint management approach. Two government officials provide support and technical expertise in administration and finance to the committee, while overall responsibility for the park resides with the Comoros Minister for Environment.



Impacts



The creation of the Mohéli Marine Park had tangible benefits for the marine environment and its member communities in the early years of its existence. For instance, coral health was seen to improve thanks to bans on destructive fishing practices. Between 1998 and 2001, live coral cover on the park's reefs increased from 30% to 65%. Other regulations regarding local access include bans on harvesting sea cucumbers, starfish, and crustaceans, as well as a ban on turtle poaching. Turtle nesting sites were found at more locations on the island's southern beaches as a result.

While the conservation of more than 400 square kilometres of ocean has had visible benefits for the region's endangered marine species, sustainable management regulations have also produced social and economic gains for local communities. Government funding for sustainable livelihood projects facilitated the construction of ecotourism lodges by four community development associations. This led to the number of tourists visiting Mohéli to rise from 75 tourists per village in 1998 to 140 in 2001. This has had spill-over effects in terms of creating related livelihood opportunities for villagers. Community members have been employed as guides, in building and managing accommodation facilities, and selling handicrafts. By 2002, the initiative reported the direct creation of 30 new jobs for local people.

Sustainable harvesting regulations on fishing allowed local fishermen to increase catch sizes. Between 1998 and 2002, catch size nearly doubled from 160kg per month to over 300kg, benefitting 250 fishermen working in the park. With increased revenues from higher fish catches, villagers were able to buy motor boats for use in fishing, reserve surveillance, and tourism activities.

Limits to long-term viability

Despite the initial successes of the Mohéli Marine Park, it is currently operating at a vastly reduced capacity. Although some components of 'Project Biodiversity' were extended for two years in 2003 under the title 'The Project for Rehabilitation Activities for the Conservation



of Biodiversity', all GEF-funded activities concluded in 2005. Since then, while the Mohéli Marine Park still nominally exists, the management of the park at the community level has been significantly eroded. Tourism numbers have declined dramatically from their initial levels, and lack of funding for monitoring and enforcement of park regulations has led to increases in poaching of high-value species such as sea turtles.

A study conducted in 2007 interviewed a large number of respondents across the park's ten communities to assess its impact. All of the focus groups agreed that the existence of the park was still important, citing its role in ensuring the conservation of marine and coastal biodiversity,

habitats and endangered species, encouraging the development of ecotourism and other income-generating activities; ensuring the sustainable use of marine resources; and reinforcing environmental education, training and communication. This demonstrates that the project had been effective in communicating its purpose and objectives to its target audiences; the extent of local disenchantment with the project arguably reflects, in part, the failure to meet these high expectations. In particular, community respondents were often frustrated by the slow progress in seeing economic rewards from sustainable fishing that had been promised by park officials.

Although the survey respondents credited the park with eleven key achievements, such as reducing environmental degradation, raising environmental consciousness, and increased coral cover, they also identified eighteen negative aspects of the park. These included its lack of sustainability, the lack of effective monitoring or enforcement, lack of respect for park personnel or official agreements, and poor management of equipment. Specific criticisms were directed at the lack of communication between the park's management and external actors: commercial harvesting of sea cucumbers had been carried out within the park by foreign companies, for instance, while local community members were banned from harvesting these commercially valuable species. There was also a widely-held belief that the park's regulations had unfairly discriminated against women, for instance in outlawing the use of *uruva* poison (*Theophrosia candida*) in fishing, an activity exclusively carried out by female fishers. Benefits of ecotourism were also not distributed equally across the ten communities; those that were marginalised were typically where the worst instances of poaching were seen. Lack of technical assistance and equipment was also highlighted: the promised introduction of Fish Aggregating Devices (FADs), which would have helped to increase fishing yields, was not carried out, for example.

The study identified six main contributing factors to the park's diminished effectiveness. These were: the inequitable distribution of benefits; the lack of sustainable livelihoods options; the failure to involve women in awareness-raising and leadership roles; the challenges to effective monitoring and enforcement; the number of environmental threats to biodiversity that remained; and the lack of sustainability that undermined the management of the project.

Lack of financial sustainability

This lack of sustainability was identified as the primary flaw in the Mohéli Marine Park project. Although there were originally plans to address this, it seems that they were not fully realized by the park's management team. 'Project Biodiversity' laid the groundwork for a Biodiversity Trust Fund for the Comoros that would have included the management of protected areas, but this failed to materialise. A much longer time-scale was required to set up the fund – several years, rather than the 4-5 years envisaged in the project document – as well as a much greater level of capitalisation: USD 15 million was required, rather than the USD 2 million proposed in the project document. The management plan estimated annual management costs at between USD 87,000 and USD 215,000. In the absence of the Trust Fund to cover these costs, and no alternative means of



financing the project, the park's financial situation was already unclear by 2003. This led to reductions in management effectiveness, activity and levels of enforcement; following the end of funding, communities were no longer willing to accept the potential of low-cost, community-motivated conservation initiatives, preferring to leave enforcement to the salaried eco-guards. The study concluded that community enthusiasm for conservation 'was, in some ways, reduced by the creation of *Parc Marin de Mohéli* as stakeholders became disillusioned by the lack of activity and realized benefits following Project Biodiversity.'

A quote from a male respondent from the community of Ouallah 1 sums up the challenges that now face the project and the difficulty of sustaining community enthusiasm for conservation initiatives in the absence of institutional support:

'Since Project Biodiversity finished, we now say that the word Parc Marin de Mohéli does not exist. There has never been follow-up to anything that was implemented during the project. With the project, we stopped all of the harmful activities that we were told to stop. However, we saw that we gained nothing, and now, bit-by-bit, we have started engaging in harmful activities again. Moreover, the management of the Parc Marin de Mohéli now remains only in the hands of a few individuals – this is the reason that there is more damage occurring now than before – people have lost respect for Parc Marin de Mohéli. To make matters worse, the eco-guards were abandoned as soon as the project finances stopped. They were expected to work hard and were paid very little. For example, they were expected to defend themselves against poachers carrying weapons, without having any weapons themselves or even training in self-defence.'

Looking to the future

Despite this, there remains a widespread desire to see the project ultimately succeed. Its importance for marine biodiversity and its potential for improving local livelihoods are well-recognised. In the words of another respondent from the community of Ndrondroni:

'We want youth to be involved with Parc Marin de Mohéli. We want them to become motivated and to forget about all the past negative aspects associated with Parc Marin de Mohéli. We want them to be able to gain the benefits. Our generation has failed, but we should look to improve the situation for the following generations.'



INTEGRATED FORESTRY ENTERPRISE OF BAYAMO

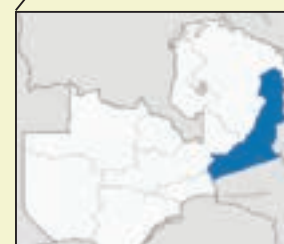
Cuba



PROJECT SUMMARY

Integrated Forestry Enterprise of Bayamo is a state-run forest enterprise operating Granma Province, Cuba. In 1999, Granma was one of two pilot sites for an ecological forest farms (Fincas Forestales Ecológicas) initiative, which put reforestation of Cauto River basin in the hands of smallholder farmers.

The working model saw plots of land assigned to interested households for concession periods of 30 years. These households were given responsibility for managing and reforesting plots of between 12 and 25 ha, and were encouraged to plant timber-yielding trees, fruit trees and medicinal plants. The initiative had expanded to three hydrological regions of the country by 2004; the result was the reforestation of over 3,000 ha of land along the banks of the Cauto River, and improvements in livelihoods and wellbeing for economically marginalized communities.



Background and Context

The eastern Cuban province of Granma is of immense national importance, both in terms of its cultural and historical significance and its ecological wealth. The province is named after the yacht 'Granma', used by Che Guevara and Fidel Castro to land in Cuba in 1956. The American who sold the revolutionaries the second-hand yacht in Mexico named it 'Granma' after his grandmother, and the name of the vessel subsequently became an icon of Cuban communism. The province extends over approximately 8,400 square kilometres and has a population of 835,000 people, of whom more than 670,000 live in rural areas. The province contains the second largest river in Cuba, the Rio Cauto, which extends 140 kilometres and crosses three of the five eastern provinces. This area forms the Cauto River Basin, the largest and most important water reserve in the country.

Land conversion and deforestation in Granma

The basin has been subjected to landscape-level changes which have led to substantial environmental degradation. Large areas of forest were cleared for charcoal production, agriculture and cattle-rearing. As a result, the province is the second largest producer of milk and rice in the country, but by 2000, only 19 per cent of its land remained forested. Much of the vegetation had disappeared, including a good deal of indigenous fauna; canyons and hillsides had become heavily eroded and the river valley soil had become too salinized to sustain agriculture production. During storms, the erosion of crevices and gullies from flash floods caused major landslides, devastating the landscape and human settlements. Lastly, siltation of the river resulting from large-scale cultivation and infrastructure projects threatened the hydrological potential of the region.

Government attempts to stimulate local development

Widespread environmental degradation was exacerbated by the area's low level of economic development. In 2000, the province of Granma ranked lower than any other on the country's Human Development Index. The province is characterised by high levels of rural to urban migration, as well as outmigration from these cities to Havana. Granma, therefore, became a development priority for the Cuban government, who focused on protecting the water table, combating drought, halting soil erosion, and curbing the rate of migration from the countryside to cities.

However, several government-led attempts to reforest the Cauto River Basin failed. These failures were attributed to a range of factors, including heavy drought, inadequate site preparation, uncontrolled grazing, illegal logging and inadequate financing. Another significant factor in the failures was insufficient input from local communities. To address this, the provincial administration designed a programme that took a more holistic approach to rehabilitating the Basin, encompassing environmental, social and economic elements.

Reforestation, farm by farm

Since 1998, the United Nations Development Programme (UNDP) has led the Local Human Development Programme (Programa de Desarrollo Humano a Nivel Local – PDHL) in Cuba. The programme promotes technological innovation for sustainable human development in rural communities and brings together more than 160 institutions from 11 countries worldwide to exchange knowledge and experiences on local-level development. These international partnerships include South-South cooperation with institutes from Colombia, Ecuador, Guatemala, Nicaragua, Uruguay and Venezuela, as well as the Federation of Canadian Municipalities, the National Association of Italian Communes, and the Andalusian Federation of Municipalities and Provinces.

The programme has also encouraged a high degree of cooperation among UN agencies in Cuba, including UNDP, the UN Office for Project Services (UNOPS) and the former UN Development Fund for Women (UNIFEM). Among other objectives, the programme has sought to create a model of decentralised development based on Cuba's rural villages and municipalities, while mainstreaming improved gender awareness in all of its projects.

PDHL began operating in the country in 1999 in two pilot provinces – Granma and Pinar del Río. In Granma, the programme focus was a local initiative to promote sustainable natural resource management and the environmental rehabilitation of land along the Cauto River. Emphasis was placed on diversifying vegetation and creating new employment opportunities for economically marginalized communities.

The programme focused on a reforestation project called *Fincas Forestales Ecológicas*, or 'ecological forest farms' that was based on a state-run forest enterprise model, *Empresa Forestal Integral de Bayamo*. The working model saw land divided into plots and assigned to interested households for a concession period of 30 years. Interested farming households were given responsibility for managing and reforesting plots of between 12 and 25 hectares in size. Families planted timber-yielding trees, fruit trees and medicinal plants, and raised livestock on their plots. No restrictions were placed on whether goods produced or crops harvested were used for personal consumption or for sale to outside markets.

The 'ecological forest farms' initiative gained widespread acclaim across Cuba and expanded to three hydrological regions of the country by 2004. The conservation and development model has been recognized internationally as a successful example of decentralization and an effective modality for community-based reforestation.

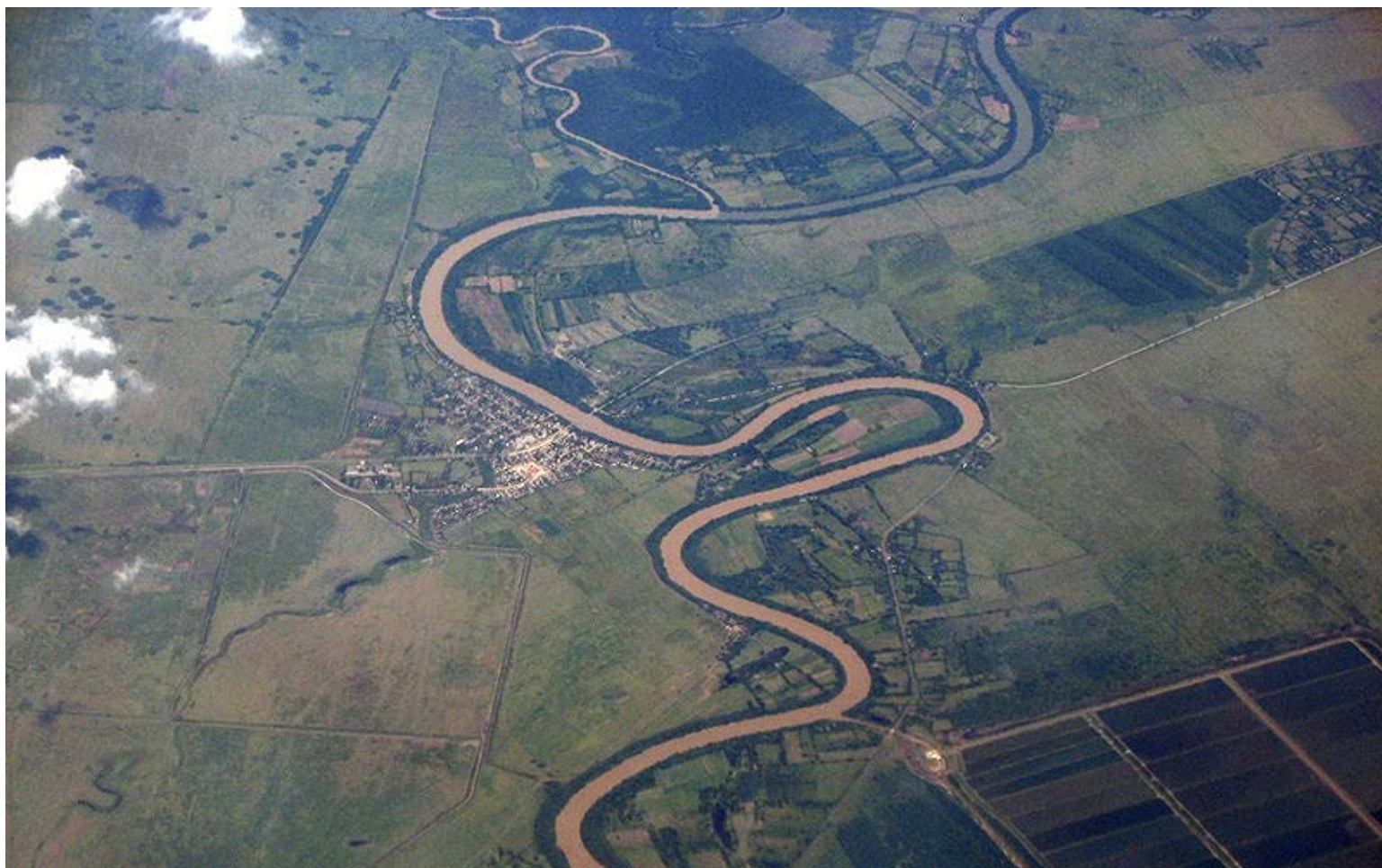
Key Activities and Innovations

Community members running 'ecological forest farms' are empowered to manage their parcels of land as individual owners. By 2002, the project had established 55 forest farms along the Cauto River, each of which averaged between 12 and 25 hectares in size. In total, around 1,300 hectares of land have been reforested. Plots were reforested with trees provided by the provincial forest authority. Training on farm management and environmental conservation was provided by government extension staff. To encourage families to remain on their plots, the project also oversaw the construction of comfortable family homes, each equipped with fuel-efficient stoves, photovoltaic panels and a television set. The project created 220 new jobs for farm families, benefiting men and women equally.

As one important dimension of the project, UNIFEM and the Cuban Women's Federation carried out training workshops focusing on gender relationships in the context of the forest farms. One outcome of the workshops was a proposal, which was presented to the Granma People's Power Provincial Assembly, recommending that half of newly-created forest farms be assigned to women. An agreement was subsequently drawn up that made this equal allocation of land between men and women into reality. So

successful was this approach that it was replicated in the 'ecological forest farm' projects in Guantanamo and Las Tunas. This innovation in gender mainstreaming helped secure a high level of community participation in the project and was effective in ensuring the involvement of women heads of household in farm management.

The ecological forest farms project also served as a delivery mechanism for alternative energy technology to marginalized communities. By 2002, the programme had overseen the installation of nine solar power energy stations and 79 windmills. The programme was also effective at promoting the uptake of organic farming and the use of organic fertilizers by smallholder farmers; more than 4,500 tonnes of fertilizer were being produced and used each year, substituting for chemical inputs which had detrimental effects on the local environment. In addition, the programme helped to improve irrigation systems, which, in turn, improved soil conditions which strengthened food security. New and improved irrigation systems were credited with the rehabilitation of over 1,000 hectares of farmland. Lastly, and certainly most important from a socioeconomic vantage point, the ecological forest farms project created a total of 1,206 new jobs in the country, 921 of which went to women.



Impacts

BIODIVERSITY IMPACTS

The chief biodiversity impact of the project was the reforestation of over 3,000 hectares of land along the banks of the Cauto River. This woodland belt now consists of 14 multipurpose forest species, and acts as a water regulator for the river. The interventions of this project helped reduce degradation of the river basin by, among other things, preventing soil erosion. Reforestation using indigenous timber and fruit tree species also helped restore biodiversity in the region and forested areas now provide habitat for endemic wildlife. What has distinguished the forest farms initiative most markedly from previous reforestation attempts has been the maintenance and upkeep of the plots. The survival rate of plantations has increased due to farming families remaining on their household plots, and therefore investing time and energy in the upkeep of their forest land.

Ecological forest farms have had a wide impact on reforestation across Cuba. Adopted as a nationwide programme following its success in Granma, 848 forest farms had been set up in the three hydrological regions of the country by early 2004, covering a total area of 91,067 hectares. In the province of Pinar del Río (which has the highest woodland ratio in Cuba at 39 per cent) forest companies set up 111 farms to manage 74,100 hectares of natural woodland, or 23 per cent of the total land area of the province.

The impact of ecological forest farms in the eastern region has been especially notable, with some 8,573 hectares planted on 11,472 hectares of forest farms. Farms in the eastern region tend to be smaller on average, but have been established in greater numbers and predominantly in the areas prioritised for reforestation. The eastern region has a rural population of more than 1.5 million, and over half of the country's river basins, yet water regulation remains a critical challenge. Both soil salinity and soil erosion are still high, making the eastern region a priority for reforestation efforts.

In the course of its first six years, the forest farms project was responsible for planting 13,643 hectares, a figure that represents almost 35 per cent of the country's annual total. In regions with limited agricultural production, due to poor soil and frequent droughts, a 95 per cent survival rate has been achieved across all planted areas. This contrasts with a historical average of 36 per cent for previous reforestation attempts in similar circumstances. The incidence of illegal logging and forest fires also diminished.

SOCIOECONOMIC IMPACTS

The forest farms project has generated social and economic benefits primarily through direct job creation. By 2002, the work of the



Integrated Forestry Enterprise of Bayamo had led to the creation of 220 jobs in Granma, and was providing income for 55 families. Associated benefits of the project include improved agricultural productivity of farms, and revenues generated by the sale of forest products and livestock-rearing. Growing vegetables and breeding animals for household consumption also benefitted food security.

Gender empowerment has been a critical integrated benefit of the programme's work in Granma. Through an agreement with the provincial government, fifty per cent of all forest farms were titled to women heads of household. Improving the wellbeing of farming families, including the provision of televisions, photovoltaic panels, and fuel-efficient stoves contributed to decreased rates of migration from the countryside to urban areas.

By 2004, these benefits had been felt on a wider scale. Across the provinces of the country's eastern region, 75 per cent of forest farm areas had been planted. The farms employed 1,025 workers, at a ratio of 8.3 hectares per worker.

The province of Las Tunas, for instance, was one of the most deforested in the country, with only 12 per cent forest cover and a rural population of around 40 per cent. By 2004, this province was at the forefront of the national reforestation effort, with 146 forest farms established. Direct forestry production per 26-hectare farm was 3,300 m³, worth a total of USD 75,092. Average salaries have increased by an average of 17 per cent, and agricultural production by 38 per cent. These figures demonstrate the viability of adopting forest farms as a means of providing employment and effectively rehabilitating hydrological basins.

Sustainability and Replication

SUSTAINABILITY

Support for reforestation has been enforced at a national and local level. There are national targets to increase the amount of land covered by forests, supported by 1998 legislation banning the felling of trees without 'direct authorisation from the Council of Ministers or its Executive Committee'. Municipal authorities have included forest farms in their management plans and allocated necessary financial resources. The forest farm system benefits from a national fund for reforestation activities, which also serves to verify that sustainable criteria are being used. Through forest farms, advances or decline in forestry and agroforestry activities can be monitored with greater precision. Reforestation activities at the provincial level are also a key component of Cuba's National Environmental Plan.

By involving the local community at every stage of reforestation planning and implementation, the long-term success of the project has been secured. While previous attempts at large-scale reforestation had often proved unsustainable, this approach has ensured that individual households have maintained their own forest plots, with a survival rate of 95 per cent between 1998 and 2004. One reason for this has been the granting of land plots in usufruct to farming households for a period of 30 years. As families have a greater interest in the long term productivity of their farm plots, they have been more likely to maintain their ecological integrity. The potential for income generation has also enhanced households' interest in maintaining their individual forest plots.

Undeniably, however, the success of the project has been largely contingent on two factors: international support, through the UNDP's Programa de Desarrollo Humano a Nivel Local; and continued central funding from the Cuban government. These two sources have ensured that the project has enjoyed a high degree of local support, thanks to gender mainstreaming work and long-term financial security.

REPLICATION

The fast pace of replication of the forest farms project beyond Granma to other hydrological basins in Cuba is testament to the results achieved by the Integrated Forestry Enterprise of Bayamo. The transferability of the project has made it a model for state-run reforestation programmes, with its popularity in Cuba mirrored by its recognition on the international stage. Interest in the project was first sparked by a film documentary on forest farms, shown on Cuban television's 'De Sol a Sol' programme in 1997.

Results from more than 10 reports on forest farms representing the various hydrological regions of Cuba were presented at the 1998 Cuban Forestry Conference, which was attended by international institutions concerned with sustainable forestry development. The

idea was subsequently the focus of attention at the First Conference on River Basin Soil Conservation and Management, held in 1999. The Cuban Forestry Research Institute presented on ecological forest farms at international workshops on the sustainable management of mountain areas held in Querétaro, México (1999), and Santo Domingo, Dominican Republic (2000).

Forest farms were profiled during the 2002 Regional Conference on Mountain Areas in Latin America and the Caribbean, held in Cuba. The idea gained further traction at the regional level at a workshop organised by the Food and Agriculture Organization of the UN (FAO) in Peru in 2003, where Latin American and Caribbean representatives agreed to encourage pilot ecological forest farms in river basin areas. The project won the inaugural UNDP Equator Prize in 2002, at the World Summit on Sustainable Development in Johannesburg.

PARTNERS

Forest farms are implemented by Cuba's Ecological Forest Enterprise System, operating in provinces through enterprises such as the Integrated Forestry Enterprise of Bayamo in Granma, or the Integrated Forestry Enterprise of Las Tunas in its neighbouring province. These enterprises receive technical assistance from the Forestry Research Institute and the State Forestry Service. These bodies have also provided assistance in implementing forest farms in other countries, and can draw on a large qualified group of experts to help define, develop and evaluate projects. Both operate within the Cuban Agriculture Ministry (MINAGRI), with support from Forest Study Centre of the University of Pinar del Río. The Land Department of the University of Granma has also provided technical support to the project.

The international partners to the project, coordinated through UNDP's Programa de Desarrollo Humano a Nivel Local, include a vast array of multilateral actors. UN partner agencies include UN Educational, Scientific and Cultural Organization (UNESCO), UNOPS, World Health Programme, International Labour Organisation, and UNIFEM. The latter worked alongside the Federation of Cuban Women in conducting workshops with groups of local women to develop a gender component for the project. These workshops resulted in a proposal to the People's Power Provincial Assembly of Granma, stipulating that fifty per cent of all forest farms established were to be leased to women heads of households.

Meanwhile, knowledge-sharing has taken place through the PDHL initiative, which brings together more than 16 institutions in eleven countries worldwide. These include decentralised federations of municipalities from Canada, Italy, Sweden, and the Basque region of Spain. In recent years, the project has also benefitted from the support of Oxfam Canada, which funded a capacity building project for technical personnel and forest farmers.





FIJI LOCALLY-MANAGED MARINE AREA NETWORK

Fiji



PROJECT SUMMARY

The community of Ucunivanua on the eastern coast of Fiji's largest island was the site of the first locally managed marine area (LMMA) in Fiji in 1997. Scientists from the University of the South Pacific supported environmentalists and local villagers in declaring a ban on harvesting within a stretch of inshore waters for three years, building on the tradition of taboo prohibitions for certain species. After seven years of local management, the clam populations had rebounded and village incomes had risen significantly with increased harvests.

The success of the Ucunivanua LMMA spread rapidly, and a support network – the Fiji Locally Managed Marine Area Network – grew from this. By 2009, the network had increased to include some 250 LMMAs, covering some 10,745 square kilometres of coastal fisheries, or more than 25% of Fiji's inshore area. The network has also inspired replication in countries across the Pacific.



Background and Context



Blue anthias and staghorn coral, Navakavu MPA. Photo: Toni Parras

Fiji is an archipelagic state of some 300 islands located in the South Pacific. As a small, tropical island country, Fiji's marine and coastal ecosystems provide significant physical, economic, social and cultural benefits to its people. The country's abundance of forest, marine and mineral resources has allowed it to become one of the most developed economies among Pacific island nations. However, Fiji's rural communities, which constitute approximately half of the country's 900,000-strong population, remain heavily reliant on traditional, subsistence livelihoods, drawing on marine resources to meet daily protein needs and provide cash income.

Traditional marine management areas called qoliqoli (traditional fishing grounds under the control of the communities adjacent to them) have been implemented for hundreds of years in Fiji. Decisions about the management of these areas are taken by tribal chiefs, through village councils which often work together at the district level to coordinate planning. This customary resource management system is typical of many Pacific islands in which communities have long imposed traditional management methods such as seasonal bans and temporary no-take areas.

These methods are based on a system of community marine tenure – the right to own or control an inshore area – that is recognized informally by local authorities. In Fiji, qoliqoli are officially referred to as 'customary fishing rights areas'. They are mapped in records maintained by the Native Fisheries Commission. There are 385 marine and 25 freshwater qoliqoli in Fiji and their marine resources support the livelihoods of approximately 300,000 people living in coastal communities.

In recent years, however, the livelihoods of Fiji's rural fishing communities have increasingly come under threat as the fragile balance of this system has been disturbed by human pressures from overfishing, the advent of a cash-based economy, insufficient implementation of regulations, and the adoption of unsuccessful approaches to resources management, resulting in decreasing

availability of marine resources. While the specific causes of marine resource depletion vary from village to village, a common trend of rising poverty has been the result, and by 2005, approximately 30-35 per cent of rural households in Fiji were living below the poverty line.

Ucunivanua Locally-Managed Marine Area

By the early 1990s, the scarcity of marine resources had become apparent to the residents of Ucunivanua village, on the eastern coast of Viti Levu, Fiji's largest island, when the women of the community found themselves spending ever longer collecting kaikoso clams (*Anadara antiquate*) from the village's mudflats. These clams are a staple food for the local population and an important source of cash income. The community's observation of reduced clam numbers illustrated a decline in the community's natural resource base which reflected a larger pattern of resource depletion occurring throughout Fiji.

The community of Ucunivanua reacted to this worrying trend by establishing a locally-managed marine area (LMMA) in 1997. This took the form of a 24-hectare no-take zone on the mudflats and seagrass bed directly in front of the Ucunivanua village, and its aim was to restrict the harvesting of kaikoso clams to allow their numbers to regenerate and to encourage their settlement in neighbouring areas. This built on the existing tradition of enacting tabu prohibitions on fishing for certain species. The project was led by researchers at the University of the South Pacific in Suva, Fiji.

Following a series of workshops with the community, a management team of 20 local men and women worked with the chief and elders of the village to hold a traditional ceremony declaring the area closed for three years. Ucunivanua LMMA was the first in Fiji and it yielded dramatic results. Seven years after the implementation of community-based marine resource management in the village, the kaikoso clam was once again abundant and village incomes had risen significantly.

The development of the LMMA network

Since the establishment of the Ucunivanua LMMA in 1997, use of LMMAs to address overfishing has spread rapidly throughout Fiji. This is in part the legacy of a community-managed marine area pilot programme implemented by the Biodiversity Conservation Network in the late-1990s. In 2001, at the end of the pilot project cycle, project stakeholders, including NGOs, research institutes, government departments and community leaders, established the Fiji Locally-Managed Marine Area (FLMMA) Network as a forum for communities implementing LMMAs to share their methods and results.

The Network's objectives, as stated in its constitution, include encouraging collaboration between government departments, NGOs and communities to better manage Fiji's traditional fishing grounds; engaging in collective advocacy for LMMAs; creating joint policy briefs based on collective learning; and encouraging the use of adaptive management as a key to achieving best practice. The Network's constitution also emphasizes the importance of collecting data as a tool for learning, alongside on-site training workshops, cross-site visits and the sharing of logistical and technical information between communities.

The Network's approach recognizes local communities' autonomy in managing their marine resources, while simultaneously providing a network of support and guidance to help them achieve the best possible results. The Network is responsible for planning and facilitating the programme, while the decision making, implementation and evaluation are undertaken on the ground by the individual groups. Ongoing capacity building activities empower local communities with the necessary knowledge to reverse the decline of their natural resources. An adaptive management approach emphasizes participatory learning and action to ensure that communities remain the key agents in planning, decision making, and implementation of management actions. This approach ensures active leadership and participation of communities as custodians of their local resources.

In 2005, Fiji's network of LMMAs included nearly 60 LMMAs, involving 125 communities and covering about 20 per cent of Fiji's inshore fishery. By 2009, the network had grown to 250 LMMAs, covering 10,745 sq. km. By this time, the Network incorporated 235 management tools, such as Marine Protected Areas, and 208 management plans.



Villager at coral cultivation racks, Votua MPA, Fiji. Photo: Jimmy Kereseka

“Biodiversity depletion is a reality that is impacting the livelihood of the local people, the national economy and the biodiversity value of the country. Addressing it requires a holistic approach whereby the government provides the necessary legislative support, practitioners provide technical expertise, and communities take the lead in planning, designing and implementing management strategies”

Sakiusa “Saki” Patrick Fong, Fiji LMMA Network.

Key Activities and Innovations



Mangrove replanting in Tagaqa village, Korolevuiwai, along the coral coast of Fiji. Photo: Alifereti Tawake

The FLMMMA Network works directly with communities to guide their conservation efforts, but also supports them in developing solutions to broader problems including a lack of alternative livelihood options. Advocacy and cooperation with local government departments is also a focus of the Network's work, to ensure rapid scaling-up and replication of this successful model.

Supporting communities

Once a community in Fiji makes its interest in local marine management known, the FLMMMA Network and various partner organizations determine who will be the lead agency, and discussions are held with the community to ensure that the goals of all parties are clear and aligned. This initial planning and education process can take up to one year. Network staff then offers assistance through three types of workshop: action planning, biological monitoring, and socioeconomic monitoring. The action-planning workshops are adapted from Participatory Learning and Action (PLA) methods and include sessions on mapping the village, understanding historical trends, and identifying local stakeholders. The biological and socioeconomic monitoring components of the workshops focus on identifying resource use patterns, threats to local resources, and the root causes of these threats. Finally, a community action plan is developed.

While the establishment of a tabu area (where a no-take zone or ban on destructive fishing practices is declared) is usually a central part of an LMMA, the action plan also contains ways to address other issues faced by the community, such as lack of income sources, poor awareness of environmental issues, pollution, and sometimes, declining community cohesiveness. Agricultural and forestry practices are often examined, alongside vulnerability to climate change and the enhancement of available livelihood options. Socioeconomic monitoring tests whether these broader

problems are being addressed. Ongoing assistance is provided to communities to help them carry out their plans, including practical assistance such as marking protected area boundaries, publishing LMMA rules, and training fish wardens to protect against poaching.

The work of the FLMMMA Network goes beyond working with individual communities to support their resource management efforts, to address the wider needs of communities and offer input to higher level marine policy. The Network cooperates with local government authorities in the establishment of Marine Protected Areas, and promotes sustainable livelihood projects to underpin conservation efforts and compensate local fishers during tabu periods. These projects include mangrove rehabilitation and plantation, tree nurseries, ecotourism, apiculture, prawn fishing, freshwater fish farming and pearl farming, among others. By targeting income generation and business development activities at women, the Network has helped to encourage greater gender equality in communities.

The Network also plays a leading role in monitoring and quantifying results across project sites, producing a substantial body of knowledge on the linkages between sustainable resource management and poverty alleviation.

Education and capacity building

The Network conducts workshops and education programmes at the community level to address aspects of communal resource management. Programmes to increase capacity in village and resource governance, financial management, waste management, and sustainable livelihoods have been conducted to strengthen resource management in these communities. These programmes target women, youth, and key community leaders in particular, helping to build grassroots support and capacity. In 2009, 27 such workshops were held, involving 603 participants.

Impacts



Turtle calling point at sunset, Kadavu, Fiji. Photo: Toni Parras

BIODIVERSITY IMPACTS

Case 1: Tavua LMMA

The district of Tavua, on the northern coast of Viti Levu, is comprised of seven villages (Tavualevu, Rabulu, Vanuakula, Vatutavui, Korovou, Nabuna and Nadolodolo). The largest of these, Tavualevu, is the head village and hosts the paramount chief of the district (Tui Tavua). The Tavua LMMA, Fiji's second oldest, was established in 2003 following a management planning workshop hosted by the FLMMA Network and the University of the South Pacific's Institute of Applied Science (USP-IAS). The Tavua LMMA aims to eliminate the destructive practice of dynamite fishing, a method which yields a higher catch in a shorter period of time than traditional net fishing, but has a devastating impact on coral reefs.

Tavua's LMMA comprises nearly 700 sq. km of fishing ground, and includes within it a 14 sq. km Marine Protected Area (MPA). The remainder of the LMMA remains open to fishing for the people of the district and a select group of commercial fishermen issued licences to fish there. Within the entire LMMA, the following practices are banned: the use of destructive fishing techniques including dynamite fishing, undersized net mesh, and cyanide fishing; unlicensed fishermen; poaching from the MPA; and the dumping of waste into the marine ecosystem.

Management of the LMMA is undertaken by the Tavua Qoliqoli Committee, which consists of a member of each clan and village in the district, registered fish wardens, and the paramount chief (Tui Tavua). In addition to the initial management planning workshop, the FLMMA Network and USP-IAS have carried out workshops on dynamite awareness-raising (2004), biological monitoring training and management plan reviewing (2005), and baseline biological monitoring and socioeconomic surveys (2006). The Network's researchers also briefed a Tavua District Council Meeting on the need to increase the licensing fees for commercial fishing in 2007.

Numerous publications and reports have been produced based on these workshops. The reef, while still showing some evidence of having been blasted, is showing signs of ecological recovery. Live corals abound, as do fish and invertebrates, including high-value species such as snapper and sea cucumber.

Success throughout the network

Tavua LMMA is just one example of the positive impact Fiji's coastal communities have had on their local marine environments through the FLMMA Network. Positive results have been replicated across more than 250 FLMMA sites and the Network has brought together researchers from local universities to assist in monitoring ecological impacts. Techniques differ from site to site but have included underwater visual census, and belt and line transect sampling.

These monitoring data show that, in many cases, previously extirpated (locally extinct) species have returned, and marine specimens have increased in number, species diversity, and biomass. For instance, a new species of seaweed was recently discovered in the Natokalau site. The outcome of such species sightings has been increased recognition of the benefits of maintaining long-term MPAs as safe havens for significant food fish species and other over-exploited animals and sea plants. A study conducted by Conservation International at three LMMA sites (Navakavu, Malolo and Waitabu), found all three sites to have significantly greater mean total fish biomass and mean targeted fish biomass compared to control sites.

Additional positive indicators reported across FLMMA Network sites include growth in the number and sizes of clams and crabs inside and outside tabu areas, and the return of marine life such as stingrays to offshore mudflats. Navakavu witnessed the return of the smooth or red-spotted box crab (*Calappa calappa*, known locally as burebure matatolu) after a 50-year absence. They were last seen in the area in 1953.

At Fiji's first LMMA, in Ucunivanua, community members were trained by USP-IAS experts to monitor the clam population. A comparison of the resultant data from 1997 and 2004 demonstrated a dramatic increase in the number and size of clams, in both the tabu and adjacent harvest areas (Aalbersberg et al., 2005; see Table 1). While, at the start of the project, it was extremely rare to find clams bigger than five centimetres in diameter the Ucunivanua community today routinely finds clams over eight centimetres in diameter in the tabu area. Due to its success, the Ucunivanua tabu area, which was initially intended to be closed to fishing and collection for just three years, was extended indefinitely. Impressive results from the monitoring of shellfish have also led the community to set up no-take areas in the mangroves and coral reefs to encourage lobster and coral fish production.

Similar successes have been achieved throughout the FLMMA network. The village of Sawa, for example, imposed a tabu on a mangrove island, with the result that the number of the mangrove lobsters (*Thalassina anomala*) increased roughly 250 per cent annually, with a spillover increase of roughly 120 per cent outside the tabu area. In Nacamaki village on the island of Gau, meanwhile, one year after the declaration of a tabu area, the community harvested approximately eight tons of rabbitfish in one week.

SOCIOECONOMIC IMPACTS

In addition to biodiversity monitoring, the FLMMA Network has also undertaken extensive socioeconomic monitoring using such techniques as household surveys and catch-per-unit-effort (CPUE) data, with resultant data demonstrating the correlation between biodiversity conservation and poverty alleviation. Booklets have been issued to communities for recording CPUE data, which quantifies the time taken, the distance covered, the number of people involved, and the equipment used, to catch a given amount of fish. Increases in this index indicate an improvement in stocks of commercial marine species, and, therefore, fishers' livelihoods. Specific socioeconomic benefits of the initiative include increased household income, improved livelihood options, diversified income sources, improved diets, greater gender equality, and substantially strengthened local management capacity. Two specific cases, those of the Navukavu LMMA and the Korolevu-i-wai LMMA, are described below, with additional data referenced from across the FLMMA Network.

Case 2: Navukavu LMMA

The Navukavu community, located on Viti Levu's southern coast, is comprised of four villages (Muaivusu, Nabaka, Waiqanake and Namakala) which share customary rights to the Navukavu qoliqoli. The community is situated less than 10 kilometres from the capital city, Suva, which serves as the island's main port. In recent years, the community's ability to harvest sufficient marine resources to meet their basic needs has been severely impacted by the presence of waste from the nearby city, and from large container ships that travel along the coast, littering the shoreline. Corroding metal from rusting, sunken ships washed up by heavy storms has damaged coastal reefs and poisoned marine life. Being located close to an urban centre has also increased pressure on the area's marine resources. The community established an LMMA in 2002. Although efforts to restrict poaching in the LMMA by outsiders have been partially successful, thanks to the authority to arrest intruders, granted by the local government, reliance on volunteers and a non-confrontational approach has left the community unable to adequately defend the qoliqoli against armed poachers.

Despite such challenges, studies have shown the LMMA to have had positive impacts on the social and economic situation of the Navukavu community. A 2007 study (van Beukering et al., 2007) on the linkages between LMMAs and poverty at the Navakavu site showed monthly income to be far higher there in comparison to a control site. A survey of 300 households found that monthly income in Navakavu averaged FJD 418 (USD 251), while income in control sites with similar demographic and geographic characteristics averaged only FJD 197 (USD 118) per month.

Another important benefit of LMMAs identified by various studies has been increased household consumption of fish. In Navakavu, around 75 per cent of surveyed households reported eating more fish in 2007 compared to five years previously, while a similar proportion of households in non-LMMA villages reported eating less fish. A second study analysing changes in finfish catch over time in Navakavu suggested that there had been an average increase of three per cent per year in catches between 2002 and late 2007. This increase, worth a total of around FJD 630,000 (USD 378,000) to the community, was attributed to the establishment of the LMMA (van Beukering et al., 2007).

Table 1: Trends in Clam Size and Abundance, Ucunivanua (1997-2004)

Size class (cm)	Number of clams (per 50 m ³)			
	Tabu Area		Adjacent Harvest Site	
	1997	2004	1997	2004
<2.5	0	3502	1	532
2.5-3.5	5	1546	7	622
3.5-4.5	12	935	14	385
4.5-5.5	13	570	9	221
>5.5	8	530	1	91

Source: Aalbersberg et al., 2005 after Aalbersberg and Tawake, 2005

In an effort to reduce their dependence on marine resources, the community is also exploring new potential sources of income. A women's group, established to explore new livelihood projects, has sought funding from the International Oceans Institute (IOI) to purchase sewing machines. Workshops have been held by USP- IAS and the FLMMA Network on conservation, community-based marine resource management, and biological and socioeconomic monitoring to build the capacity of the community to manage their LMMMA. The case of Navakavu illustrates the Network's multi-faceted approach, helping rural communities overcome the range of challenges they face.

Case 3: Korolevu-i-wai LMMA

Approximately 130 kilometres west of Suva, the Korolevu-i-wai district qoliqoli spans six sq. km and encompasses four adjacent villages, with a tourism resort situated in the middle. The Korolevu-i-wai qoliqoli includes mangroves, seagrass beds and coral reefs, and is home to mangrove crabs, clams, octopuses, lobsters, sea urchins, trochus, and reef fish such as emperors, parrotfish, grouper, and mullet. Damage from destructive fishing methods (undersized fishing nets, poison fishing, and breaking corals and rocks to catch octopus), coral harvesting, pollution, and damage to coral from tourists, prompted the local village chief to initiate discussions with other chiefs and the local tourism resort. After hearing about the Fiji LMMA Network through radio broadcasts, the Korolevu-i-wai stakeholders contacted the Network for assistance, and the Korolevu-i-wai LMMA was established.

Within the LMMA, the area of reef directly in front of the resort was subjected to a tabu that prohibited fishing. After 18 months of operation, initial biological monitoring indicated that key species, such as mullet, were recovering, while survey results indicated an increase in the abundance of groupers, parrotfish, octopuses and lobsters both within and outside the tabu area.

The Korolevu-i-wai community has established a mutually beneficial relationship with the owners of a beach tourist resort whereby, in return for making the fishing ground available to the resort for low-impact tourism activities, the community receives substantial financial and technical assistance. The resort owners have provided a television for village youth, computers for schools, buoys for the MPAs, building materials, and furniture, in addition to providing scholarships for local school children, as part of an agreement that has endured for over a decade.

With technical advice from USP-IAS and the FLMMA Network, the LMMA management committee launched a coral farming project along reefs adjacent to the resort, at Tagaqe village. The resort hired a marine biologist to help establish the coral farming programme and to train hotel staff. Visitors to the resort can now take part in a 'reef walk' (a tour along a carefully marked path through the reef) to appreciate the marine environment and to view the coral racks. For a fee of USD 5.00, they can sponsor a coral in their name with the proceeds split between the Tagaqe Village Environment Trust Fund and the resort (to cover expenses). Several youths from the village are now employed by the resort to guide tourists to a coral

garden, plant corals, and help police the protected area. The number of tourists engaged in the project increased from 16 per month in August 2003 to 62 per month in March 2004.

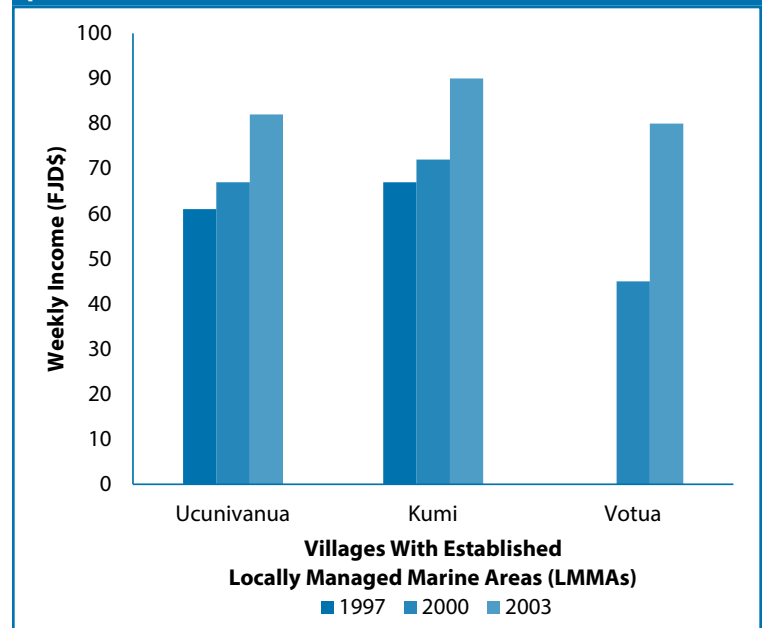
Research on the Korolevu-i-wai LMMA identified notable positive outcomes in its first two years of implementation (Fong, 2006). As well as comparing favourably to former attempts at resource management, the LMMA system was shown to have strengthened social cohesion amongst the community members. The average CPUE and the income level of fishers in the district also increased.

Positive socioeconomic impacts, such as those described in Navukavu and Korolevu-i-wai have been noted in communities throughout the FLMMA Network.

Increased household income

In Ucuivanua, a study that described the increased abundance of mangrove lobsters by approximately 250 per cent annually (Aalbersberg et al., 2005) also detailed how average household income rose from just over FJD 430 (USD 258) per month in 2002 to about FJD 990 (USD 594) in 2006, an increase of 130 per cent. Similarly, the community of Daku in Kadavu province experienced an increase of just over 30 per cent in average income in one year, from about FJD 235 (USD 141) per month in 2005 to FJD 307 (USD 184) in 2006. Across the communities of Ucuivanua, Kumi and Votua, all with LMMAs, household income increased by an average of 43 per cent between 2000 and 2003, as illustrated in Figure 1.

Fig. 1: Weekly household income from sales of marine products (1999-2010)



Source: Aalbersberg et al., 2005

Various studies have examined the wider economic impacts of Fiji's LMMAs as part of studies of the role of MPAs in poverty reduction. Van Beukering et al. (2007) claim that LMMA sites generated about three times the income from fishing that non-LMMA sites generated, and argue that the ability of fishers from LMMA villages to secure

larger fish catches from a smaller harvest zone was evidence of substantial spillover effect from tabu areas into the harvesting zone.



Shrimp at the Suva market. Photo: Toni Parras

Diversified income sources

Interestingly, despite the above claim, other studies have noted that households in LMMA villages were likely to be less reliant on income from fishing than households in non-LMMA villages. Twenty-eight per cent of households near LMMA sites have alternative income sources versus only 17 per cent in comparable, non-LMMA villages. Income diversification is a key component in ensuring ecosystem-based resilience, and LMMA communities have substantially increased their ability to withstand threats to future fisheries income from the impacts of reef degradation due to coastal pollution, severe storms and climate change. This resilience is underpinned by additional LMMA-related benefits as well, such as improved planning and management skills and closer community cooperation.

Strengthened community cohesion

Beyond producing economic benefits for individual households, the ongoing work of the FLMMMA Network has strengthened channels of communication and cooperation within LMMA communities. In some cases, this has helped in conflict resolution between clans or villages. In Votua, for example, social cohesion was seen to have improved after three years of LMMA work that facilitated dialogue between three clan chiefs after decades of dispute. The emphasis placed on collective decision-making regarding resource management has revitalised traditional systems of community cooperation, with a survey of villagers in the Navakavu revealing that over 80 per cent of villagers felt there had been a higher level of participation in community meetings, that women had a stronger voice, and that the community had become more united, since the establishment of the LMMA (van Beukering et al., 2007).

LMMAs have also played a role in fundraising efforts for communal purposes, such as supporting local schools or churches as households earning additional income from selling surplus fish and shellfish are

better able to meet their traditional social obligation to contribute to village fundraising. In Waiqanake village in Navakavu, for example, a community fundraising project amassed some FJD 20,000 (about USD 12,000) in donations, three quarters of which came from the sale of fish and shellfish from the LMMA.

Empowerment of women

Furthermore, the FLMMMA Network has begun to confront the prevailing culture in which women are typically excluded from decision-making processes. This situation has proved to be a particular disadvantage, as women are often those most involved in collecting inshore marine resources and have unique knowledge of them. In Verata, for example, only the women of the community knew how to locate and accurately count kaikoso clams. Although women typically collect seafood for the community, it is men who traditionally make all decisions regarding the management of such activities. The inclusion of women on LMMA committees has addressed this disparity somewhat. Collaboration with outside researchers has also helped to boost the profile of women at LMMA sites, while the network has introduced a gender programme in which meetings are held with local women's groups to discuss progress of LMMA action plan.

POLICY IMPACTS

Among the positive results of the FLMMMA Network's growth has been greater bargaining power and advocacy capacity of LMMA communities to affect policy change at the national level. Organizing communities into a network has given them greater access to decision makers and greater influence in the policy making process.

The efforts of the FLMMMA Network have helped to secure recognition by national governments of the value of traditional resource management approaches, and of the importance of local communities as stakeholders in resource governance. Indeed, Fiji's government has formally adopted the LMMA approach and has devoted a division of the Fisheries Department to coordinate with the Network to promote inshore conservation. The FLMMMA Secretariat is now housed in the Fisheries Department. Establishing locally managed marine areas has been enabled to some degree by customary fishing rights regulations under Fiji's Fisheries Act, while the decentralized nature of the FLMMMA Network has encouraged the active engagement of provincial and district governments as stakeholders in LMMA management processes. The FLMMMA Network has also played an advisory role in the country's National Biodiversity Strategy and Action Plan.

The success of the initiative has also driven national level policy change in support of sustainable fisheries management. In 2004, during a Small Island Developing States (SIDS) conference in Mauritius, the Fijian Government declared that, by 2012, 30 per cent of Fiji's Exclusive Economic Zone (EEZ), including both inshore and offshore marine borders, would be established as protected areas. The FLMMMA Network was tasked with overseeing the implementation of this commitment within Fiji's internal waters, while the government oversees its implementation in offshore waters.

Community-based resource management programmes that result in the establishment of locally-managed MPAs contribute to the commitment made by Fiji. To this end, the Network held a workshop that resulted in the creation of a 20-year provincial vision for marine resource management and conservation within the traditional fishing grounds surrounding Kadavu, including moving toward establishing a community-led, provincial network of MPAs. The process and activities used during this workshop are to be adapted for future application within other Fijian provinces as a step toward the creation of a national MPA system.

The creation of environmental committees at the district level has helped to streamline the work of local government and community stakeholders. Meanwhile, the devolution of resource management to the grassroots level has been supported by legislative efforts to reduce large scale pressures on marine resources. As a result of community pressure on the Fisheries Ministry, Fiji implemented a 12-nautical-mile limit to keep foreign fishing vessels from qoliqoli. This is expected to reduce external pressures on fishing grounds from commercial activities. Meanwhile, the government enacted the Environment Management Act in 2007 to tackle the issues of waste management and Environmental Impact Assessments.

Constrained by insufficient enforcement powers

One constraint to the effectiveness of LMMA sites remains the inability of local communities to effectively enforce their marine resource use regulations against unlicensed poachers. In some sites,

the effects of poaching have led community members to lose faith in the sustainable management approach as they fail to reap the rewards of their own efforts. Greater legal recognition of community-managed marine areas would help to strengthen the enforcement of customary regulations. As of 2009, however, only one site in Fiji had been legally gazetted by the government. There, community fish wardens have been trained and given the legal power to arrest offenders, but in most cases, this process relies on volunteers and amicable conflict resolution with poachers.

Inconsistent support from regional and national officials and inadequate resources both cause problems. Fish wardens often experience difficulties carrying out their assigned duties due to a lack of resources. Many LMMA villages consider the availability of a specially designated, motorised patrol boat a prerequisite for successful enforcement, particularly in areas of conflict with commercial fishers. While some communities have been able to secure the use of such a boat, they often lack the means to purchase fuel for it. Only sanctioned fish wardens have the right to take individual violators to the police. Some transgressors may be brought before community meetings for traditional forms of punishment, such as shaming, but a general lack of consistency and the occasional unwillingness of official law enforcement agencies to get involved often undermine the effectiveness of enforcement. New inshore fisheries legislation will establish clearer regulations for tabu areas, greatly increase fines for violators and give more support to fish wardens, which it is hoped will improve the situation.



Virimi placing the nets at high tide on Nukunuku reef off the coast of Korotubu village. Photo: Meghan Kelly

Sustainability and Replication



Teeming fish life (bigeye trevally and jack) in the Namena Marine Reserve, Fiji. Photo: Stacy Jupiter

SUSTAINABILITY

Various factors have ensured that individual LMMA sites and the FLMMA Network as a whole enjoy relatively high levels economic and social sustainability. The LMMA extension and scaling approach is a highly participatory one, requiring strong commitment from the communities themselves. This tends to enhance the resilience of individual sites, reinforced by visible, positive economic benefits. These benefits also arise within a relatively short timeframe: even a fairly limited no-take zone restriction can have the positive result of improved fish catches. Rigorous monitoring and data collection have also helped to provide a quantitative evidence base for the efficacy of the LMMA approach. Experience with the earliest established LMMAs indicates that most communities engaged wholeheartedly in the collective efforts needed for successful ongoing resource management.

Value for money

Another factor contributing to the rapid uptake and replication of the LMMA approach is the relatively low cost of creating and managing a site. For instance, the total cost of establishing Navakavu LMMA was estimated at less than USD 12,000 over five years, a modest investment that has led to a doubling of average household income for about 600 people. A separate study in Navakavu showed that the increase in fish caught over the same timeframe provided about USD 37,800 in benefits to the community.

In addition to the benefits of increased fishing yields, individual sites have been able to develop supplementary sources of income to defray the costs of LMMA management. As part of the conservation initiative in Verata, the community agreed to a bio-prospecting arrangement with a pharmaceutical company, under which the community was paid licensing fees for samples of medicinal plants and marine invertebrates collected in their district. These activities earned the community USD 30,000, which was put into a trust fund to sustain their local fisheries work.

At another site, a hotel pays USD 2 to a community trust fund for each scuba diver that utilizes the village's protected area. This provides an income of roughly USD 1,000 per year. Yet another village has 'planted' artificial live rock in its tabu area to sell to exporters for the aquarium trade after marine life has colonized it. A company makes the artificial live rock substrate, brings it to the village, and assists in placing it on the reef. Within a year, the company harvests the rock with local help. The potential return to the community is USD 4,000 a year. Although these sums are not often large, they are at least sufficient to cover LMMA management costs.

The country-wide network also generates management costs. The estimated cost for the initial suite of community workshops provided by the FLMMA Network is about USD 3,000 per site in the first year, USD 1,000 in the second year, and USD 500 per year thereafter. However, the costs of replicating the LMMA approach have decreased as a result of province-wide approaches established in Kadavu and other provinces of Fiji. This decentralised extension network model is a highly effective, low cost method for extending LMMA work to remote sites. Continued training is needed across sites, however, due to personnel changes over time, as well as with LMMA Network partner organisations such as government ministries.

External funding covers the operational costs of the Network. The total cost of the FLMMA Network's core operations, including workshops, monitoring equipment, and buoys for demarcating tabu areas, is about USD 500,000 per year, much of which has historically been supplied by US-based charitable organizations, including the MacArthur Foundation and the Packard Foundation. It has been challenging for the Network to secure additional sources of financial support, however, especially for core costs. An FLMMA Network Trust Fund has been established to cover ongoing site assistance costs. This was originally established with prize money from international awards for the Network's work, but has also received some funding from Conservation International.

Tailoring to local needs

Additional factors contribute to sustainability at the local level. Needs assessments are conducted with participation from community members during the LMMA preparation process, ensuring that the resource management systems established are tailored to meet local needs, rather than adhering to a generic, one-size-fits-all model. Secondly, the various capacity building workshops undertaken have focused on skills such as financial management, leadership, resource governance, and waste management, ensuring a high degree of local management capacity. This also helps communities to withstand external shocks and adapt to changing conditions, increasing their resilience and sustainability.

REPLICATION

From a single village in 1997, Fiji's LMMA Network model grew to include some 213 LMMAs by 2007, involving 279 villages and covering almost 8,500 sq. km (850,000 ha) of coastal fisheries, or about 25 per cent of Fiji's inshore area. By 2009, this number had increased again to 250 LMMAs, covering 10,745 sq. km. This rapid replication has been mirrored across the Pacific, as other countries have followed Fiji's example, with flourishing LMMA networks developing in areas of Indonesia, Micronesia, Papua New Guinea, the Philippines, and Solomon Islands.

The Pacific island LMMA network has facilitated the international dissemination of the LMMA approach through workshops, site visits and the coordination of a range of publications documenting the success of local marine management in the region. Fiji is the LMMA Network's flagship country network, accounting for more than half of the total number of LMMAs in the Pacific.

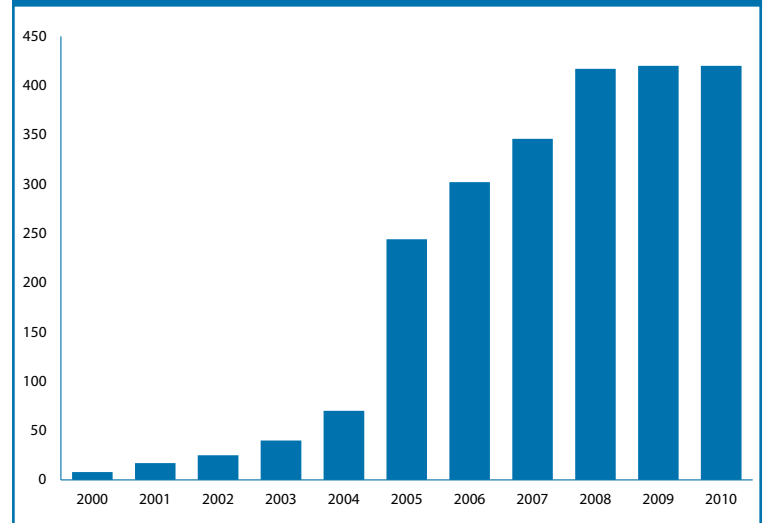
Within Fiji, various strategies have been used to communicate the success of the LMMA approach. News of the Network has been disseminated through newspaper articles, radio shows, television broadcasts, newsletters and brochures, leading to request for technical advice from individual communities.

Replicating LMMAs through sub-networks

A particularly effective method of enabling replication has been the creation of sub-networks to extend LMMA work to more remote areas of Fiji. This is being carried out by province-wide teams which provide systematic support to communities. Qoliqoli Management Support Teams (QMST) are comprised of community members, fisheries officers, overseas volunteers, USP-IAS students, and provincial government officials. They hold management planning workshops and link LMMA groups across provinces. The approach has worked especially well in Kadavu, Fiji's fifth largest island, located to the south of Fiji's main island of Viti Levu, where communities rely heavily on fishing and farming for their livelihoods. Kadavu QMST's efforts to extend the LMMA approach throughout the province resulted in a rapid increase in the number of communities that have established tabu areas, from five in 2002, to 30 in 2005, to 52 in 2008.

The provincial council endorsed the team's work and has passed a resolution calling on every community to set up both terrestrial and marine protected areas. Similar province-wide approaches are also being pursued in Cakaudrove and Macuata, two of three provinces based on Vanua Levu, Fiji's second largest island.

Fig. 2: Growth of number of sites in the LMMA Network (Fiji, Indonesia, Micronesia, Papua New Guinea, the Philippines, and the Solomon Islands), 2000-2010



Source: LMMA Network <http://www.lmmanetwork.org>

PARTNERS

The University of the South Pacific's Institute of Applied Science (USP-IAS) collaborated with the FLMMA Network in the implementation of training workshops. As well as an initial management planning workshop, these have included workshops on dynamite awareness-raising (2004), biological monitoring training and management plan reviewing (2005), and baseline biological monitoring and socioeconomic surveys (2006). USP-IAS also provided technical advice for the launch of the Tagaqe village coral farming project.

The Government of Fiji has supported the FLMMA Network through its Fisheries Department (a department of the Ministry of Fisheries and Forests). The government has formally adopted the LMMA approach and has devoted a division of the Fisheries Department to coordinate with the Network to promote inshore conservation. The FLMMA Secretariat is now housed within the Fisheries Department.

The MacArthur Foundation and the Packard Foundation have both contributed significant amounts to help cover the costs of the FLMMA Network's core operations, which come to about USD 500,000 per year. Conservation International has contributed funds to the establishment of the FLMMA Network Trust Fund to cover ongoing costs.

World Wildlife Fund (WWF), the Wildlife Conservation Society (WCS) and Fiji Institute of Technology have also contributed to the success of the initiative.





SISI INITIATIVE SITE SUPPORT GROUP

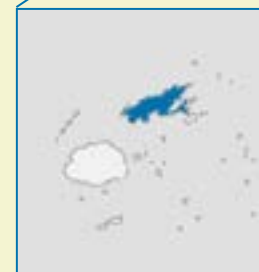
Fiji



PROJECT SUMMARY

Sisi Initiative Site Support Group manages natural resources around the periphery of the Natewa Tunuloa Important Bird Area. The organization has established a 600-hectare community protected forest and developed alternative livelihood options for the area's indigenous landowners. Developed in response to illegal logging, forest fires, overgrazing, agricultural encroachment and invasive species, the organization uses an innovative incentive scheme to protect the globally important bird and wildlife species in Natewa Tunuloa. Communities signed a Memorandum of Understanding in which they agreed to protect the community forest and refuse logging concessions.

In return, the initiative provides alternative livelihood training and projects in beekeeping, poultry, handicraft and jewelry-making, bakery and pastry-making, and sustainable agricultural. The group's model farm and tree nursery also help to reduce deforestation. The initiative has been used as a learning model for community-based conservation and forest management across Fiji.



Background and Context



Sisi Initiative Site Support Group was established in late 2005 to conserve the Natewa Tunuloa Important Bird Area (IBA) on the island of Vanua Levu in Fiji's Northern Division. It is a community-based volunteer group that works with a range of stakeholders to develop sustainable, environmentally friendly initiatives for communities living in and around the IBA. These initiatives – which have included sustainable agriculture projects, ecotourism, and bee-keeping – have afforded community members a means by which to live in greater harmony with their natural environment, reducing threats to the forest and securing it for future generations.

Natewa Tunuloa Important Bird Area

The Natewa Tunuloa IBA contains within it most of the remaining tracts of native forest on the Natewa Tunuloa Peninsula. Communities living in the vicinity of the IBA have traditionally depended on agriculture for their subsistence and income, and rely heavily on forest resources for firewood, hunting, timber, medicinal plants and wild foods. In recent years, however, the rate at which resources have been extracted from the forest grew to unsustainable levels, threatening the integrity and biodiversity of the forest.

Natewa Peninsula houses a unique array of birdlife, including a number of threatened and endemic species. Seven of the nine subspecies endemic to the island of Vanua Levu are found on the peninsula. The peninsula is home to the Shy Ground Dove (*Gallicolumba stairi*), classified as a vulnerable species, and the near-threatened Silktail (*Lamprolia victoria*), ornithologically unique in the region due to the absence of Giant Forest Honeyeaters or Blue-crested Broadbills that are otherwise widespread across Vanua Levu and neighboring Taveuni. The Natewa Peninsula was assigned the status of “Key Biodiversity Area” by Conservation International in 2005. It has also been identified as a “Site of National Significance” in Fiji's National Biodiversity Action Plan, and received the designation “Important Bird Area” in 2005 from BirdLife International. Despite this recognition of the area's natural significance, however, the peninsula does not have official protected area status and remains vulnerable to the threat of deforestation.

Deforestation, soil erosion and water insecurity

Excessive logging, human-induced fires and overgrazing have historically been the main threats to the peninsula's forests. Large areas of native forests were cleared for mahogany plantations (although this practice, for this purpose, has since ceased) and extensive and unsustainable logging continues to degrade the forests adjacent to the IBA. Since much of the flat land on the peninsula has been converted to coconut plantations, agriculture tends to encroach on the forest. The resulting deforestation leads to soil erosion and water insecurity, as well as threatening birds and wider biodiversity.

The IBA is the source of the peninsula's rivers and of the drinking water for all of its villages. Unsustainable logging has impacted water quality, disrupting ecosystem functioning and the water cycle, which in turn has affected the availability of drinking water and even the health of marine resources in Natewa Bay. The impact on drinking water quality in particular was severely affecting the living conditions of peninsula communities, and this provided the main impetus for community leaders to partner with BirdLife International in developing a programme of forest conservation.

Genesis of the Sisi Initiative

Following designation of the 17,600-hectare IBA in 2005, local communities started to work in partnership with BirdLife International on a plan to conserve the forest. The first of many awareness-raising workshops followed, and included participants from local government, the Cakaudrove Provincial Council, and the Departments of Forestry, Agriculture, and Land Use. Over the course of these workshops, local community representatives were nominated to form a “Site Support Group”. Out of this process, in October 2005, the Sisi Initiative was formally established as a community-based volunteer group charged with leading efforts to conserve the IBA. The initiative is named after the Sisi, a Fijian silktail bird and a characteristic species of the area found only on the peninsula and on the neighbouring island of Taveuni. (The silktail of

Natewa Tunuloa is roughly 20 per cent smaller and more iridescent than its relative on Taveuni).

The primary challenge faced by the Sisi Initiative at the stage of organizational inception was commercial logging, the second greatest source of income (after agriculture) for local residents and a cornerstone of the local economy. For conservation efforts to succeed, it would be necessary to identify and develop economic alternatives to logging. Again, a series of consultations were held with local community representatives, technical experts from government departments, and other relevant local authorities. Out of this process came the innovation at the heart of the Sisi Initiative: a Memorandum of Understanding (MOU) under which eleven landowning clans agreed to conserve the forest and avoid logging for ten years in exchange for support with a suite of village-based alternative livelihood projects. The MOU was signed at a workshop in Navetau village in 2009 and resulted in the declaration of a 6,000-hectare community-managed forest.

The next step in the initiative was a draft community management plan for the forest. As part of this plan, the Site Support Group was adjusted to ensure equal representation of each of the landowning clans in the conservation programme. Fiji is particularly well-suited to this land (or resource) management approach, as over 80 per cent of the country's territory is owned by indigenous peoples who are organized in land-owning units or clans known as *mataqalis*. In consultation with the statutory body that oversees management of land tenure issues in Fiji, these clans ultimately decide how land is used.

Membership in the Site Support Group – that is, representatives of participating clans – grew from six members in 2006 to fifteen in 2012. Members are nominated by their respective *mataqalis*. To maximize community participation and promote inclusive decision making, membership is not limited to a set number of individuals, but varies depending on interest. Membership, however, is limited to clans that own land within the community-managed area (and not simply within the IBA), meaning that decisions pertaining to the management of resources within the managed forest rest solely with the landowners.

Governance and institutional structure

The Site Support Group includes a Chairperson, Secretary and Treasurer, and its activities are guided by Terms of Reference which state that the aim of the group is ‘the conservation and sustainable management of the forests for the benefit of land-owning communities’. Within these same Terms of Reference, the roles of landowners are clearly defined. All decisions of the Site Support Group are raised at village meetings to allow other members of the *mataqali* and the wider community to have their voice heard. The initiative and its governance are guided by a strong partnership with BirdLife International, which has invested heavily in raising awareness of the value of biodiversity in the peninsula. This innovative approach to natural resource management in Fiji demonstrates the value of partnering with local landowners and including them in resource governance decisions.



Key Activities and Innovations



The Sisi Initiative has developed a number of alternative livelihood projects in villages that fall within the community-managed area. The top priorities in all areas of activity are providing local communities with sustainable sources of food and income, and guiding the local economy away from dependence on local forests, as was previously the case. Where logging concessions used to constitute a high percentage of the local income base and local economy, the Sisi Initiative is aiming to create new income-generating opportunities. In parallel, the initiative is working on a community-based forest management plan and intends to expand into ecotourism.

From logging concessions to alternative livelihoods

Alternative livelihood projects have provided the local community with sustainable sources of income that do not rely on felling local forests. The suite of alternative livelihood projects offered through the Sisi Initiative also helps enhance forest conservation efforts. As one example, model farms have been established to bolster village food security and reduce encroachment of agricultural land into the forest. The farms are specially designed and cultivated to mitigate soil erosion and enhance the water and nutrient retention functions of the soil. Vetiver grass is being planted to prevent erosion, while pineapples and vegetables provide new sources of food. Nurseries have been established to cultivate yam and taro varieties, while sandalwood farming has been proposed as a complementary activity that would further mitigate pressure on forest resources. A Participatory Land Use Planning Survey, coordinated by Fiji's Department of Land Use, reported a significant improvement in sustainable agricultural practices at the site thanks to the Sisi Initiative.

Another example: a poultry farm has been established and has quickly generated significant income for the local population. Within two months, the community had generated over FJD 1,000 (approximately USD 550) from the sale of chicks – a significant amount in a community where the average daily income is FJD 20 (around USD 11.) Similarly, a beekeeping project is generating income through the sale of honey, while enhancing food security by replacing or supplementing raw sugar in the local diet. The beekeeping project provides additional value as a reminder of the value of standing forests, as the bees source their nectar from forest plants.

The Sisi Initiative has also tailored a number of alternative livelihood projects specifically for local women. Among others, these projects have included training in handicrafts and basket weaving (using raw materials gathered from the forest), jewellery-making and screen printing, baking, and pastry-making. These projects include a specific



component aimed at reviving local culture through traditional dance and weaving. Many of these activities are being developed with the intention of incorporating them into a broader ecotourism strategy for the IBA.

Community-based forest management

Perhaps the most innovative dimension of the Sisi Initiative is its community-based forest management strategy. In return for the suite of alternative livelihood projects that have been developed, communities within the managed forest area have committed through the MOU to conserve and sustainably manage 6,000-hectares of forest. Under this agreement, participating communities agree to not only refuse logging concessions within the demarcated area, but also to undertake collective activities that will restore and enhance the remaining tracts of native forest. With technical guidance from Fiji's Department of Forestry – as well as catalytic funding from the UNDP-implemented GEF Small Grants Programme – a forest resources management plan has been developed by the community and participating landowners.

The management plan has been developed to guide land use and forest rehabilitation activities. It is also designed to guide and direct the sustainable management of forest resources, which is a

key factor in maintaining water quality, ensuring adequate food supplies, and mitigating flood risks. The management plan takes into account the impact of deforestation on fish populations, and allows for connectivity for migratory fish species to move between the saltwater (coastal) and freshwater (Buca River system) habitats of the peninsula.

Ensuring the clear articulation and effective implementation of the forest management plan has required an investment in local capacity building. Training has been provided to members of the Site Support Group in fundraising and proposal writing, which has important implications for the long-term financial sustainability of the initiative. This was also a critical step in securing funding from the UNDP-implemented GEF-Small Grants Programme, which was put towards the creation of two nurseries where native tree species and sandalwood are grown for deployment in the reforestation of degraded areas. Community youth groups in particular have been charged with reforesting degraded forest areas and planting vetiver grass to reduce soil erosion on degraded slopes. The sandalwood trees are also being cultivated as a source of income for the local community and a resource that can be sustainably harvested. Capacity building and training have also focused on environmental education and bird identification, so that community members are able to actively participate in monitoring the IBA.



“Protecting biodiversity is not just about protecting birds or plants, it’s about protecting what’s rightfully yours, your children’s and your children’s children’s. What type of planet will our future generations be living in by 2020?”

Mr. Silio Lalaqila, Treasurer, Sisi Initiative Site Support Group

Impacts



BIODIVERSITY IMPACTS

Prior to establishment of the Sisi Initiative, excessive logging in the Natewa peninsula forests was having predictably deleterious effects on soil quality, biodiversity, and drinking water. So disruptive was the logging to ecosystem functioning and environmental health that dramatic changes were noted in endemic birdlife, marine species and terrestrial biodiversity. The clearance of native forests was effectively destroying the habitats of endemic and vulnerable or near-threatened bird species, which were also under pressure from the incursion of invasive alien species. A lack of alternative livelihood options left peninsula communities highly dependent on logging concessions for income, while the limited availability of flat land drove agriculture ever further into the forest. The Sisi Initiative has mitigated this dependence on logging and provided a suite of alternative, sustainable livelihood options for the local population.

Forest conservation through local management

The initiative's MOU has secured the protection of a 6,000-hectare community-managed forest area. Under the agreement, land-owning clans (*mataqalis*) agreed to conserve and sustainably manage the forest in return for the provision of alternative livelihood projects in their villages. Through the agreement, and despite the absence in Fiji of an official legislative framework for the conferral of protected area status, the Sisi Initiative has effectively created a safe haven for birds and other biodiversity in the peninsula. The Department of Forestry has also demarcated the forest boundaries of the IBA as an area that needs to be protected for the survival of the silktail. Importantly, this has resulted in a decrease in the number of logging licenses issued for the IBA. As a result, reports have been received from communities of sightings of the silktail in forest areas closer to the village, a stark difference to few years ago where one had to walk deep into the forest to see the bird.

Alternative livelihood activities reduce pressure on the forest by creating options for community members who previously relied

on unsustainable agriculture or logging for income. In some cases, these activities have gone beyond risk reduction to interventions that are actually enhancing ecosystem functioning and forest cover. Model farms and tree nurseries, for instance, have reduced the need to clear forest for agriculture. According to a Participatory Land Use Planning Survey, coordinated by the Department of Land Use, there have been significant improvements in sustainable agricultural practices at the site thanks to the Sisi Initiative. In addition, the handicraft, jewellery-making and bee-keeping projects all provide income that depends on non-timber forest products, and so provide an incentive for the forest's conservation.

Building conservation capacity

Crucially, the Sisi Initiative has strengthened the capacity of the local population living in the community-managed forest and the larger IBA to sustainably manage and monitor their forest, empowering them to take responsibility for its conservation. Community members and local landowners were responsible for the development of the forest management plan, and the document gains legitimacy from this high degree of community ownership. Community members have been trained in bird identification and monitoring techniques so that they can take part in the monitoring of the IBA, while younger community members have been involved in reforestation and forest enhancement measures through community youth groups. By building community pride in the forest and highlighting the greater long-term value of standing forest over cleared land, the activities of the Sisi Initiative aim to ensure the conservation of the forest for generations to come.

SOCIOECONOMIC IMPACTS

The Sisi Initiative has empowered the communities of the Natewa Peninsula to pursue sustainable livelihoods that meet their daily needs without destroying the forest that supports ecosystem services and biodiversity.

Alternative livelihoods and improved food security

Importantly, several Sisi Initiative activities are enhancing and strengthening both the short- and long-term food security of local communities. In the short term, pineapples, yams and taro are being grown in nurseries and model farms, which provide household-level food security without requiring that the local population resort to unsustainable agricultural practices. In the long term, the shift to sustainable agriculture will ensure the preservation of the forest and the services it provides – the sources of food, water and resource security.

Beekeeping and poultry-rearing projects, too, are improving food security and providing new sources of income in place of logging concessions. The local communities now use honey from the beekeeping project to replace or supplement more expensive sugar in their diets, while the sale of surplus honey provides a new revenue stream. The poultry rearing initiative in particular has been highly successful, generating approximately USD 550 from the sale of chicks in the first two months of operations. Given that the average daily income of the community is around USD 1, this represents a significant new source of income.

Education, health and capacity building

A significant percentage of income generated through alternative livelihood projects is managed by village committees and is invested in community infrastructure, social services and meeting collective needs. Community profits are regularly invested in children's education and health services, while those profits accruing to individuals have also been directed towards school fees and medical costs. Additionally, the training provided through the initiative is equipping local people with the skills needed to diversify their income base and take a more active role in the governance and management of their natural resources. Training has spanned sustainable agriculture, alternative livelihoods, and biological monitoring and evaluation, the latter to improve management of the community forest and IBA. In addition, members of the Sisi Initiative Site Support Group have received training in fundraising and resource mobilization, proposal writing, small business development and management, and community-based ecotourism. Again, the range and variety of these programs is serving to diversify the skill base – which will ultimately diversify the income base – of the local population.

Traditional knowledge and local culture

In the management of the peninsula forest, the Sisi Initiative has opted to work through traditional channels, drawing from and bolstering local customs. The Memorandum of Understanding which established the community-managed forest area is based on traditional clan (*mataqali*) land management authority, whereby each *mataqali* has the right to decide how their land is used. This traditional system of customary rights is the cornerstone of both the

Site Support Group and the forest management plan. Similarly, many of the alternative livelihood strategies promoted by Sisi Initiative are based on traditional knowledge and local skills. The group has also made concerted efforts to revive traditional cultural practices, such as mekes (traditional Fijian dances).

Meetings with the local communities have always been inclusive, with both men and women present. To allow for the fact that women might be hesitant to speak up in these meetings, separate meetings are held just for women, so that they too may have their say. The BirdLife International team that has partnered with the Sisi Initiative in coordinating its work is headed by a woman. Projects initiated by Sisi have taken gender considerations into account, and consequently, a number of activities were developed specifically with women in mind. Jewellery making, screen printing, baking and pastry-making, which are also being incorporated in the ecotourism strategy, are examples of these.

POLICY IMPACTS

Although Fiji has a number of protected areas and nature reserves, their effectiveness is compromised somewhat by the absence of national protected area legislation. The existing legal framework in Fiji offers a range of mechanisms with the potential to support the establishment and management of terrestrial protected areas. However, community conserved areas, and those established purely on the basis of customary law – such as the Natewa Tunuloa community-managed area – are subject to certain limitations. In this respect, the Sisi Initiative Site Support Group has brought needed attention to both the importance of community-managed areas and the legal obstacles and hurdles they are up against.

The approach used by Sisi Initiative has been brought to the attention of the National Protected Area Committee, formed in 2008 to oversee the development of protected area legislation for Fiji. Since community-conserved areas do not retain legal powers of enforcement, the Sisi Initiative has shown that ongoing conservation efforts, partnership with government entities, and alternative livelihood options are required to support land-owning communities. The mechanism by which the Sisi Initiative established its community-managed forest area – that is, through an agreement with local landowners – provides a powerful demonstration of how this can be achieved.

BirdLife International, in collaboration with relevant government entities, highlighted the approach employed by Sisi Initiative at a 2010 forum of the Protected Area Committee. Consequently, Natewa Tunuloa has been recognised as a site where an informal protected area exists, and where legal endorsement of this status would cement community achievements. The Sisi Initiative is regarded as a leading example of what bottom-up action can achieve. Its experiences, together with similar community conserved areas throughout Fiji, are now being taken into account in the development of a national policy and legal framework for protected areas.

Sustainability and Replication



SUSTAINABILITY

The key to the sustainability of the Sisi Initiative is that it does not offer direct compensation to communities for conservation efforts, but rather helps them to develop income-generating activities that use locally available resources and which complement conservation objectives.

All components of the initiative are deeply rooted in community ownership. From its inception, the Sisi Initiative has prioritized a high degree of community involvement and engagement, beginning with the initial consultations and extending through articulation of the forest management plan. The authority on which the forest management plan is based comes from the communities themselves, recognizing the ownership and control of *mataqalis* over their land. Having this authority legally enshrined in a Memorandum of Understanding legitimizes and strengthens the system of community-based forest management. The *mataqalis* retain control over their land, and thus their continued involvement in the initiative reflects the value they see in continuing to conserve their remaining tracts of native forest.

Sisi Initiative Site Support Group members are nominated by their respective communities and represent the land-owning clans of the community-managed forest area. The Site Support Group delivers reports at village meetings to keep the wider community informed of its activities and to remain accountable to the people it represents. This system complements the traditional system of land ownership, and has gained the confidence of the *mataqalis*, who understand that the decision to sustainably manage their forest resources remains in their hands alone.

BirdLife International holds a long-term commitment to the people of Natewa Tunuloa and to the Sisi Initiative and will continue to provide

support into the future, including through its Local Empowerment Programme. Amongst other things, the NGO continues to provide capacity building training. These efforts have been very successful, notably the training in fundraising and proposal-writing, which resulted in the successful acquisition of a grant from the UNDP-implemented GEF-Small Grants Programme. Community members have also received training in sustainable agriculture and sustainable forest management, and are now successfully managing many of their own alternative livelihood projects. The initiative is legally registered, maintains its own bank account, and is well positioned to operate with relative autonomy. The Sisi Initiative also works closely with the Department of Agriculture (to address threats posed by unsustainable agriculture) and with the Department of Forestry (to address threats of deforestation and to curtail logging).

REPLICATION

The Sisi Initiative approach is rooted in local customs, culture and land management authority, so has a high level of potential for replication in Fiji and across the region. The project model has already, in fact, been applied to community-based conservation initiatives in Fiji. Since its establishment, five other Site Support Groups have been established in the country. Experience gained and lessons learned through implementation of the Sisi Initiative are informing development of these newer Site Support Groups.

BirdLife International has facilitated peer-to-peer exchange programmes whereby representatives of the Sisi Initiative share their expertise and experiences with counterparts in other local conservation groups. Further, outputs from these learning exchanges will be deployed in the establishment of Fiji's Permanent Forest Estate Framework, which is designed to empower local landowners to become part of Fiji's sustainable forest programme.

PARTNERS

BirdLife International has been the primary partner throughout development of the Sisi Initiative. BirdLife facilitated the MOU that led to the establishment of the community-managed forest, and drove development of the alternative livelihood projects. The Sisi Initiative has also benefitted from the support of BirdLife International's Local Empowerment Programme, which provides support to similar local organizations around the world. BirdLife International plays a mentoring and supervisory role in the implementation and management of Sisi Initiative's SGP grant. The NGO has a long-term commitment to supporting the communities of Natewa Tunuloa, and continues to work through its country partner, NatureFiji-MaregetiViti, to further develop livelihood projects that are compatible with conservation.

The UNDP-implemented GEF Small Grants Programme provided a grant of USD 48,000 over two years to fund a projects associated

with the community-managed forest area. This support included the establishment of two tree nurseries and the development of an ecotourism strategy for the IBA (still to be implemented).

The Natewa Tunuloa communities and the Sisi Initiative benefitted from a three-year programme funded by the Critical Ecosystem Partnership Fund (CEPF) and carried out in partnership with Fiji's Departments of Environment, Forestry and Agriculture and the Cakaudrove Provincial Council (the government administration unit that oversees all work undertaken at the site). The I Taukei Land Trust Board was also involved in the planning development of the community-managed forest area.

The Sisi Initiative has also received support from the UK Darwin Initiative, the Australian Government Regional Natural Heritage Programme and the United States Embassy's Small Grants Programme.



“Patience is a virtue and together with hard work and commitment, you’re sure to succeed & be recognized for the little things you do.”

Mr. Silio Lalaqila, Treasurer, Sisi Initiative Site Support Group





NAMDRIK ATOLL LOCAL RESOURCES COMMITTEE

The Marshall Islands



PROJECT SUMMARY

To reduce dependence on declining fisheries and vulnerability to the impacts of climate change, Namdrik Atoll Local Resources Committee is promoting a model of community self-sufficiency, local food security and adaptation. Traditional crops such as breadfruit, taro and native pandanus have been reintroduced to protect and restore soil, improve food security and open value-added secondary processing industries for local communities.

A pearl farm provides jobs and a revenue stream to fund community development projects in education and health. Training in rainwater harvesting is providing the community with access to safe drinking water, and access to solar technology is providing the community with a source of renewable energy. The initiative is community-owned, fueled by local leadership and has provided a sustainability model that has been replicated in other atoll communities across islands in the Pacific.



Background and Context



Namdrik Atoll is located along the western reaches of the Republic of the Marshall Islands, in the archipelago's Ralik (Sunset) chain of islands. The Atoll is situated 240 miles west-southwest of Majuro, the Marshall Islands' main centre of population. Namdrik Atoll consists of just two low-lying islands, Namdrik and Madmad, which house the eight villages of Zulu, Betol, Majol, Jinai, Rantak, Elmon and Madmad. The two islands have a combined land area of just 1.07 sq. miles and encircle a 3.25-sq. mile lagoon.

The majority of the Atoll's approximately 600-strong population is concentrated in the south-western part of the larger Namdrik Island, where a freshwater lens is located. The majority of the Atoll's assets and buildings are located on the lagoon side of Namdrik. The Namdrik community relies heavily on local natural resources to meet daily needs. Marine resources provide for subsistence needs and a small amount of income generation, but the Atoll's main sources of income are copra production and the sale of handicrafts to the main Marshallese centres of Majuro and Kwajalein.

The Marshall Islands' isolation and relatively low population mean that the region harbours some of the world's most pristine coral reefs and richest terrestrial biodiversity. The Marshall Islands lie within Conservation International's Polynesia-Micronesia Biodiversity Hotspot with the northern Marshall Islands forming the Key Biodiversity Area of Kabin Meto. A wealth of marine biodiversity, including over 1,000 species of fish, 362 species of coral, 40 sponges, 1,655 molluscs, 728 crustaceans, 128 echinoderms, 27 marine mammals and five turtle species, has already been recorded in the Islands, with new species undoubtedly remaining to be discovered. About 700 land animals (mostly insects) have also been identified.

Namdrik Atoll is no exception to this abundance of biodiversity, harbouring a wide array of marine and terrestrial species. The Atoll is almost unique among Marshallese atolls in exhibiting concentrated numbers of the black-lipped oyster (*Pinctada margaritifera*) which are believed to thrive in Namdrik's lagoon due to the Atoll's unusual formation. Three mangrove swamps (Ajelto, Lobat and Madmad)



can also be found in Namdrik Atoll, which provide habitats for mangrove crabs. The Atoll is also home to a number of catfish species, the amphibious mudskipper and the Mantis shrimp (*Lysiosquilla maculate*). Mangrove swamps and surrounding systems support tree species including the kanal (*Pisonia grandis*), kojbar (*Neissosperma oppositifolium*), wop (*Barringtonia asiatica*), jon (*Bruguiera gymnorhiza*) and bulabol (red mangrove), some of which are rare or endangered. The Atoll also supports a number of different species of banana.

Threats from climate change

Atoll islands such as Namdrik consist of accumulations of sediment on top of coral reefs, and typically have highly dynamic shorelines that are constantly being reshaped by the forces of erosion and accretion. The Marshall Islands are thought to have breached the

sea's surface between 2,000 and 4,000 years ago as a result of a slight lowering of the sea level. Local stories and recent climatic records together indicate that the Marshall Islands' biodiversity, land and people have endured constant pressure from typhoons and droughts ever since. The low elevation and fragile equilibrium of atoll islands make them some of the most vulnerable landforms with regard to the impacts of climate change.

It is now widely accepted that climate change poses a major threat to low-lying island states such as the Marshall Islands. In the near term, storm surges and flooding threaten infrastructure and livelihoods, while longer term threats include rising sea temperature and ocean acidification with resultant coral bleaching. Ultimately, islands such as the Marshalls could face complete inundation as a result of sea level rise. Sea level rise also threatens freshwater sources through the encroachment of saltwater into the fragile freshwater lenses that sustain agriculture and ecosystems. As one of the lowest-lying atolls in the Marshall Islands, Namdrik is particularly vulnerable.

In 2007, Namdrik's tribal chiefs, elders, and local government authorities reached out to government and NGO partners to request support in initiating a community-based resource management action plan in order to address a number of issues that were leading to environmental degradation and affecting the quality of life on the Atoll. During that year, Namdrik was selected to participate in marine and socioeconomic assessments led by the Secretariat of the Pacific Community (SPC). Due to logistical difficulties, however, these surveys never took place.

The following year, the atoll's leadership requested the development of a community-based resource management project under the Marshall Islands Marine Resources Authority (MIMRA) and other partners in the Coastal Management Advisory Council (CMAC) such as the College of the Marshall Islands and the Marshall Islands Conservation Society. Initial efforts as part of this partnership included the revival of community-based pearl harvesting, with support from New Zealand Aid, the UNDP-implemented GEF Small Grants Programme, and research institutes from Hawaii and Micronesia, as a first step in encouraging conservation of the Atoll's resources.

During 2009, these early conservation and livelihoods activities evolved into a fully-fledged natural resources management initiative. In partnership with relevant government agencies, a Resources Management Plan for Namdrik Atoll was developed, informed by a series of community workshops involving representatives of different groups from the Atoll community. Held over the course of a week in September 2009, successive workshops brought together local government representatives, Namdrik Council, key landowners, and the Atoll's Men's and Women's Groups for a series of participatory planning and mapping exercises.

The resultant plan puts mitigation of the impacts of climate change at the centre of development planning, while simultaneously aiming to address a range of environmental threats that were identified through consultation with the community. The issues identified include waste management, declining fisheries, erosion and

flooding, invasive species, threats to mangroves, and the impacts of shifts in the seasons. Although many of these issues are naturally occurring, they have the potential to be significantly worsened by the impacts of climate change.

Namdrik Atoll Local Resources Committee

Under the leadership of the Mayor of Namdrik (Clarence Luther), the Senator (Mattlan Zackhras), representatives of local government, and tribal leaders, the community as a whole engaged in a process to define the issues and identify concrete actions that could be taken to address them. This process led to the development of the Resources Management Plan for Namdrik Atoll, and the establishment of the Local Resources Committee, charged with management and oversight of the plan's implementation. The Committee is comprised of the Mayor of Namdrik, three representatives of Namdrik Council (or Alaps – a group of the community's elders), two representatives of the Atoll's Women's Group, two representatives of the Men's Group, one representative of the Teachers' Group, one youth representative, and one representative each of the Atoll's Lijabkanira and Wut Kajdo Groups. The Committee works closely with the Marshall Islands Marine Resources Authority (MIMRA), the Marshall Islands Conservation Society and the College of the Marshall Islands for advice and technical support.

The specific responsibilities of the Committee include:

- Developing an annual work plan to guide the yearly implementation of the plan's activities and the achievement of its objectives;
- Making sure that the responsibilities of the community under the plan are carried out properly;
- Working closely with MIMRA and CMAC partners to ensure their obligations are carried out;
- Reporting on the progress of the Resources Management Plan's development to the community and to Namdrik Government Council;
- Arranging community workshops and gatherings;
- Representing the interests of the Namdrik community in national and regional gatherings in matters concerning marine environment and fishery resources;
- With assistance from MIMRA, establishing processes that lead to the formulation and approval of Fisheries Management Ordinances; and
- With assistance from MIMRA, determining conditions and licensing fees for consideration and approval of the Local Government Council.

The focus of the Committee's work is on resilience and adaptability. Despite being in one of the most vulnerable nations in the world to the impacts of climate change, the Namdrik community has taken a strong and proactive leadership position and is taking decisive action to ensure that both their natural resources and their way of life are as resilient as possible to whatever future challenges they may face.

Key Activities and Innovations



As a small and isolated community, highly dependent on local natural resources, threats to Namdrik's fragile ecological equilibrium inherently threaten the health and sustainability of its community members' livelihoods. In order to build resilience to environmental threats and to climate change in particular, the Resources Management Plan focuses on core issues including food security, sustainable livelihoods, and the creation of opportunities for young people, within the context of improving natural resource management. Since 2007, Namdrik's leaders and community members have developed and implemented a set of actions to address the most pressing of the community's concerns.

Securing basic needs

Self-sufficiency was deemed to be a key goal in achieving food security for Namdrik. Where previous generations of the community grew much of their own food, dependence on external shipments has grown, leaving the community vulnerable if food deliveries are delayed, for example during bad weather. To diversify food sources and reduce reliance on imported food, gardens growing traditional food crops are being re-established. Species include breadfruit (which can be stored for many months), taro, more varieties of banana, and native varieties of pandanus which are now harvested exclusively on Namdrik. With these crops at hand, the community aims to be able to survive three to four months without a supply shipment if necessary, rather than three weeks as was previously the case.

Water security is also an issue, as the community previously relied almost exclusively on the Atoll's small and fragile freshwater lens. The incursion of saltwater, exacerbated by sea-level rise, has already contaminated many of the Atoll's wells. To improve water security, rainwater tanks, each holding around 1,500 gallons, were installed throughout the community. Of Namdrik's 120 households, 110 now have a water tank, which significantly reduces pressure on the freshwater lens. Combined with training in water management,

these tanks have reduced the incidence of waterborne diseases such as diarrhoea (which was previously commonplace on the Atoll). In fact, since the water programme was implemented, there have been no cases of waterborne illness at the hospital. The community now aims to be able to survive for at least three months without rain if necessary.

Renewable energy has been promoted across the Atoll. Where previously generators were the main source of power, almost every house now has solar panels. The elementary school also received a 10,000 kW solar panel system to provide for the electricity needs of the school. This initiative, achieved with financial support from the French government and the European Union, has provided cheap, clean, low-maintenance energy and reduced the pollution, expense and uncertainty associated with the use of generators. The community was also able to install 33 solar-powered freezer systems with funding from Taiwan and the United States Department of Agriculture (USDA). Other solar-powered systems include the DAMA TeleCenter, recently installed by the National Telecommunication Authority, which provides internet access and voice calls to the outside world.

Waste management was identified as yet another area requiring urgent attention. Waste and pollution pose serious threats to biodiversity through excessive nutrient loading of water, and poorly managed landfills on the Atoll provide habitat for invasive species such as rats. Without action to address food security, the community feared that changes in climate would require more food to be shipped in, thus exacerbating the waste problem through the introduction of greater volumes of packaging. To address this threat, measures were undertaken to promote recycling, in particular with regard to car batteries and old solar power units. Steps are being taken to formalise a community-based integrated solid waste management system that would serve as a model for other atolls throughout the Marshall Islands.

Developing sustainable livelihoods

Sustainable livelihood options were identified as a pressing need for community members, particularly given the risk of declining fish stocks and the lack of local employment opportunities for young people. Declining fish stocks have been noted throughout the Marshall Islands as the erosion of traditional resource management techniques and a lack of enforcement of traditional conservation practices have led to unrestrained harvesting of marine resources, threatening marine biodiversity and fish populations.

An innovative action plan combines the creation of opportunities for Namdrik's younger generation with improved stewardship of natural resources. Opportunities have been developed for young community members to study natural resource management at the College of the Marshall Islands. Upon completion of the course, these students undertake marine surveys, coastal and erosion monitoring, and vulnerability assessments, which then inform the Atoll's planning. These students also engage in the implementation of sustainable fisheries policies.

In addition, a pilot black-lipped oyster Pearl Farm was established, with its first harvest undertaken in October 2010. This harvest yielded 517 pearls which brought significant revenue to the community. The Pearl Farm will provide a valuable and reliable income on an on-going basis, reducing dependence on copra production for cash income. A scholarship programme is planned to allow community members to learn specialised pearl grafting and harvesting techniques in the Cook Islands.

The replanting and improved management of pandanus trees across the Atoll has facilitated the development of Namdrik's handicrafts industry by the women of the community. The pandanus trees' spiny leaves make a good fibre for weaving, as they are long, thick, and durable, and are used to make a variety of woven handicraft products popular across the Marshall Islands. Namdrik's women have focussed on producing mats and traditional clothing, which can sell for up to USD 100 each. The University of the South Pacific, with the support of the RMI National Training Council, has extended the successful Apprenticeship Jaki-ed Weaving programme to target teenage girls who are unemployed and out of school.

As an atoll island, Namdrik is highly susceptible to erosion and flooding, which the community noted were occurring with increasing frequency. Both climate change and locally-induced stressors are acknowledged to drive coastal changes, posing hazards to homes and infrastructure along coastlines. Although rising sea level is beyond the influence of the Namdrik community, they took action to address a number of local activities that were likely exacerbating the erosion problem. Sand-mining (for construction) was banned from the lagoon-side shore where the majority of homes and infrastructure are situated. The community has demonstrated a desire to learn land surveying skills to help identify the most suitable areas for construction and relocation of houses and to employ alternative building techniques to reduce the impact of construction.

Conserving biodiversity

The Committee has undertaken a number of additional activities specifically to address biodiversity loss and protect important habitats. These activities include the implementation of conservation measures to reduce overfishing, through the use of sustainable fisheries tools such as fish aggregation devices and seasonal no-take zones. The Committee worked successfully with Seacology, an international marine conservation NGO, to fund the establishment of an education, surveillance and monitoring centre and provide additional support to the Pearl Farm as part of an agreement to designate 86 acres within the lagoon as a marine protected area (MPA). Better human waste management will also improve the health of the Atoll's lagoon and thus the health of its fish populations. Shoreline vegetation is also being restored, specifically targeting the Atoll's mangrove forests. The Namdrik mangroves are the largest mangrove system in the Marshall Islands and provide an important nursery area for many marine species. Such improvements simultaneously enhance protection from flooding and erosion.

As one of the countries most vulnerable to the effects of climate change, much of the Marshall Islands is predicted to become uninhabitable within 50 to 100 years as a result of sea-level rise. Despite this disheartening prospect, the people of Namdrik Atoll are implementing a holistic and wide-reaching management plan to ensure the maximum wellbeing and sustainability of their community for as long as external circumstances allow. Their plan is innovative in combining a 'back-to-basics' approach, emphasizing self-sufficiency and the protection of local resources, with the use of modern technology and external knowledge through a range of national and international partnerships.



Impacts



BIODIVERSITY IMPACTS

Most of the activities undertaken by the Resources Management Committee are inherently beneficial to the local environment and biodiversity, although some have been undertaken specifically to address environmental degradation or threats to biodiversity. For example, actions to address waste management issues and the conversion of the Atoll's energy use to renewable sources are major steps towards reducing local pollution of the Atoll. New power sources are cleaner, while improved waste management will reduce contamination of soil and water sources and help to address problems surrounding invasive species.

The restoration of shoreline vegetation through the planting of native and traditionally-used species not only helps to mitigate erosion and flooding of the Atoll but regenerates a crucial habitat. Namdrik's mangroves are the last sizeable such system remaining in the Marshall Islands, and they provide important nursery areas for marine species. The mangroves support some 150 species of fish, including the endangered Napoleon or Humphead Wrasse (*Cheilinus undulatus*), and is home to breeding populations of the critically endangered Hawksbill Turtle (*Eretmochelys imbricate*) and endangered Green Turtle (*Chelonia mydas*). As such, the restoration and sustainable management of the mangroves has positive implication for the Atoll's wider biodiversity.

In late 2012, the entire Namdrik Atoll including the lagoon and ocean reef flat (a total area of 5,435.5 acres) was designated by the Government of the Republic of the Marshall Islands as a Wetland of International Importance under the Ramsar Convention. In doing so, Namdrik became the Convention's 2,050th Ramsar site, and the Marshall Islands' second. Within this area, 286.5 acres is designated as MPA, including an 86-acre, ten-year no-take zone that was established by the Local Resources Committee under the Resource Management Plan in partnership with Seacology.

Steps have also been taken to establish gardens, which provide diversified food crops and also support the conservation of native species, including the pandanus, which is endemic to the region. Breadfruit, taro, and various species of banana are also being cultivated and conserved in these gardens. With support from the Asian Development Bank, the community will undertake an atoll-wide coconut replantation project to replace the old coconut trees that no longer bear fruit. This will also create an opportunity to develop a coconut lumber industry as well as encourage intercropping of various fruit-bearing trees as a food security initiative.

Under the Management Plan, measures are being undertaken to address invasive species which threaten Namdrik's terrestrial and marine biodiversity. Invasive species already established in the Marshall Islands include the plants *Merremia peltata* and *Wedelia trilobata*, the long-legged (or 'yellow crazy') ant (*Anoplolepis gracilipes*) and the Red-vented Bulbul bird species. A study by the Ministry of Resources and Development on both Namdrik and Madmad identified new weeds locally named as 'likatoltol' and 'kiloklok'. The community was advised to pull these by the roots and burn to protect gardening projects. The presence of white fly and a local termite was also noted in some areas. Locally-abundant insects such as the black beetle, mealy bug and *Encarsia formosa* were introduced during the survey process to control invasive species. Training on how to address worst case scenarios involving the invasive species identified was also conducted as part of an agricultural programme funded by the government. Waste management measures will help to address invasive species to some extent, by reducing opportunities for rats (another invasive species) to inhabit poorly managed landfills.

A number of measures related to sustainable fisheries management will help to strengthen fish stocks and marine biodiversity. As well as the mangrove restoration activities outlined above, these include addressing human waste management to improve the health of the Atoll's lagoon, and enforcing a seasonal no-take zone to allow fish stocks to regenerate.



SOCIOECONOMIC IMPACTS

The greatest benefit of this initiative to the community of Namdrik is through its holistic strengthening of the community's long-term resilience and adaptability to the anticipated impacts of climate change. Although the long term future of the Marshall Islands is uncertain, the people of Namdrik Atoll are taking action to ensure that they are as prepared as possible in crucial areas such as food and water security, and are securing their future livelihoods by developing diversified sources of income and new educational and livelihood opportunities for the younger generation. The resulting activities are providing socioeconomic improvements in the short term, for example by enhancing access to fresh drinking water, while helping to ensure the longer term survival and wellbeing of the Namdrik community.

The establishment of food gardens and the promotion of traditional and native food crops are diversifying Namdrik's food sources and reducing reliance on expensive imports. The crops that are being promoted, such as pandanus and breadfruit, can be stored for many months and provide improved food security for the community by allowing them to stockpile provisions for times when supply shipments are delayed by bad weather. Given Namdrik's isolation, such a system provides a great deal of reassurance. By reducing reliance on imports, these gardens can also reduce the cost of food, leaving more income available for other necessities. In the longer term, diversifying food sources will improve food security if certain crops are negatively impacted by changes in climate.

Water security measures, too, have both short and long term benefits. In the short term, the installation of rainwater tanks in almost all of the Atoll's households has reduced pressure on the freshwater lens, and on wells that are increasingly contaminated with saltwater. It

“When I was a boy over 50 years ago, we ate our own fish and grew our own food. We couldn't rely on the supply ship which only came maybe twice year. But now if the supply ship doesn't come for three weeks we are worried – what will we do, what will we eat? So I am helping my community become more sustainable through the initiatives we are developing and implementing with help from government and partners.”

Clarence Luther, Mayor of Namdrik Atoll

has also significantly reduced the incidence of waterborne diseases such as diarrhoea. It is reported that there have been no new cases of waterborne illnesses at the hospital since the rainwater tanks were installed. In the longer term, the tanks will increase the community's resilience to changes in rainfall patterns, allowing them to survive up to three months without rainfall if necessary.

Measures to develop sustainable livelihood opportunities on Namdrik through the development of the Pearl Farm, sustainable fisheries management, and the handicrafts industry, have provided new sources of income, more numerous options for the younger members of the community, and diversified livelihoods, which build the community's economic resilience by reducing reliance on copra production as the main source of cash income. The Pearl Farm's first harvest was a resounding success, indicating a clear prospect of significant revenue to the community in the future. Young community members have been supported to undergo education at the College of the Marshall Islands, where they are trained in sustainable fisheries management, a skill that can be put to use in the implementation of the Resources Management Plan upon their return to Namdrik.

Namdrik's women in particular have been involved in the development of the Atoll's handicrafts industry. This involves the production of house mats from a native species of pandanus. The mats sell for about USD 100 each, providing a source of cash income to the women and again reducing overall dependence on copra production. This financial security, combined with the community's increasing reliance on local food sources, locally generated power and locally harvested water are increasing the decision-making power of women in the community.

As a matrilineal society, land and hereditary titles on Namdrik are passed down through women, and thus women are already empowered and respected within Marshall Islands society. This was reflected and respected throughout the consultative process leading to the development of the Resources Management Plan. As

well as being well represented on the Local Resources Committee, all groups within the community, including Namdrik's Women's Group, have separate meetings as well as partaking in group consultation to identify major challenges and contribute to the development of optimal solutions. This consultative process of developing a shared vision for Namdrik and its future has ultimately strengthened the community by bringing its members together in pursuit of a shared goal.

POLICY IMPACTS

The main policy benefit of the work undertaken on Namdrik has been through its value in demonstrating to policy makers and practitioners the types of activities that are most successful in building the resilience of atoll communities such as Namdrik. The strong partnership between Namdrik's leadership, its community members, and their array of national and international partners has helped to engage government and NGO groups to get involved and has inspired other atoll communities to consider taking similar steps.

National policy frameworks, such as the Marshall Islands' Reimaanlok' (Way Forward) National Conservation Area Plan, are being directly informed by lessons learned through the implementation of Namdrik's Resources Management Plan. For example, at a specially convened Parliamentary session in August 2011, the Executive Director of the Marshall Islands Conservation Society (Mr. Albon Ishoda) presented Namdrik Atoll's work on community-based adaptation, emphasizing how such work could be used to inform planning for the Marshall Islands more widely. This presentation was attended and supported by the President of the Republic of the Marshall Islands and the First Lady. The Mayor of Namdrik has attended and spoken at regional meetings on adaptation to climate change. He has also shared his expertise with other Marshallese and Micronesian communities that find themselves facing similar challenges, and even more broadly, with communities from other regions such as the Caribbean, Melanesia and Polynesia.



Sustainability and Replication



SUSTAINABILITY

The development and implementation of a natural resources management plan by the Local Resource Management Committee are sustainable for a number of reasons. First, the initiative is very much led and owned by the community. Rather than being imposed by external actors, the Resources Management Plan was initiated and developed by the community itself. The community was involved in the Plan's development through a series of consultations with the Atoll's various groups.

Second, the initiative benefits from strong local leadership and political support from a number of levels: the Senator and Mayor of Namdrik, as well as tribal chiefs, national government representatives and even the President of the Republic of the Marshall Islands have voiced support for the Plan and have actively supported its development. The initiative operates in coordination with local government and tribal leaders. The local government authority has a mandate to manage and protect resources within a of five miles' radius from the Atoll, while the *Iroij*, (tribal chief), *Iroij-drik ro*, *Alaps* (tribal elders) and *dri-jerbal* (traditional leaders) play advisory and leading roles pertaining to economic and social development issues.

Third, Namdrik's Resources Management Plan, which forms the basis for the Local Resources Committee's activities, is strongly aligned with national policy, including the national strategy for resource management (Reimaanlok) which has received strong endorsement from Parliament. This lends legitimacy and a sense of purpose to the community's endeavours.

Fourth, a team of local and international partners have committed their ongoing support to the initiative, with roles and responsibilities clearly defined in the management plan, which is intended to become a statutory document. Such support from partners is focused on building Namdrik's sustainability by transferring skills to the community, thus reducing dependence on external assistance.



Finally, the activities being undertaken under the Plan have both short- and long-term benefits, which allow community members to see the results of their efforts now as well as knowing that they are strengthening their long-term resilience to future challenges. This helps to bolster local support for the plan and to provide on-going incentives for its implementation. The plan also has a strong emphasis on self-sufficiency and sustainability, placing high value on reducing Namdrik's reliance on imports, while valuing local solutions to local problems. The plan offers a vision for the future that keeps Namdrik's community connected with their natural and cultural heritage.

REPLICATION

The Namdrik initiative has inspired other atoll communities within and beyond the Marshall Islands to take similar action to build their own resilience to climate change. This has taken place through both formal and informal channels. Namdrik has become something of

a benchmark for the climate change adaptation strategies of other Marshallese atolls and islands, and has informed official guidance to other atoll communities, as well as the 'Reimaanlok' national resource management strategy. Namdrik is viewed as a working model in strategies to build climate change resilience, improve food security, and enhance natural resource management. The Namdrik initiative has also been presented to Parliament and receives widespread support from policy makers and high-level government officials, as well as the President.

One of the benefits of Namdrik's work is as a demonstration site to policy makers and practitioners involved in supporting the development of climate change adaptation strategies in other Marshallese atolls. With support from the Coastal Management Advisory Council, communities across the Marshall Islands are building on the successful programme initiated at Namdrik. Strong leadership from Namdrik's Mayor and Senator has helped to inspire other atoll leaders to consider similar action. For example, the Mayor of Namdrik has attended and spoken at regional meetings on climate change adaptation. He has also shared his expertise with Marshallese and Micronesian communities that face similar challenges, as well as with communities from other regions such as the Caribbean, Melanesia (e.g. Papua New Guinea and Solomon Islands) and Polynesia. The Mayor has also participated in international meetings focusing on sustainable development at the community level in both Brazil and India.

PARTNERS

Although geographically isolated, the Namdrik Atoll Local Resources Committee takes advantage of a range of partnerships with government agencies, NGOs and educational institutions. The consultative process of developing Namdrik's Natural Resources Management Plan has united the community in pursuit of a shared goal. Their vision has benefitted from the engagement of external partners who have provided expertise, finance and support.

The Marshall Islands Conservation Society (MICS) and the **Coastal Management Advisory Committee** assisted in the drafting of Namdrik Atoll's Resources Management Plan. MICS has also assisted the Committee in coordinating conservation efforts, including solid waste management, climate vulnerability assessment, coastal and marine monitoring and training.

The Committee works closely with the **Marshall Islands Marine Resources Authority** and other partners in the Coastal Management Advisory Council including, importantly, the **College of the Marshall Islands (CMI)** for advice and technical support.

The **UNDP-implemented GEF Small Grants Programme** provided a grant of USD 50,000 to support the development of Namdrik Atoll's Pearl Farm. **The Nature Conservancy**, with endorsement from the **Australian Government**, is supporting training and scholarship opportunities for younger community members to learn how to manage the Pearl Farm, led by MICS.

Seacology provided USD 34,000 for the construction of an education, surveillance, and monitoring centre, and has provided continued support for the Pearl Farm and funding support for the Committee's operation, in return for the allocation of 86 acres within the lagoon as a no-take marine protected area. Seacology agreed to fund continued surveillance, monitoring and protection of this site in exchange for the Atoll communities designating it as a no-take zone for ten years. The Local Resources Committee may approach Seacology for further support in protecting the rest of Namdrik's MPAs

MIMRA and other partners assisted Namdrik's effort to develop the pearl project and forge connections with other partners such as Dr. Maria Haws and Simon Ellis of **Pacific Aquaculture and Coastal Resources Center (PACRC)** at the University of Hawaii in Hilo, the **Marine and Environmental Research Institute of Pohnpei (MERIP)**, and CMI and MIMRA's Pearl Farm project.

The installation of solar panels in each household and at the elementary school to provide renewable energy on Namdrik was supported by the **European Union**. The solar-powered freezer systems were funded by the **USDA** and **People's Republic of China (Taiwan)**. The installation of water catchments on Namdrik was also supported by the Taiwanese government, along with the European Union.

University of the South Pacific (USP) and the Marshall Islands' **National Training Council** supported the extension of the successful Jaki-ed Apprenticeship Weaving Program to training targeted young girls that are considered unemployed and out of school.

The Ramsar Convention recently recognised Namdrik Atoll as its 2,050th Wetland of International Importance. Efforts are taking place to take full advantage of the various programmes to raise awareness and continuously promote the wise use of mangroves as an adaptation measure to climate change.

The **Marshall Islands National Telecommunication Authority (MINTA)** helped install a solar-powered satellite system (DAMA) call centre which provides access to internet and voice calls with the outside world.

In 2009, the **Coastal Resources Center** at the University of Rhode Island's Graduate School of Oceanography and the **United States Agency for International Development (USAID)** initiated a partnership with the Marshall Islands to pilot an international programme to mainstream climate change adaptation into coastal management initiatives. This involved working directly with the Namdrik community to demonstrate assessment and adaptation activities, and to integrate this within the larger national policy framework. In 2010, a specialist from the Coastal Resources Center visited the community to provide technical support and advice to the Local Resources Committee.



CONSERVATION SOCIETY OF POHNPEI

Micronesia, Federated Islands



PROJECT SUMMARY

Since 1998, the Conservation Society of Pohnpei has worked to improve the ecological and social sustainability of a network of seven marine protected areas around the island of Pohnpei in the Federated States of Micronesia. Through environmental education and biological monitoring programmes, the initiative has coordinated marine conservation efforts across Pohnpei, while encouraging a diverse suite of alternative livelihood activities for local communities to reduce human pressures on scarce marine resources. In recent years, the organization has supported MPA sites to introduce innovative monitoring and enforcement systems that combine modern and traditional approaches.

The organization also operates an environmental education program which reaches more than 8,000 students in 27 schools across the island, has engaged in conservation of important terrestrial forests and watersheds, and has partnered in initiatives to eradicate invasive species.



Background and Context



The Federated States of Micronesia (FSM) is made up of 607 islands spread over one million square miles of the western Pacific Ocean, comprising four states – Yap, Chuuk, Kosrae, and Pohnpei. The islands of the FSM contain over 1,000 plant species, at least 200 of which are endemic. Its coral reefs, estimated at 14,517 km², are home to nearly 1,000 species of fish and over 350 species of hard coral. Its proximity to the Indo-Malay region, and the vast distances between the islands favored high endemism and species diversity. The majority of people living on these small islands depend on natural resources for their food, livelihoods, and traditional cultures. These resources are threatened by pressures associated with rapid population growth, overharvesting, habitat destruction, changing cultural practices, invasive species, and climate change.

Palikir, capital of the Federated States of Micronesia, is located on Pohnpei Island. At over 780 metres, Pohnpei's tallest peaks are lush and verdant, towering above a gentle talus slope at lower elevations around its 80-mile (130 km) circumference, surrounded by coral reefs. The state of Pohnpei covers approximately 133 square miles (345 km²), with a population of around 34,000; its outer islands include Pingelap, Mokil, Ant, Pakin, Ngatik, Nukuoro, and Kapingamarangi.

Balancing livelihood needs with resource sustainability

In recent decades, this island state has been the setting for a conflict between local resource use and environmental sustainability. A growing Ponapean population and the transition from subsistence lifestyles to a cash-based economy resulted in unsustainable levels of harvesting of fish and wildlife by the island's communities. This has been particularly acute in the case of marine and coastal resources, leading to the overharvesting of fish populations, depletion of mangrove forests, and declining coral reef health.

One approach to conserving these threatened marine resources is the institution of Marine Protected Areas (MPAs), first established in Pohnpei in the late 1990s as part of a national strategy to conserve

the Federated States of Micronesia's biological diversity. The FSM's Environment Sector Strategy (1999) called for the establishment of a "network of effective community-managed, ecologically representative, and socially beneficial marine and forest protected areas in the nation to safeguard the country's precious natural heritage". In 2003, the FSM completed a National Biodiversity Strategies and Action Plan (NBSAP) with the goal of protecting and sustainably managing a full representation of the country's marine, freshwater, and terrestrial ecosystems. In the same year, the government of the FSM, the U.S. Forest Service, The Nature Conservancy (TNC), university scientists, and local experts also drafted "A blueprint for conserving the biodiversity of the Federated States of Micronesia" to begin to address this goal.



A total of 130 areas of biodiversity significance, including 86 coastal and marine sites comprising 260,948 hectares, were identified nationwide. Marine Protected Areas were a key strategy adopted to regulate over-fishing, and are now well-established as a conservation measure across FSM, including in Pohnpei. Each MPA site incorporates a no-take zone; many also include key fish spawning sites known to local fishing communities. By banning fishing from these areas, the MPAs hope to allow for regeneration of species numbers. To date, however, the effectiveness of these MPAs has been limited by a lack of government investment in tactics to enforce fishing regulations, leading to encroachment within protected marine and coastal zones by local fishers.

Conservation Society of Pohnpei

The Conservation Society of Pohnpei (CSP) emerged largely to bridge the gap between state-led conservation efforts and the local stakeholders affected by them. The group was founded in 1998 by a group of forty volunteers with the aim of preserving the natural heritage of Pohnpei State and promoting sustainable development based on community-led resource management. Their approach was to act as an intermediary between the traditional leaders of communities and state authorities to ensure local compliance with legislation on MPAs, watershed reserves, and fishing regulations.

CSP works to create linkages between the state and local communities in the management of natural resources. Through environmental education campaigns, supporting alternative livelihood projects that reduce fishing pressures, and engaging communities in participatory processes to establish MPA boundaries, CSP has sought to root marine management in local capacities. To ensure compliance with regulations, the initiative has combined innovative monitoring strategies with traditional justice systems, with some notable successes. CSP currently works with a network of seven MPAs around Pohnpei's main island. Other work areas have included invasive species eradication, improving water quality through watershed management, and collaborating with partners in research and monitoring activities.

CSP's work has taken place against the background of ongoing attempts to rehabilitate fish stocks and coral health around Pohnpei. Government efforts were renewed in 2006, when the Federated States of Micronesia was one of five nations to sign up to the Micronesia Challenge (along with the Republic of Palau, the Republic of the Marshall Islands, the U.S. Territory of Guam, and the Commonwealth of the Northern Mariana Islands) in partnership with The Nature Conservancy. Together, they promised to conserve 30 percent of near-shore waters and 20 percent of key lands in the region by 2020. Rapid Ecological Assessments were conducted around Pohnpei's main island to inform this strategy, and have been used to direct the setting-up of Marine Protected Areas.



Key Activities and Innovations



The group categorizes its activities into three main areas of work: marine, terrestrial, and educational. These focuses are integrated into a holistic approach to environmental conservation, emphasizing for Ponapean residents that their land-use practices directly affect the state of the marine environment. CSP's terrestrial programme works with communities neighbouring Marine Protected Areas to mitigate poor land use practices, while its marine programme includes enforcing bans on destructive fishing practices. The educational component is targeted at Pohnpei's large youth community, and is delivered through extensive outreach programmes.

Marine programme

The main focus of CSP's marine programme is coordinating the activities of their network of Marine Protected Areas. There are eleven legally-designated MPAs surrounding Pohnpei; CSP currently works in close collaboration with seven of these areas, namely Nahtik and Kehpara in the municipality of Kitti, Dehpek/Takaieu and Mwand (Dekehos) in U, Sapwitik in Nett, and Namwen Na and Namwen Nanhngih in Madolenihmw.



Many of these MPAs were established as early as 1999, but have faced difficulties in ensuring compliance and gaining local support. With the help of community youth groups and the Pohnpei State Office of Marine Conservation, CSP has demarcated the MPAs with boundary markers, no-take signs and mooring buoys, all of which are maintained regularly. They work in close conjunction with state conservation officers, municipal police, and community leaders in developing plans for the co-management of MPAs. These are known locally as "Community Action Plans". This process of developing co-management plans can typically involve between five and ten participatory planning meetings. CSP's role also consists of providing technical and scientific advice, developing the capacity of conservation enforcement officers to impose established rules and regulations, facilitating the creation of a network through which MPAs can learn from one another, and the collection of fish and coral reef data at the MPA sites.

CSP has conducted extensive research and environmental assessments within the MPAs in conjunction with partners, as well as training community volunteers to conduct biodiversity monitoring. This has included monitoring of seagrass, coral, sediment and spawning fish populations. By facilitating network development between the different MPAs, CSP hopes to provide a forum in which conservation managers can learn from one another, as well as from other MPA networks in the Asia-Pacific region, and work collaboratively to gain support from traditional and government leaders. This includes funding to support MPA management, on- and off-island trainings and learning exchanges, and allocation of equipment and supplies to managers and enforcement officers. To supplement their conservation of marine areas, CSP has encouraged the development of alternative livelihoods such as sponge and coral farming.

As well as maintaining this MPA network, CSP has advocated for the creation of new protected areas, with notable success in the case of Ant Atoll, a neighbouring privately-owned island. New legislation established the Ant Atoll Biosphere Reserve in 2010. The momentum

for community-based marine management has also led to three MPAs being created on Pakin Atoll, another local island.

Terrestrial programme

CSP's terrestrial programme has been based on parallel conservation and monitoring efforts conducted on Pohnpei island. This has included the creation of a Watershed Forest Reserve in which agricultural activities are restricted, and other initiatives to improve water quality. A second area of work has been raising awareness on the eradication of invasive species, such as the False Sakau plant, entailing a campaign to change agricultural practices in upland areas of the Forest Reserve. Finally, CSP has also worked with international partners on an Ethnobotany project, compiling documentation of the island's plants, their medicinal properties, and their usage by local people.

Education and awareness-raising programme

The third component of CSP's work is raising awareness of conservation through educational outreach. Their Environmental Awareness Programme works to educate Pohnpei residents about the importance of the environment and encourages their participation in conservation activities. The Society's flagship programmes are the "Youth-to-Youth" Programme, which works with grade six classes from seven local schools; the Green Road Show, which travels to elementary schools on the island and works with grade five classes; an Environmental Club for high school students; and community outreach, involving various communities in Pohnpei. CSP has also supplemented its public education efforts with the production of several publications, including a quarterly newsletter, and weekly radio programmes, video, posters, a children's activity booklet, and numerous other resource materials.



Impacts



BIODIVERSITY IMPACTS

Pohnpei is home to some of the richest biodiversity in the Federated States of Micronesia. Sixteen percent of its species are endemic, including 110 trees, 56 birds, 25 species of terrestrial tree snails, 3 fish species and the skink lizard. Pohnpei also has the lowest dwarf cloud forest and the largest intact lowland tropical forest in the Pacific, and the largest grouper fish spawning and aggregation site in the Indo-Pacific region. These features have made the area the focus of many international conservation groups and researchers; the Conservation Society of Pohnpei has facilitated these relationships, and integrated the results into its conservation strategies. Much of CSP's work within its seven Marine Protected Areas has been based on analysis of the main threats to its ecological integrity.

Integrating international expertise and local action

From 2005 to 2006, a Rapid Ecological Assessment (REA) was conducted in Pohnpei, including Ant and Pakin Atolls, to identify areas of significant biodiversity. This framework was developed by TNC and was carried out in conjunction with CSP staff. The results were used to assess the effectiveness of the existing MPA network, both from a fisheries and biodiversity perspective. For instance, a unanimous finding recorded by the team of scientists during the REA was that sedimentation caused by human activity is a threat to biodiversity conservation within the Pohnpei lagoon. CSP's current efforts incorporate a "ridges to reef" strategy to address the threats of sediment build-up and pollution, which affect the health of the coral reefs and therefore fish stocks. CSP also conducts its own ongoing monitoring of Pohnpei's fish populations, coral reefs, sediment build-up, and seagrass to keep track of positive or negative changes over time, as well as implementing socioeconomic and governance monitoring programmes; these results inform the management of individual MPAs and the MPA network as a whole.

Monitoring key biodiversity indicators

Commercially-important fish species: Key fishery species and benthic habitats are monitored inside and outside of each MPA using permanent belt transects and line-intercept transects. Using volunteers from local communities, CSP conducts fish monitoring in five MPAs. Monitoring fish populations measures the effectiveness of MPA management and occurs bi-monthly in and around the MPAs, to indicate population trends over time. This has focused on three of the preferred local market fish families: Scaridae (Parrots), Lethrinidae (Emperors), and Siganidae (Rabbit).

Fish spawning sites: The Serranid spawning aggregation at Kephara MPA, meanwhile, is monitored on an annual basis, using permanent 325-ft transects. The three aggregating species — Widir (or Camouflage grouper), Sawi (Coral trout), and Ripw-ripw (Brown Marbled grouper) — occupy the reef in distinct sections where they perform rituals that include changing colour, territoriality and courtship. These events repeat around full moon every January to May and last 1-2 weeks per month. During the past decade, Widir species numbers have declined as a result of unregulated overfishing, representing an ongoing challenge for Pohnpei's Marine Protected Areas. Kephara MPA's Widir aggregation and spawning site is the last remaining of substantial magnitude in the Asia Pacific region. CSP has assisted in instituting a state-sanctioned annual ban on the sale of grouper fish in the months of March and April. This is monitored through markets, however, rather than on-site: the ban has not prevented fishers from freezing their catches to sell after the closed period, and is an ongoing concern for CSP's conservation efforts.

Coral health: CSP currently monitors coral health in Dehpehk, Dekehos, and Sapwitik MPAs to determine yearly changes in the coral community, using monitoring of neighbouring coral reefs as a basis for comparison. Coral sedimentation monitoring is also undertaken in Sapwitik MPA, as well as in adjacent reefs to sand mining areas

in order to measure water quality. All samples are collected, dried, and weights are recorded. The resulting data is plotted to determine sediment load throughout the year.

Seagrass: Seagrass monitoring has been carried out on Pohnpei since 2001 by researchers from the College of Micronesia. In 2007, CSP partnered with this team at two existing sampling sites, Ipwal-Sokehs and Rohi-Kitti, and included a new site at Sapwitik Island MPA. Results from this research contribute to SeagrassNet, an international monitoring programme that documents coastal habitats worldwide.

Ecological monitoring informing conservation practice

These ongoing monitoring processes help to inform the regulation of activities within the Marine Protected Areas. Methods for ensuring compliance with the protected areas' regulations have included traditional ceremonies held in conjunction with community members, village leaders, NGO representatives, CSP staff, and municipal government representatives, in which trespassers ask village chiefs for forgiveness. Cultural norms around shame and punishment, dictated by a person's rank within their village community hierarchy, are a potentially powerful tool to ensure compliance. This process of traditional justice has been promoted by CSP in Enipein community, part of the Nahtik Marine Protected Area.

CSP has also assisted Nahtik MPA in finding innovative ways to monitor compliance within their no-take zone. In 2007, with a grant of USD 20,650 from the UNDP-implemented GEF Small Grants Programme, local community conservation officers built a bamboo raft, complete with roof, cooking area and outhouse, from which to monitor illegal fishing within the MPA. This also allows monitoring during the night, when incursions would otherwise go undetected. The combination of re-introducing traditional justice systems and encouraging modern-day innovations has proved to be highly successful in the case of Nahtik MPA.

Combating environmental challenges on Pohnpei Island

Terrestrial resource management has supplemented CSP's marine programme. The creation of a Watershed Forest Reserve to protect Pohnpei's upland forest has been a major initiative undertaken by CSP, while recent work has focused on the Nanpil and Sehnpehn Watershed. The project studies the correlations between stream flow, sediment load and rainfall, using gauge measurement and monitoring studies. These activities provide solid information on the effects of land-clearing activities on the quality of the watershed and the sedimentation runoff levels to the coral reefs. CSP is also working with communities to establish community-based Mangrove Forest Reserves. This process has consisted of participatory workshops, zoning demarcation, and monitoring mechanisms. Another concern is the control of invasive species. CSP works with the Pohnpei Invasive Species Task Force to eradicate and raise awareness on alien species.

False Sakau: A primary threat to biodiversity in Pohnpei is the illegal growing of False Sakau (*Piper Arithrium*) in the Watershed Forest

Reserve. Sakau is used to produce a traditional beverage with a calming effect that has been widely consumed in Pohnpei and other South Pacific islands for centuries. Once restricted only to the aristocracy, this root drink has become widely popular in Pohnpei. Traditionally the crop was grown mainly in the lowlands, but demand has become so high that people are increasingly moving illegally into the uplands forest reserve and clearing trees to plant sakau, where it grows faster.

To discourage sakau farmers from encroaching on watershed reserve land, CSP has developed the "Grow Low" campaign. Farmers are taught new and more effective techniques for growing sakau in the lowlands, given sakau seedlings to start their new farms, and are also given vegetable seedlings and training in growing vegetables to supplement their income. To date, CSP has worked with over 3,000 sakau farmers. The incentives offered by the programme, in conjunction with a strong compliance system, proved to be effective in decreasing the number of new forest clearings from 2002 onwards. In 2007, with a USD 50,000 grant from the GEF Small Grants Programme, CSP implemented a two-year programme incorporating the distribution of vegetable seedlings to sakau farmers as a means of generating alternative income sources in a shorter period of time. It was envisaged that this project would bring sufficient income and better nutrition to sakau farmers, further reducing the number and size of forest clearings in the Watershed Forest Reserve. While the work has continued using funding from the European Union, the alternative livelihoods component has not taken hold. Sakau continues to be grown, largely as a result of its cultural importance for Ponapeans. It is used in traditional ceremonies throughout people's life cycles, and has continued to expand from a preserve of the richer elite to a widely-shared practice. CSP's work did have success in moving sakau growing out of the island's important forest watersheds, however.

Monitoring forest watershed integrity: Since 2001, the Watershed Forest Reserve monitoring programme has focused on thirteen forest areas. These areas have been monitored for human incursions, and especially clearing forest areas for land plots to plant crops. Run-off from clearings in the forest reserve adds to sedimentation, damaging Pohnpei's coral reefs. A few community members from each area are taught measuring and evaluating techniques, including the use of GPS technology, and are responsible for quarterly monitoring of forest activities in these areas along with CSP staff and municipal police. Recent monitoring results have shown that CSP's terrestrial strategies are having a positive effect. Within the first year, there was a 50% decrease in forest clearing. The clearest results were in areas where the watershed boundary lines were already demarcated, such as U and Madolenihmw. This demonstrated that having clearly demarcated watershed boundary lines is an effective strategy to discourage intrusions. From a high of six hundred forest clearings in 2002, plots fell to twenty-eight in January 2004, while in April 2005 there was a single clearing recorded. In 2006, there were eight new forest clearings, followed by only five new clearings in 2007.

Terrestrial invasive species: Invasive species targeted by CSP for eradication include the Ivy Gourd (*Coccinia grandis*), Chain of Love (*Antigonon leptopus*), Mile-a-minute (*mikania micrantha*), and the



Brown Tree Snake (*Boiga irregularis*), an invasive species that has famously devastated native bird populations in Guam. Through participation in a high-level advisory group, the Regional Invasive Species Council (RISC), the Federated States of Micronesia and other Micronesian nations are drafting a bio-security plan to address the spread of invasive species in the region. Through awareness-raising about these threats, CSP can play a role in a locally-adapted plan as part of this regional strategy, which hopes to eradicate 100% of these species by the end of 2012. CSP has implemented its invasive species programmes with the support of the Critical Ecosystem Partnership Fund (CEPF). It has also helped to coordinate a three-year strategic action plan for the Invasive Species Taskforce of Pohnpei (iSTOP), a multi-agency group aimed at protecting the island from the threat of invasive species.

Environmental awareness-raising

In addition to measures that enforce compliance with CSP's various conservation initiatives, the group has carried out environmental education initiatives with Pohnpei's communities. Much of this has focused on young people. Since 2002, the "Green Road Show" has delivered mobile, entertaining environmental education for Pohnpei's fifth grade students. This was the first environmental education programme focused specifically on Pohnpei's conservation issues. Two Environmental Educators visit primary schools six times throughout the school year in a painted vehicle, teaching educational sessions centered on four environmental topics: Upland Forests, Mangroves, Coral Reefs, and Waste and Pollution. Students receive activity booklets, while posters are given for classrooms. Test results

from before and after the visits show an increase in the participants' knowledge of their environment. This programme has visited all 27 island schools, reaching approximately 8,000 young students to date. This work is undertaken in partnership with the state's Environmental Protection Agency and the Department of Education.

Borrowing from the successful Youth-to-Youth public education and awareness programme in the Marshall Islands, the Conservation Society of Pohnpei has tailored this approach to improve environmental awareness and education in Pohnpei. Together with partners, CSP coordinates the "Pwulopwul ohng me Pwulopwul" (Youth-to-Youth) environmental programme in seven schools. The programme partners each school with a state agency or non-governmental organization to work on an environmental project throughout the school year. Projects that have been implemented include lowland sakau production, water quality testing, medicinal plant gardening, marine surveying, demarcating Marine Protected Areas, education on Persistent Organic Pollutants, marine conservation practices, mangrove forests, agroforestry, upland forest/deforestation, and recyclable art. The respective agency, teachers and students carry out their chosen activity in the surrounding community. The programmes culminate in a fair where students showcase what they learned from their mentor agencies in the form of drama, poster shows, presentations, songs and dances. The fair is also taped and aired on the local radio station and recorded and edited for the local TV station.

An Environment Club, formed by CSP in 2004, targets high school students. Activities in 2005 included participation in CSP's RARE Conservation flagship species campaign, raising awareness of the

Pohnpei Mangrove Crab (Elimoang), as well as radio programme production, video making, mural painting, community outreach and environmental songs. Summer marine environmental camps have given students the opportunity to participate in coral identification, fish monitoring, GPS techniques and Marine Protected Areas exploration. In 2007, CSP held its first terrestrial summer camp, at which students learned about the Watershed Forest Reserve, Ethnobotany, forestry, and bird surveys, and were able to hike Nahnalaud, the highest mountain in Pohnpei.

In 2010, a Youth Environmental Ambassadors Summer Camp was held on Black Coral Island. The Society's Marine programme and the Marine Conservation Unit led the students through three days of interactive sessions on marine conservation and environmental laws and regulations in Pohnpei. The students were also given a tour of the Nahtik Marine Protected Area, including the permanent monitoring raft. These extensive environmental education and outreach efforts are integral to the organization's long-term strategy of equipping Pohnpei's youth with the knowledge and technical skills to value and conserve their island's natural and cultural heritage.

SOCIOECONOMIC IMPACTS

The socioeconomic benefits of CSP's work have been felt through their sustainable aquaculture programme, an ethnobotany project documenting knowledge on medicinal plants and their usage by local people, and water quality monitoring.

Diversifying marine-based livelihoods

CSP works in partnership with another local NGO, the Marine Environment Research Institute of Pohnpei (MERIP), to support sustainable aquaculture in the form of sponge and coral farming. The technical role of coral and sponge farm development is handled

by MERIP, while CSP assists with raising awareness of and promoting the idea in the targeted communities. The number of sponge farms grew from two in 2001/2002 to twenty active farms by 2007. Six coral farmers were given training in 2006; this number increased to nine in 2007. The number of farms is expected to expand by more than 50% in the next three years as local markets are established and begin to grow. Most of the sponge farmers are connected to Pohnpei's MPA Network, which includes the MPA communities of Nahtik, Sapwitik, Mwahnd, Dehpehk, Namwen Nahningi and Namwen Na. Markets developed to date include local hotels and restaurants, a U.S.-based private company, the Community Conservation Network in Hawaii, The Nature Conservancy in Minnesota, and Swatch, in Japan.

Coral farming has helped to diversify the income of farmers and, due to a shorter maturation period, farmers receive more rapid returns on their time and investment. One cause of overfishing is the artificially low market prices paid to fishers that drive them to take increasingly larger volumes of fish to cover growing expenses, such as rising fuel and supply costs, and still earn a living wage. By supplementing their income through sponge or coral farms these fishermen are able to reduce their fishing to more sustainable levels.

Demonstrating the value of biodiversity to wellbeing

A project that has successfully combined conservation, culture, and the health of local communities is the Micronesia Ethnobotany Project, begun in January 2006. This project was initially established in 1997 by a researcher from the New York Botanical Garden, USA. Two CSP staff members currently participate as field staff in this project.

The initiative aims to preserve and document the traditional uses of plants. Plant use information is carefully obtained through interviews and collection of specimens. These are dried and submitted to research institutes for identification and herbaria purposes. Plant specimens



are also returned and stored at the College of Micronesia herbarium in Palikir. The project's findings have been documented in two books: *A Primary Health Care Manual and Ethnobotany of Pohnpei: Plants, People and Island Culture*. The Primary Health Care Manual has included local plant uses for common ailments and was made available to health care professionals on Pohnpei in the many dispensaries around the island. *Ethnobotany of Pohnpei, Plants, People and Island Culture* serves as a record of Pohnpei's traditional plant knowledge. The latter was published in January 2009, copyrighted in the name of Pohnpei's traditional leaders and the Pohnpei State government, ensuring that this knowledge remains the property of Pohnpei's people.

A second health benefit of CSP's work has been in improved water quality for Pohnpei's citizens. The Nanpil River is a vital source of drinking water for nearly 60 percent of Pohnpei's residents. CSP targeted the river's water quality in the community of Nett in an eighteen-month project funded by the European Union, from 2008-10. This project was varied in its scope and activities: one of the main components was the continuation of the "Grow Low" Sakau campaign, which encouraged farmers to plant in the lowlands rather than in the watershed forest reserve, while a team also identified over 34 sources of contamination, mostly piggeries or pit toilets, along the river banks. CSP, in conjunction with the Environmental Protection Agency, tested water at five different locations and found levels of *E. coli* and Enterococci to be extremely high in some sites. With the support of the Federated States of Micronesia's Integrated Water Resource Management fund, CSP has identified good practices in animal and human waste management to help counteract this threat. The fund has also helped support public awareness and education activities comprising community meetings, radio announcements, and posters. CSP has identified resources to remove half of these sources of contamination from Nanpil, as well as expanding to assess tributary rivers and streams, using geographic information system (GIS) mapping of these sites to develop action plans for further contaminant removal.

Socioeconomic and governance monitoring within MPA communities provides feedback on how the MPA is affecting people's lives and monitors the communities' understanding of the value of MPAs and their involvement in their management. Information from all of these monitoring activities is used to strategically manage the MPA network and to further formulate sound management policy.

POLICY IMPACTS

CSP's success in coordinating conservation activities within Pohnpei has led to it playing a lead role in conservation within the Federated States of Micronesia. One success in this area has been the designation of Ant Atoll as a biosphere reserve, while CSP has also contributed experts to national research bodies.

Collaborative creation of a new MPA

Ant Atoll is one of the most significant islands in Micronesia, and was identified as one of twenty-four "Priority Action Areas" in the

Federated States of Micronesia's National Biodiversity Strategic Action Plan (NBSAP). During the Rapid Ecological Assessment conducted in 2006, the Ant channel was recorded as having one of the highest levels of biodiversity in Pohnpei, with an estimate of over 165 species of fish, 25 bird species, and 13 species of reptiles, including the green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*). One of the islets on the atoll, Wolouna, is home to one of the last intact seabird rookeries in the region. The atoll's main channel into its 742 km lagoon is a spawning and aggregation site for three grouper species (*Plectropomus areolatus*, *Epinephelus fuscoguttatus*, and *Epinephelus polyphkadion*), while the surrounding coral reefs hold healthy populations of giant clams (*Hippopus hippopus*, *Tridagna Maxima*, and *Derasa*).

In October 2007, Ant Atoll was nominated to become the nation's second Biosphere Reserve, following the Utwe/Walung Biosphere Reserve in Kosrae; the reserve gained official status in 2010. This was the result of a ten-year partnership between CSP, the Nanpei Family, which owns the island, UNESCO's Man And Biosphere (MAB) Programme, and both Pohnpei State and Federated States of Micronesia governments. The reserve will contribute to the conservation of substantial ecosystem, species, and genetic biological diversity.

Unlike Pohnpei's other MPAs, Ant Atoll Biosphere consists of three zones: Core Zones, where strict protection measures will be applied to protect the key areas for fish spawning, turtles, and bird nesting; Buffer Zones, adjacent to the core zones, in which fishing activities are regulated and tourist activities can be developed; and Transition Zones, allowing for better management of fish stocks through monitoring. The ongoing management of its fish stocks will serve as an important test case for the Federated States of Micronesia's fishing policies.

Contributing expertise to policy processes

With climate change and its effects already being experienced in many areas of the Federated States of Micronesia, the national government commissioned a team of experts to compile a set of baseline data for the country. Three members of CSP's Marine Programme and one member of their Terrestrial Programme were included in the team, which gathered information on a variety of issues related to the outer atolls, including soil composition and health, reef surveys, disaster preparedness, and invasive species.

Finally, CSP's monitoring activities have also contributed to a body of research managed by SeagrassNet. This international monitoring programme documents the status of seagrass resources worldwide, as well as threats to this important marine ecosystem. The programme started in 2001 in the Western Pacific and now includes 60 sites in 20 countries; a global monitoring protocol and web-based data reporting system have been established. SeagrassNet's ultimate aim is to preserve the seagrass ecosystems by increasing scientific knowledge and public awareness of this threatened coastal resource.

Sustainability and Replication



SUSTAINABILITY

In terms of the social basis for CSP's work, there is strong support from local communities for the continued management of their Marine Protected Areas. The group helps to build the capacities of local staff in these efforts as well as coordinating conservation efforts across its network. It has also been successful in gaining assistance from external sources in the forms of funding and technical assistance. These relationships with international actors have also been used to build the capacity of CSP's own staff, ensuring its organizational sustainability. In environmental terms, however, the initiative still faces several challenges. Fish stocks and other marine resources continue to be depleted unsustainably, posing an ongoing challenge to the ecological viability of the region.

Capacity building: CSP focuses much of its efforts on the education of communities and training of MPA community leaders, in partnership with the international network of Locally Managed Marine Areas (LMMA). CSP has helped to train Community Conservation Officers, community volunteers who patrol the MPAs and conduct monitoring in these areas. Training has also been facilitated through organizing cross-site visits within the LMMA network.

In 2010 alone, CSP's Marine Programme Manager took part in a graduate certificate course for conservation practitioners in Fiji, supported by the Packard Foundation; the organization's Executive Director participated in a three-week tour of America as part of a U.S. State Department project on climate change adaptation strategies; the Environmental Educator participated in a Japan International Cooperation Agency-funded course in Fiji on Waste Management and Education; and two staff members from CSP's Terrestrial Programme spent two weeks in the Philippines for a course on invasive species and protected areas management. In addition, CSP was able to bring in a human resources expert from The Nature Conservancy to supervise a self-evaluation process. This was aimed to keep CSP competitive in the job market in order to retain their



highly-qualified young staff members. Organizational capacity both within CSP and the MPAs it works with is therefore very high.

Strategic partnerships and accountability: National and international partnerships have been critical to CSP's success. CSP has secured two three-year grants and one four-year grant for its MPA network through the David and Lucile Packard Foundation, which has also provided on-site technical and capacity development support. WildAid, an international organization spearheading global conservation enforcement, approached CSP to offer funding for community enforcement training and conservation practices. CSP has also garnered funding from various United States government agencies that continue to support their local conservation and community capacity building focuses. Finally, CSP has worked closely with a national interagency working group, the Pohnpei Resource Management Committee, to access financial and technical assistance for its programmes.

Financial accounting has been prioritized as a key component for CSP's organizational sustainability. Staff members have received training in account management. Monthly financial reports are presented to the Board of Directors, while progress and budget spending reports are submitted to all funders. CSP has also employed a full-time MPA coordinator since the inception of the project, who manages any monies dedicated to this initiative, ensuring proper distribution of funds and resources. The organization has been able to maintain a focus on its strategic goals through the setting of three-year plans, evaluations and strategic planning exercises.

iii. Identifying current environmental threats

An ecological assessment of Pohnpei's fishing stocks has shown that population sizes continue to diminish. Data from a 2006 market survey show that 1.6 million pounds of reef fish are harvested annually, while Pohnpei's reefs can produce only 1.1 million pounds of reef fish each year. Declines in coral reef health and increased fishing are adding to the problem. Marine Protected Areas may not be enough to maintain fish stocks in Pohnpei. Regulations such as a reef fish export ban and fish size limits might be necessary to prevent this over-exploitation; restrictions on gill nets and night-time spear fishing, and targeted protection for fish during spawning periods have also been proposed as strategies for restoration of fish stocks. CSP continues to work with its partners, Pohnpei state legislators, and local governors to produce a legislative programme that will comprehensively tackle the challenges of unregulated over-fishing; this will be crucial to the long-term ecological sustainability of Pohnpei's marine biodiversity.

REPLICATION

Various aspects of CSP's programmes, including both their MPA models and educational campaigns, have been replicated in other areas. This has been facilitated by CSP's ongoing involvement in regional and international LMMA and MPA networks.

As well as the creation of the Ant Atoll biosphere reserve, the community of Pakin Atoll has established three MPAs around their island. The three protected sites were designated to help manage the ongoing problem of over-fishing in Pohnpei, as well as to preserve and protect the island's coral reefs and its marine resources. CSP is committed to providing assistance to the Pakin community through the creation of a collaborative management structure.

In 2010, the sixth annual national LMMA network cross-site visit was held on Peniou Island. This brings together community chiefs, municipality mayors, community conservation officers, conservation practitioners from NGOs and the state, church leaders, and government officers. One of the issues discussed was the formation of a new protected area in the Kitti area. Some community leaders felt that establishing another protected area would limit fishing options and take away a valuable sand mining resource for local people. The

proposed area could soon join the eleven other MPA sites around Pohnpei, however, if these issues can be collectively resolved.

The success of CSP's Green Road Show has led to its replication in Palau and Kosrae. Today, both islands have similar education initiatives: the Ridges to Reef Show, coordinated by Palau Conservation Society, and the Nature Road Show, implemented by the Kosrae Conservation and Safety Organization. CSP worked with these two organizations to adapt and develop these programmes for their islands.

PARTNERS

- Pohnpei State, including the Department of Education, Department of Lands and Natural Resources, Department of Public Safety, Marine Conservation Unit, Pohnpei Resource Management Committee, Environmental Protection Agency
- Municipal Governments
- Paramount Chiefs and other Traditional Leaders
- Community Conservation Officers and Forest Rangers
- Secretariat of the Pacific Community
- Youth and Women's Organizations
- FSM Sustainable Development Council
- Micronesia Conservation Trust
- Micronesians in Island Conservation
- College of Micronesia, FSM
- USDA-Natural Resource Conservation Services
- Island Food Community of Pohnpei
- Marine Environmental Research Institute of Pohnpei (MERIP)
- The Nature Conservancy (TNC)
- Locally Managed Marine Area (LMMA) network
- David and Lucille Packard Foundation
- UNDP-implemented Global Environment Facility (GEF) Small Grants Programme (SGP)
- UNESCO
- U.S. Department of the Interior
- U.S. Fish and Wildlife Service
- National Fish and Wildlife Foundation
- Micronesia Conservation Trust
- U.S. Geological Survey and the Water and Environmental Research Institute (WERI) of the University of Guam
- U.S. National Oceanic and Atmospheric Administration
- Critical Ecosystem Partnership Fund
- Global Greengrants Fund
- AusAid
- Australian Government's Regional Natural Heritage Programme
- Secretariat of the Pacific Community - Applied Geoscience and Technology Division
- U.S. Forest Service
- University of Hawaii
- U.S. Department of Agriculture
- Canada Fund



CONSERVATION MELANESIA

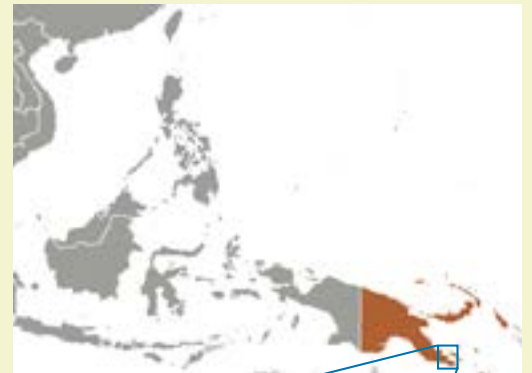
Papua New Guinea



PROJECT SUMMARY

Since 1995, the biologically diverse Collingwood Bay area on the coast of Oro Province, north-eastern Papua New Guinea, has been the setting for a conflict between the province's 3,000 indigenous Maisin people and proposed commercial logging and palm oil development within the community's 262,000 hectares of ancestral lands. In 1998, 38,000 hectares of tropical forest were fraudulently signed over to a foreign investor; since then, Conservation Melanesia, a local environmental NGO, has been a critical ally in publicizing the community's plight and building capacity to resist the proposed development.

In 2002, after a three-year battle, the Papua New Guinea National Court ruled in the Maisin's favour, returning the title of their land back to them. Since then, Conservation Melanesia has worked to develop a sustainable, long-term resource management strategy that effectively conserves the Maisin's traditional forest land and supplies the community with a means of supporting themselves.



Background and Context



Nestled on the coast of Oro Province, north-eastern Papua New Guinea, is Collingwood Bay, a rich haven of marine life and coral reefs of national conservation significance. The coastal habitat includes seagrass meadows, mangroves, sandy beaches and coral reefs and shoals. The terrestrial environment is similarly abundant in biological diversity, comprising rainforest stretching from one of the country's highest mountains to the coast. This forest of Oro Province also provides a habitat for the world's largest butterfly species, the Queen Alexander Birdwing butterfly, which is endemic to Papua New Guinea.

Since 1995, Collingwood Bay has been the setting for a conflict between the province's indigenous Maisin people and proposed commercial logging and palm oil development of the region's forests. The Maisin community numbers around 3,000 members living in nine coastal villages spread across the bay. Their ancestral lands cover around 262,000 hectares of tropical forest, forming the watershed of five major rivers.

The region has long been a target for logging companies. Aware of the destructive environmental and social impacts of large-scale logging in other areas of Papua New Guinea, the Maisin people drew up the Maisin Declaration in 1994.

"We firmly and unanimously stand opposed to destructive large-scale industrial logging, and to agricultural activity that entails the clearing of large areas of forest, in any part of the lands traditionally held by the Maisin people." The Maisin Declaration, 1994

The declaration states the importance of the Maisin people's natural resources to their livelihoods, culture and future, and outlines their intention to continue to develop sustainable sources of income based on non-timber forest products.

Threats to the Maisin customary lands

In 1998, however, 38,000 hectares (94,000 acres) of the Maisin customary lands were fraudulently signed over to a Malaysian investor in the capital city of Port Moresby. The land was purchased from individuals claiming to represent the Maisin people, but was carried out without the knowledge of the community. The investor planned to clear the forest for palm oil development; the first the Maisin knew of the land lease was when barges arrived in Collingwood Bay in June 1999 carrying bulldozers and other logging equipment.

Conservation Melanesia, a local environmental NGO, was a critical ally in combating this attempted logging operation. The organisation works in partnership with local communities to conserve the environment of Papua New Guinea through sustainably utilizing its terrestrial, marine, and cultural heritage for the benefit of current and future generations. To achieve this goal, Conservation Melanesia has sought to research, develop, demonstrate, and promote strategies for conservation and sustainable development that are environmentally sound, economically viable, culturally appropriate, and socially equitable. The organisation's five programme areas focus on supporting and training community organizations in environmental conversation; researching alternative eco-enterprise options; enhancing environmental awareness through educational materials and campaigns; influencing environmental legislation and governing practices; and promoting marine conservation and sustainable resource utilization.

The organisation's executive director, a member of the Maisin community, led a campaign against the foreign investor, beginning with an information-gathering exercise to determine the details of the sale of the land. Conservation Melanesia also sought legal assistance from an environmental law firm while working closely with Maisin tribal chiefs and elders to develop a comprehensive strategy to halt the land deal and logging plans. Based in Port Moresby as a focal point for liaising with national and international supporters and media, Conservation Melanesia was able to draw substantial attention to the plight of the Maisin.

Key Activities and Innovations



In close consultation with village representatives, Conservation Melanesia has coordinated a multi-pronged approach to protecting the natural resources found in the Maisin ancestral lands. The initiative has collaborated with research institutes in conducting surveys of flora and fauna in the bay's marine and forest environments, and has compiled inventories of natural resources identified and used by villagers. To raise local awareness of environmental conservation and landowners' rights, Conservation Melanesia organized a number of workshops in the community's villages. The central aim of this work has been to establish the groundwork for the Maisin to declare their lands a conservation area, which would make it more difficult for the government to approve development projects there.

Partner environmental organisations have also played key roles in defending the Maisin's rights over the future of their lands through supplying technical and financial assistance. They have also sponsored a number of initiatives to publicize the Maisin's struggle to preserve the rainforest. Since 1995, small delegations of Maisin have travelled to the United States, Japan, Australia, and New Zealand to attend museum exhibitions featuring Maisin traditional handicrafts, to speak before audiences of conservationists, and to seek out financial support for small-scale economic projects in the villages. As knowledge of the Maisin has spread, a steady stream of visitors has made the journey to Collingwood Bay. In 1999, both CNN and the Australian Broadcasting Corporation covered the story of the Maisin's fight against commercial logging.

From forest protection to sustainable development

After a three-year battle, in May 2002 the Papua New Guinea National Court ruled in the Maisin's favour, returning the title of their land back to them. The challenge for the community and for Conservation Melanesia since this ruling has been developing a sustainable, long-term resource management strategy that effectively conserves the Maisin's traditional forest land and supplies the community with a means of supporting themselves. The initiative has sought to

promote livelihood schemes through integrated conservation and development activities as an alternative to the destruction of the forest, and to meet pressing social challenges, such as the need for better health care and education services, resource management strategies, and micro-enterprise development. This has also resulted from the need for sources of cash income in a society that was previously based on a cashless economy.

To this end, Conservation Melanesia supported the Maisin in forming a local community-based organisation, the Maisin Integrated Conservation and Development (MICAD) association. MICAD includes community-appointed board members from each Maisin village as well as women and youth representatives. Conservation Melanesia has assisted these community members to explore alternative, sustainable development options for income generation. Workshops have guided MICAD leaders through project identification, prioritisation, development, and evaluation.

Preserving a traditional livelihood

The chief means of generating income from forest sources as a viable alternative to large-scale cultivation or timber harvesting has proved to be making tapa cloth, a traditional occupation of the Maisin community, which has been used in traditional handicrafts that have been successfully marketed to urban and international consumers. Tapa cloth is pounded from the bark of mulberry trees, grown by the Maisin in family gardens. The damp bark is beaten flat, and then painted with natural dyes collected from the forest. Traditionally a women's art in Collingwood Bay, each cloth is painted with a different design, depending on the clan of the artist. Tapa has been used for generations for trade, as clothing, and for ceremonies.

The Maisin people have a particularly strong culture of tapa production, and have identified it as a key source of income for their communities. Together with Conservation Melanesia, the Australian Conservation Foundation and Greenpeace, the Maisin

have established a community based micro-enterprise based on the production and marketing of tapa cloths. Assistance from partner organisations has focussed on ensuring the equitable distribution of profits from the enterprise, and on the role of women community members in decision-making.

Ongoing threats...

Many challenges remain for the community in its defence of its cultural and natural heritage, most notably in the shape of persistent threats from commercial palm oil exploitation of the forest. The land has been the subject of logging claims as recently as 2010, with fresh attempts to clear land for palm oil plantations. The continued support of Conservation Melanesia and its international partners is critical in resisting these efforts. Identifying long-term markets for the Maisin's traditional handicrafts represents one potential strategy for ensuring that the community has the resources to defend its land; demonstrating its capacity to manage the forest resources sustainably is another strategy that would add weight to the community's bid to have their ancestral lands declared a community conservation area.





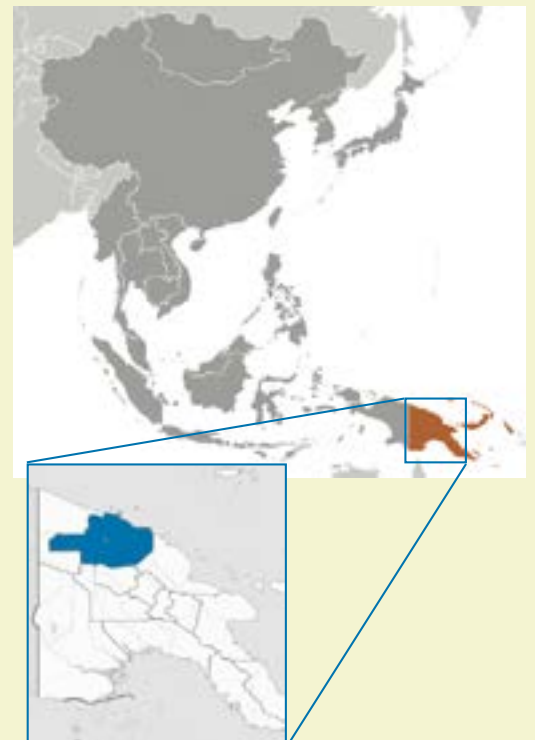
SEPIK WETLANDS MANAGEMENT INITIATIVE

Papua New Guinea

PROJECT SUMMARY

In its work with 50 communities along the Sepik River – the longest river in New Guinea – the Sepik Wetlands Management Initiative has transformed the local economy and local treatment of wetlands. The sustainable harvest of crocodile eggs from nest sites along the river has become an important source of income for local residents. Previously, crocodile nest sites were being indiscriminately destroyed by wetland fires set for hunting, agriculture, or as part of land ownership disputes.

The initiative instituted a program in which local crocodile egg collectors following specified conservation guidelines would receive a guaranteed return from a commercial crocodile egg retailer. The combination of egg collection and crocodile farming to produce high-quality skins has doubled the annual income in participating communities, all while raising the awareness of wetland values and stressing the cultural importance of crocodiles.



Background and Context



The Sepik River is the longest river on the island of New Guinea. The majority of the river flows through the Papua New Guinea provinces of Sandaun and East Sepik, with a small section flowing through the Indonesian province of Papua. The Sepik was identified in Papua New Guinea's 1993 Conservation Needs Assessment as "Very High Priority", the category of highest priority, due to its range of distinctive landforms, associated biota – in particular its extensive herbaceous wetlands – cultural diversity, and economic value.

A local response to loss of wetland resources

Sepik Wetlands Management Initiative (SWMI), based in Ambunti, East Sepik Province, was formed in 1998 to address fire-related wetlands degradation in the middle regions of the Sepik River. During dry seasons, local people were burning grassland for hunting, cultivation, or as part of landowner disputes, and in the process destroying vast areas of wetlands and nesting habitats for the New Guinea Freshwater Crocodile (*Crocodylus novaeguineae*) and Saltwater Crocodile (*Crocodylus porosus*). By 1998, more than half of crocodile nesting sites surveyed had lost over half of their suitable nesting area; at a third of the sites, more than 80% of the vegetation had been lost.

Since its establishment, SWMI has promoted crocodile and wetlands conservation work in the Sepik through various strategies. These have included raising community awareness of the importance of wetlands and wetland resources; the facilitation of a sustainable crocodile egg harvesting program between community members and a commercial collector; increasing local awareness of and taking action on controlling the spread of invasive species; crocodile population monitoring; and developing community-driven wetlands and wetland resources management plans. The link between community participation in conservation and the viability of livelihood activities based on natural resource management has been at the centre of SWMI's work.

Its four main objectives are developing a community-oriented, self-help approach to conserve local wetlands, and in particular herbaceous habitats; halting the degradation of locally-important wetland habitats, especially crocodile nesting areas, and rehabilitating sites where possible; enhancing the conservation of local biological diversity; and strengthening the sustainable utilization of local wetlands resources.

SWMI's multi-stakeholder approach to conservation has involved maintaining strong relationships with both government agencies and non-governmental actors. The latter category has included international conservation NGOs as well as the private sector. The Papua New Guinea Department of Environment and Conservation, Pacific Island Ministries, and the district-level government offices in Ambunti village have all played important roles in coordinating responses to ecosystem threats and strategies for conservation. The project has been funded and supported since 2005 by the World Wildlife Fund (WWF) through its Sepik River Programme. SWMI has also partnered with Mainland Holdings Limited, a Papua New Guinea-based commercial crocodile egg collector.

The project does not have a guaranteed funding source, however, relying on grants to operate on a full-time basis. The seven staff members, made up of five men and two women, work on a voluntary basis for the majority of the time. The organisation consists of a chairman, vice-chairman, treasurer, secretary and three field officers. A technical advisory board comprises two community members – one representing village crocodile farmers, another on behalf of crocodile habitat landowners – representatives from WWF, the Papua New Guinea Department of Environment and Conservation, and a private expert.

Key Activities and Innovations



KEY ACTIVITIES

The initiative's main activities are centered on providing adequate information to change community members' behavior, encouraging more sustainable harvesting of crocodiles and their eggs. A secondary focus has been on increasing awareness of the existence of invasive species and finding ways to minimize their expansion.

SWMI's work can be categorised into five program areas. Their management of natural resources has been underpinned by initial resource mapping and planning with local communities, using a Participatory Rural Appraisal framework. This process of engaging local people is reinforced by awareness campaigns on the importance of wetlands and their resources, and actively involving communities in minimizing their impacts on their environment. A third area of work has been monitoring populations of crocodiles. This has been carried out by crocodile night counts, aerial crocodile nest counts, and tagging of crocodile individuals. Many of these monitoring activities involve local people, while aerial counts have been carried out in conjunction with government agencies. SWMI's role in improving local livelihoods, meanwhile, has been based on its work with Mainland Holdings. The initiative oversees the relationship between this commercial collector and local people by facilitating the sustainable harvesting of crocodile eggs, and ensuring that payments are made according to a signed contract, or *Tok Orait*, between communities and Mainland Holdings. Finally,

SWMI provides training on crocodile farming and crocodile egg harvesting techniques to improve the sustainability of these income generating activities. This has involved training on regulations to ensure that harvesting of crocodiles and their eggs do not deplete crocodile breeding stocks; other training has focused on improving the quality of crocodile skins from village farming pens, allowing farmers to generate higher profits.

These work areas have involved approximately 50,000 people in the lower and upper Sepik regions. SWMI has engaged around 50 villages in these regions while conducting awareness raising, trainings, and monitoring activities. SWMI has also spent time with these communities conducting Participatory Rural Appraisal exercises. The populations of these villages range from an estimated 300 to 1,500 inhabitants.

INNOVATIONS

Various innovations have enabled substantial success for Sepik Wetlands Management Initiative in both biodiversity conservation and poverty alleviation. These have included the extensive engagement of local communities in all aspects of SWMI's work, utilizing the cultural and traditional significance of crocodiles to underpin their conservation, and creating tangible incentives that reinforce local action.

“The region has seen unprecedented changes in water levels. Crocodile farmers have been urged to elevate crocodile farms to about three meters and improve water outlets and feeding areas. SWMI intends to conduct more awareness in the area of flooding and saltwater intrusion.”

Jerry Wana, Chairman, Sepik Wetlands Management Initiative

Using Participatory Rural Appraisal (PRA) processes, maps were initially developed between SWMI staff and community members to display the various land use activities in their areas. The communities then played a key role in deciding what to protect, and how this should be undertaken. The PRA activities were explained to communities using role-playing and drama conducted in local languages. Ultimately the challenge of establishing sustainable use practices was overcome through intensive community involvement in all activities relating to the protection of natural resources, and incorporating their needs in the aims of the project. SWMI has also used participatory approaches to gain a clear understanding of local people's perceptions of development, especially in the context of the utilization of natural resources for this.

The annual Sepik River Crocodile Festival was initiated in 2007 in collaboration with WWF. The festival is used to promote the importance of the crocodile – a culturally significant species – to enhance conservation in the Sepik. Integrating conservation into local cultural traditions in this way has rooted the impetus for sustainable resource use in local capacities.

Finally, communities have gained substantial economic benefits from protecting their wetlands and their wetland resources. This has been supplemented by incentives for communities and individuals who have taken lead roles in implementing skills given in training, and in coming up with innovative ideas.



Impacts



BIODIVERSITY IMPACTS

The initiative's work in the Sepik region has achieved substantial environmental impacts, measured both in terms of the numbers of saltwater and freshwater crocodiles, their eggs, and their improved habitats.

Biodiversity monitoring and results

Crocodile population monitoring has involved three methods: aerial surveys using helicopters and GPS for nest counts, night specimen counts using flashlights conducted in canoes, and numbers reported from egg and hatchling harvesting. Members of SWMI and the Papua New Guinea Department of Environment and Conservation fly in helicopters approximately 50-60 meters above ground to spot crocodile nests, which are recorded using GPS. Two SWMI members act as spotters during the survey; one member acts as a navigator, communicating with the pilot and giving directions.

Night counts are carried out by SWMI staff members in lagoons, using flashlights to count crocodile populations based on the light illuminated from the eyes of the crocodiles. Yellow eyes are young specimens, while red eyes are adult crocodiles. Sometimes individuals are caught to identify their species type, to be weighed, and occasionally tagged for follow-up surveys.

A survey in 2007 estimated a total of 220 saltwater crocodile nests, compared to 150 in 1997 prior to SWMI beginning their work. Positive impacts can also be seen in freshwater crocodile nesting trends, with a sharp increase of almost 80% recorded between 1996 and 2007. Aerial surveys have revealed a steadily increasing total crocodile population between 1998 and 2010. The latest survey, covering 50 villages, counted over 500 nests.

There has also been a reduction in burning of grassland areas where crocodiles nest. By 2005, saltwater crocodile nesting habitats in 1.5

million ha of the middle and upper Sepik had been rehabilitated by regulations prohibiting burning.

Improvements in biodiversity are also reflected in the communities receiving improved income from the sale of crocodile eggs and skins since the initiative began its work. Between 2002 and 2006, the annual number of saltwater crocodile viable eggs and hatchlings found in SWMI canoe harvests increased from 3,465 to 13,491.

Invasive species eradication campaigns

SWMI has also been active in raising awareness of the harmful effects of invasive species on crocodile habitats. Pacu (*Piaractus brachypomum* - see image below) and Javu Carp (*Puntius gonionotus*) destroy floating grass mats that serve as nest sites; Water Hyacinth and Bush Morning Glory plants intrude on nesting areas. In villages in the mid-Sepik region, SWMI has begun activities to combat the spread of these species. This has involved conducting surveys in villages to determine the extent of these species, collecting anecdotal evidence from community members on where and when exotic species have been found, and taking photographs to collaborate these reports.



These findings are discussed with experts, who advise on developing posters to describe the adverse effects of these species and provide information on how to minimize their spread. SWMI then conducts awareness-raising in villages using posters. Actions have been taken in some villages to remove Bush Morning Glory and Water Hyacinth.

Signs stating community management rules have been erected in fourteen villages, with a further seven planned for communities in the upper and middle Sepik areas. SWMI is working with WWF and DEC to develop community-managed crocodile and wetland areas. Management areas and plans will be developed by communities as part of their ward development plans, as required under the Local-level Governments Administration Act (1997). The ward development plans will then be endorsed by local government administrators through the Joint District Budget Planning and Priorities Committee. Community-based management of natural resources is therefore rooted in the context of decentralized development in Papua New Guinea: SWMI is playing a key role in this process of devolving control over habitats to the local level.

SOCIOECONOMIC IMPACTS

While SWMI has not been able to create direct employment for many community members – five local staff primarily work on a voluntary basis – they have been able to substantially increase local incomes through an agreement with Mainland Holdings. Increases in the value of crocodile skins and eggs have also underpinned SWMI's conservation efforts.

Local people sign a written contract, or *Tok Orait*, agreeing to regulations on the harvesting of eggs and skins in return for a guaranteed high price from the collecting company. Currently this is around 660 Papua New Guinea Kina (PGK), or USD 250, for a nest of sixty good eggs. Regulations limit the burning of crocodile nesting sites, protect nesting crocodiles, and establish a maximum size for crocodile skins. These stipulations have helped to ensure that breeding stocks of crocodile populations are not depleted.



Communities in the upper and lower Sepik region earn about PGK120,000 (USD 46,000) annually from sales of crocodile eggs, predominantly to Mainland Holdings, and over PGK50,000 (USD 19,000) annually from the sale of skins. An estimated total of PGK200,000 (USD 77,000) is received by the communities in the upper and middle Sepik, meanwhile, from sales of crocodile eggs and skins. Overall, SWMI estimates that there has been a greater than 100% increase in the income of the communities currently involved in the initiative's work (based on village profiles conducted on behalf of a local NGO in 2005).

There has also been interest from local communities to develop their own crocodile harvesting facilities. A WWF-European Union initiative, titled the 'Sepik Livelihoods Project', is working with SWMI to assess crocodile ranching potential, develop a Wetland Resources Management Plan, and directly assist local communities to improve existing crocodile facilities and build new ones. Some ranches were constructed after 2009, but were destroyed by heavy flooding. Improved designs and advanced management techniques are needed to promote profitable ranches.

Many of the farmers have invested their increased profits into school fees for their children; in other cases, revenues have been used to purchase outboard motors for canoes; set up fuel sheds; build water tanks to be used by communities; build a primary school; and renovate a traditional building. In two cases, guest houses have been built using revenue from sales of crocodile eggs, while funds have also been invested in three trade stores.

POLICY IMPACTS

Sepik Wetlands Management Initiative has been able to have considerable influence on policies at the local level, and some influence at regional and national levels, while its partnership with WWF has informed planning processes for the wider Sepik region.

Many of SWMI's activities are supported by the Ambunti district's five year development programme. The district allocates funds for the annual crocodile festival, and is also actively involved in plans to establish local crocodile farming. SWMI representatives also attended a workshop on developing a National Biodiversity Strategy for Papua New Guinea, held in Milne Bay in June 2007. Finally, SWMI is working with WWF to advocate for policies on water catchment and watershed management in Papua New Guinea, including the Sepik River basin.

There have been obstacles to the initiative successfully influencing policy decisions, however. To date, the Papua New Guinea Department of Environment and Conservation has not been proactive in developing policies for crocodile and wetlands management. The department as a whole is underfunded, while repeated re-structuring has resulted in a lack of continuity in personnel. In addition, SWMI is situated in a remote area of the country. Communication and transportation costs are high, meaning that opportunities for consultations with government offices and other stakeholders are limited.

Sustainability and Replication



SUSTAINABILITY

SWMI has managed to achieve a high degree of social and cultural sustainability, while its impacts on biodiversity and local incomes are testament to its ecological and economic viability. As an organization, however, the initiative remains dependent on external resources in the form of funding and technical assistance.

Increasing egg and hatchling harvests demonstrate that SWMI's work has encouraged a more sustainable approach to resource management; the sustainable egg harvesting program generates USD 46,000/year for local communities. Ongoing work in increasing income-generating opportunities for local communities ensures that the financial incentives for conservation will be reinforced. For example, many farmers have been trained in increasing the value of crocodile skins; as a result, some crocodile pens are now producing high quality crocodile skins. SWMI's work has also emphasized identifying communities' needs, and subsequently developing strategies to address these needs. One example of this is their partnership with WWF-EU to develop local farming of crocodiles.

These positive environmental and economic benefits are underpinned by a high level of cultural awareness of the importance of conservation. The annual Sepik River Crocodile Festival has grown in size, promoting crocodiles as an iconic species in the Sepik, and further encouraging communities to take action in protecting the animal and its habitat within the region.

SWMI has identified various strategies to enable their sustained organizational existence. They are currently bidding for contracts from the government's Department of Environment and Conservation to lead natural resource management projects elsewhere in the country. They are also negotiating with Mainland Holdings for the payment of management fees for facilitating the crocodile egg harvest programs conducted annually in the Sepik.





WWF has provided funding and technical assistance through their Sepik River Programme, based out of Wewak, in East Sepik Province; longer-term funding and improved office facilities would greatly move this work forward. Having a representative based in Wewak would enable greater coordination with other groups based in this regional centre.

REPLICATION

SWMI is currently working in about 50 villages in the upper and middle Sepik regions, representing a substantial scaling-up of their initial work in the region. In 1998, SWMI was working with sixteen of these villages. It has used its experience and lessons learned from each community to inform its work in other cases. New villages applying the SWMI model for sustainable crocodile egg harvesting include Wanamoi, Waniap, Houm 3, Luluk, Japandai, Aibom and Chambri.

This work has also been published in conjunction with WWF. In June 2010, SWMI developed a training manual for crocodile farmers, based on their work to date. Approximately 30 farmers attended a training session conducted in Ambunti in September, 2010. SWMI has also facilitated peer-to-peer learning exchanges for farmers.

PARTNERS

Mainland Holdings Ltd.: only buy eggs from farmers that comply with SWMI rules for sustainable harvesting, specified in the 'tok orait' agreement.

World Wildlife Fund (WWF): provides technical support and resources. *Papua New Guinea Department of Environment and Conservation* – provides technical support and advice on government policies.

UNDP/Global Environment Facility Small Grants Programme (USD15,000, 2001-2002)

HELP Resources: local NGO conducting socio-economic development projects.

Pacific Island Ministries: have assisted in communications, printing and photocopying, etc.

Sepik River Crocodile Festival Committee: conducting awareness-raising during festivals on the sustainable egg harvesting program

Ambunti District Level Government: has included SWMI's work into the district's five-year development plan, and works closely with communities.

University of Papua New Guinea: has provided training on report-writing and establishing protected areas.

Most of these partners provide technical and financial support to the organization. SWMI partners with these organizations to conduct awareness on socio-economic issues (HELP Resources), promote sustainable harvesting of eggs (Mainland Holdings), undertake sustainable use and management of wetland resources (WWF/UNDP), and conduct crocodile population monitoring surveys (Department of Environment and Conservation).

WWF in particular has been critical to the work of SWMI. They have given training to build the capacity of SWMI staff, provided technical guidance, and shared resources with SWMI where needed. Papua New Guinea Department of Environment and Conservation has provided technical support to SWMI through a rancher based in Ambunti. This rancher spends 50% of his time working with SWMI. The organization would not be able to continue functioning if key partners such as WWF, UNDP, or Mainland Holdings withdrew their support.





ARNAVON COMMUNITY MARINE CONSERVATION AREA MANAGEMENT COMMITTEE

Solomon Islands



PROJECT SUMMARY

The Arnavon Community Marine Conservation Area was established in 1995 as the first community-managed marine conservation area in the Solomon Islands. The 157-km² area is home to nesting grounds of the endangered Hawksbill sea turtle. This Marine Protected Area, created to stem the overexploitation of dwindling marine resources, attracts ecotourism that provides a valuable source of income for local communities. Local youth are employed as monitors and high school students are brought on tours to learn about the group's conservation efforts. A management committee that represents the three founding villages – Kia, Wagina and Katupika – helps resolve resource conflicts.

In partnership with The Nature Conservancy, this initiative has led attempts to diversify sources of income and nutrition for the villages' fishing communities, including making handicrafts for visiting tourists, seaweed harvesting, and small-scale agriculture.



Background and Context



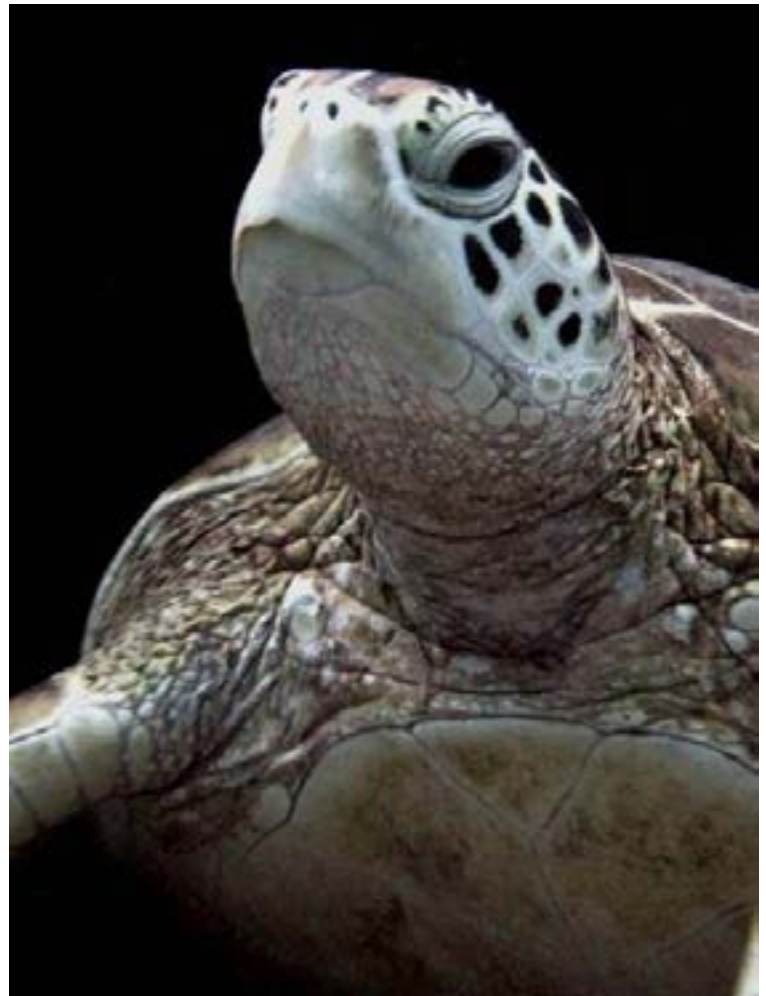
The Solomon Islands are home to more than 1,000 fish species. Photo: Alexander Vogel.

The nation of the Solomon Islands is made up of a double chain of 922 islands covering more than 835,000 square miles of the Pacific Ocean, string out southeast of Papua New Guinea. The islands are home to a staggering degree of biological diversity; much of this was first catalogued in 2004, when a scientific assessment led by The Nature Conservancy showed that the Solomon Islands has coral diversity greater than most places on Earth and the country is one of the world's top five for fish diversity.

An island archipelago rich in biological diversity

These results led scientists to extend the boundary of the Coral Triangle of marine biodiversity to include the Solomons archipelago. The survey found that the Solomon Islands is part of this area – the region of the world's richest marine life – which was previously thought to extend no further than Indonesia and Papua New Guinea. The team recorded 494 species of corals in the Solomon Islands, including several species that were previously unknown, and more than 100 corals thousands of kilometres beyond their known range. In addition to the country's remarkable abundance of corals, the survey confirmed that the Solomon Islands has one of the richest concentrations of reef fish in the world. With at least 1,019 fish species, the islands rank with Indonesia, the Philippines, Australia and Papua New Guinea as one of the 'big five' for reef fish species. On land, with the exception of Papua New Guinea, the Solomon Islands has the greatest diversity of terrestrial vertebrate species of all Pacific Island nations.

Like other emerging Pacific Island nations with fast growing populations, the Solomon Islands face the challenge of preventing the rapid depletion of these natural resources to provide basic necessities – including schools, roads, and clinics – for its mostly rural people. In particular, sedimentation from logging, overfishing, and destructive fishing practices are impacting the marine environment. As a result, large tracts of native lowland forest have been lost and some of the world's richest coral reefs are at risk. Until 1998, when



Green Sea Turtle, Derawan. Photo: A. Wijonarno/TNC-CTC.

world prices for tropical timber fell steeply, timber was the Solomon Islands' main export product, resulting in dangerous levels of overexploitation of forests.

The Arnavons

The Arnavon Islands lie between the islands of Santa Isabel and Choiseul in the north-west of the country. Surveys by the government since the 1970s established that these islands were a regionally significant hawksbill turtle rookery. In the early 1980s, the government had attempted to protect the rookery from the increasing trade in turtle shell (known by the Japanese word *bekko*, used to describe the particularly ornate hawksbill turtle shell) by declaring the area a wildlife sanctuary, but this effort failed in the face of resistance from local communities.

The Solomon Islands government officially owns the Arnavon Islands, but customary rights over its rich marine resources have been the subject of dispute between three neighbouring tribes for several decades. Local people have long regarded the three Arnavon islands as a storehouse for important subsistence resources and traditionally visited the islands only in times of need. After a large immigrant population of Gilbert Islanders from Kiribati was voluntarily resettled nearby in the 1960s, overharvesting and community conflicts precipitated a dramatic decline in the Arnavons' once abundant resources, particularly the hawksbill turtle. The Sisiga and Volaikana tribes from the villages of Kia (on the island of Santa Isabel) and Katupika (Choiseul) both claimed customary rights over the area, leading to conflicts with the Gilbertese community on Waghena Island (Choiseul).

An innovative solution to ending resource conflict

Discussions between government officials, The Nature Conservancy, and these three communities in the early 1990s found the Kia and Posarae people willing to support a conservation project in the area, provided that their rights to use its resources were recognised and that they were actively involved in managing the project. Village workshops in all three communities subsequently led to the establishment of the Arnavon

Management Committee in Honiara in December 1993. This meeting was attended by representatives from each of the three villages, key government ministries, and the provincial government. The committee that emerged included one representative each from the Ministry of Forests, Environment and Conservation, The Nature Conservancy (TNC), and provincial fisheries officers from Isabel and Choiseul, as well as two representatives from each of the Kia, Waghena, and Katupika communities.

This committee established the Arnavon Community Marine Conservation Area in 1995. This Marine Protected Area (MPA) encompasses 40,000 acres (157 km²), three small uninhabited islands, flourishing reefs, fish-filled lagoons, and beaches that are home to thousands of hawksbill sea turtles. The communities of Kia, Waghena, and Katupika are home to approximately 2,200 people; most local livelihoods in the Arnavons depend on the marine environment. These include fishing, sea cucumber harvesting, trochus shell collection (used to make buttons), and seaweed farming. Levels of human development in the Solomon Islands are low; the 2006 UNDP Human Development Index ranked the Solomon Islands 128 out of 177 countries globally based on a composite index of health, education and living standards. Socioeconomic conditions are especially poor in the marginalised Arnavon communities: the average village member lived on the equivalent of USD 0.53 a day in early 2007.

Since the establishment of this protected area, numbers of these critically endangered species have increased by nearly 400%, as well as increases in populations of coral reef fish and commercial species of marine invertebrates. The conservation area, created to stem the overexploitation of dwindling marine resources, attracts low levels of ecotourism. Local youth are employed as monitors and high school students are brought on tours to learn about the group's conservation efforts. The Management Committee that represents the three founding villages continues to help resolve resource conflicts.



The Arnavons lie in the north-west of the Solomon Islands' 922-island chain. Photo: Wade Fairley/The Nature Conservancy.

Key Activities and Innovations



Average daily income for Arnavon villagers was as low as USD 0.53 in 2007. Photo: Djuna Ivereigh.

Since 1995, the Arnavon Community Marine Conservation Area Management Committee has been central to all conservation and development activities in the Arnavon Islands and the communities that formerly depended on them. As well as two representatives from each of Waghena, Kia and Katupika, the committee brings together the Ministry of Forestry, Environment and Conservation (MFEC), Department of Fisheries and Marine Resources (DFMR), the governments of Isabel and Choiseul provinces, and The Nature Conservancy. Each community representative is elected according to their village's own customs. In addition to its role in taking decisions for marine conservation and livelihoods diversification, the committee has helped to develop its members' management skills and organisational capacities. All of the partners represented in the Management Committee are bound by the ACMCA management plan. The different constituents bring different areas of expertise to the partnership: government involvement has helped with legal and policy related issues; community engagement ensures local community support for the on-the-ground management and compliance; and the support of The Nature Conservancy has provided funding and technical expertise.

Diversifying income sources to combat over-harvesting

The ACMCA employs young men from all three partner communities as Conservation Officers to enforce restrictions on harvesting marine resources within the MPA. Beyond management of the conservation area itself, the Arnavon management committee's chief priorities have been facilitating the development of alternative income-generating livelihood activities for the Waghena, Kia, and Katupika community members. In 1995, all three communities exhibited high levels of dependence on cash income derived mainly from selling marine resources such as sea cucumbers (*beche-de-mer*), trochus shells, and hawksbill turtle shell. These sales provided the primary source of income for an estimated 79% of households; all three of these activities were prohibited by the establishment of the Arnavon Community Marine Conservation Area. This need for



Monitoring of Hawksbill Turtle egg-laying takes place at night. Photo: Djuna Ivereigh.

cash was in turn driven by a dependence on imported staple foods; 52% of households in Waghena, 44% in Kia, and 11% in Katupika respectively. The average household had one primary source of cash income and three secondary sources. The situation pitted cash needs against sustainable resource management; the demand for alternative sources of income was therefore high.

In 1996-7, the first efforts to meet these needs and adequately compensate the three communities for the loss of income from harvesting of marine species focussed on expanding deep-water fisheries. Under the guidance of the Arnavon Management Committee, an existing fish processing centre in Katupika was expanded and a new centre established in Waghena with financial assistance from international donors. A fish processing facility had previously been built in Kai with funding from the European Union. The fisheries centre project aimed to encourage deep-sea bottom fishing as a more sustainable alternative to reef fishing. Training was given to all community members in harvesting deep-sea snapper species. The three centres then bought catches from local fishers and sold them to export buyers in the Solomon Islands capital, Honiara. In partnership with the Fisheries Department, prices were allocated for different species, with deep-sea varieties receiving a higher price compared to reef snappers, which are permitted to be caught for subsistence purposes. Although initial results were promising, transport problems, lack of consistent access to electricity to power the refrigerator, and the low price of fish made the centres unprofitable. The fisheries centre project closed in 2000 when ethnic conflicts resulted in the collapse of the Solomon Islands export market. Currently these fisheries centres remain closed, although discussions are continuing between the various partners to Arnavon over a memorandum of understanding to be signed for their re-opening.

Since the closure of the fisheries centre, alternative livelihood activities have comprised making handicrafts for visiting tourists, seaweed harvesting, and diversification into agriculture, although this has been predominantly for food security needs rather than as a livelihood activity. Ecotourism provides an occasional source of subsidiary income; visitors to the marine conservation area are able to assist rangers in nightly monitoring of turtle egg-laying.



Early attempts to diversify income sources for community members focused on deep-sea fishing. Photo: Djuna Ivereigh.



The Hawksbill turtle is listed as critically endangered. Photo: Wade Fairley/The Nature Conservancy.

Impacts



Three of the Solomons' distinctive "headhunter" islands. Photo: Jordan Plotsky.

BIODIVERSITY IMPACTS

An extensive marine assessment of the Solomon Islands in 2004 provides the most comprehensive snapshot of the ecosystem health within the conservation area. A total of 494 species of corals were identified around the islands, including several new species. This extraordinarily high diversity of coral species is second in the world only to Raja Ampat in Indonesia. While these reefs were generally in good health, many sites had above normal numbers of crown-of-thorns starfish resulting in significant coral mortality at a few sites.

The survey also confirmed that the Solomon Islands has one of the richest concentrations of reef fishes in the world and is an integral part of the Coral Triangle. Over one thousand fish species were catalogued, of which 786 (77%) were observed during the survey.

Conservation of key marine species

One of the key findings of the survey confirmed that the Arnavon Community Marine Conservation Area had achieved a significant impact in allowing commercial marine species to regenerate. On many Solomon Islands reefs, numbers of sea cucumbers, Trochus shell, crayfish, tridacnid clams and large commercial fish species were very low. The most valuable species such as maori wrasse, bumphead parrotfish, Trochus, larger species of tridacnid clams and some sea cucumbers (*Holothuria nobilis*, *Holothuria fuscogilva*, *Thelanota ananas*) were often absent. In contrast, the report found that "in the Arnavon area where commercial fishing and collecting is banned and only subsistence collecting of some reef fish species is allowed, there were many sea cucumbers, Trochus, tridacnid clams, crayfish, as well as large commercial fish species particularly the bumphead parrot fish. Also, after more than 10 years of protection, pearl oyster, especially black lip *Pinctada margaritifera*, were abundant. This shows that the conservation area has achieved its goal of protecting important fisheries species" (TNC, 2006.)

Protecting the Hawksbill turtle

The chief biodiversity impact of the Arnavons project has been the conservation of the islands' turtle populations. The Arnavon Islands have been recognized as the most important nesting ground for the endangered Hawksbill turtles in the Western Pacific and are of global importance to their survival. Prior to the establishment of the marine conservation area in 1995, local communities' reliance on the islands' marine resources led to over-exploitation of Hawksbill, Green, and Leatherback sea turtles for their shells and meat. Since then, however, the recovery of these species has been dramatic. Monitoring of Hawksbill turtle nesting has shown significant increases in nesting numbers, and returning females are now common.

The success of the marine conservation area has also been instrumental in increasing community awareness of the need for marine conservation. Awareness-raising activities have focussed on the islands' youth population. Environmental issues have been included in the curriculum for local schools, while school children are taken on excursions to the marine conservation area. There is widespread acceptance that children should be educated about the conservation of resources, while there is also a high level of acceptance of the importance of this among local adult residents. A socioeconomic survey conducted in 2007 found a high degree of conservation awareness and commitment to sustainable marine resource management among respondents, and especially among community leaders.

SOCIOECONOMIC IMPACTS

As well as its impressive achievements in conserving the Arnavon Islands' rich biodiversity, the ACMCA Management Committee has helped to bring substantial social and economic benefits to the communities of Waghena, Kia, and Katupika. The formation of the conservation area was a catalyst for achieving greater social cohesion

and interaction between the previously divided three communities. The project has also gradually improved trading opportunities between the villages, and has helped them to work together to address common social and economic issues. Specifically, the ACMCA has resulted in the employment of many young men from each village as Conservation Officers, bringing consistent sources of income to their households.

Compensating loss of fishing income

The primary cost of conservation to local people has come through the loss of revenue from the sale of fish caught from the reefs surrounding their islands. Reef fishing is still permitted within the conservation area for subsistence purposes; the Fisheries Department has set low prices (SI\$2/kg, or approximately USD 0.54/kg at current prices) for these species to discourage their overexploitation for commercial purposes, however. Moreover, since the closure of the fisheries centre project, local fishers are no longer able to receive higher prices for deep-sea bottom snapper species caught in a more sustainable manner through deep-sea fishing. The cost involved in equipment for this and storing and transporting the fish caught are prohibitively expensive without the assistance of the fisheries centres. The loss of revenue from selling fish has negatively impacted households in the three Arnavon communities who had previously relied heavily on marine resources as a source of cash income. This negative impact has been offset to an extent by two processes. First, diversified sources of income have been explored with the support of the ACMCA Management Committee. Second, agriculture has been more widely adopted by these households, complemented by a more diversified range of crops. This has helped to decrease reliance on imported food staples, which in turn decreases the need for cash income.

The pristine quality of the marine conservation area has become a draw for luxury cruise boats visiting the Solomon Islands, which provide an occasional source of income in the form of visitor fees paid for the ACMCA. These visitor fees have been used for employing the MPA's Conservation Officers. Kia village residents have also benefitted from visits by tourists, as women have been able to sell artisanal handicrafts. This is reflected by an increase in weaving of mats, baskets and traditional costumes for dancing, all of which can also be sold to visitors.

Another main alternative source of income that has been promoted is seaweed farming. This began in 2003, and was initially a successful source of household income. More recently a decrease of SI\$0.50/kg in its selling price (from SI\$2.00 to SI\$1.50 – approximately USD 0.40/kg) has made this a less profitable enterprise. It remains a widespread activity, however, with many households still deriving supplementary income from it.

Village families are currently far more dependent on household agriculture than prior to the formation of the marine conservation area. While this generates little income, it has improved food security. Other livelihood activities that have been explored include bee-keeping, pig-rearing, and sustainable timber felling, but as yet there are no market outlets for these products, or for surplus agricultural products. Improved access to markets would help

to make these activities more economically viable for Arnavon community members.

A study in 2007 found that the substitution of these alternative sources of income for fishing revenues had helped families to afford school fees. About 60% of the students in the three communities pay their school fees annually, while the remaining 40% pay about half of the annual amount. In cases where students can't pay their full school fees, they typically continue to attend school in the hope that they will complete the payment the following year.

Beyond income generation, one of the principal achievements of the MPA is its perceived impact on local governance and social cohesion since the establishment of the Arnavon Community Marine Conservation Area Management Committee in 1995. Despite the short distances between the three villages, they remain culturally diverse and isolated from one another. Bringing together these three partner communities in the Management Committee to discuss marine conservation issues has helped to improve linkages between them and overcome their traditional differences. In addition, the Committee has helped to develop the organisational and management skills of its members. The committee is perceived to be functioning well and to have provided the opportunity for community representatives to express their views and to be an integral part in the decision-making processes relating to the MPA.

POLICY IMPACTS

The Arnavon MCA Management Committee has also enabled the development of relationships between resource-using communities, provincial authorities, and the national government. This cross-scale interaction between interested parties has had a number of benefits. The involvement of national and provincial governments has helped to engender supportive policies and legislative institutions. The National Fisheries Act of 1972, for instance, supported the conservation of specific species such as turtles, blacklip and goldlip pearl oysters, and certain species of bêche-de-mer. While local implementation of these restrictions was typically constrained by limited resources, such legal institutions were there to be harnessed in developing resource management strategies for the area.

Provincial governments have also had a key role in supporting fisheries development in the area. In Kia, the provincial authorities funded the development of a deep-sea fisheries centre as an income-generating venture. Isabel province also played an important role in supporting management arrangements for the Arnavons area by formalising its management plan under provincial law.

The involvement of international bodies such as The Nature Conservancy (TNC), as well as the national government, has enabled the Arnavons initiative to access international funding for various project activities. For instance, financial assistance has been obtained from the Biodiversity Conservation Network, the South Pacific Regional Environment Program, and the Japanese government. Technical assistance from government and international partners on various aspects of resource management and development has also supported the work of the management committee in various ways.

Sustainability and Replication



Students watch turtle hatchlings. Photo: Gary King/Volunteer Service Abroad.

SUSTAINABILITY

The operational sustainability of the initiative is grounded in the support it receives from the three founding communities. In the Solomon Islands, ownership and resource rights to land, reefs, and fisheries are enshrined in constitutionally recognized customary ownership. Any successful conservation initiative needs the support of local clans and communities to be sustainable. The continued conservation benefits brought by the marine conservation area more than fifteen years after its establishment are testament to the level of acceptance the project has attained within its founding communities. Coupled with this acceptance is also a high level of pride in the success of the Arnavons project, which is recognized nationally and internationally as a model of community-based marine conservation, and is the flagship case for conservation in the Solomon Islands.

Level of support within communities

Support for the MPA is predominantly based on its expected long-term benefits, however, rather than its impacts on household wellbeing to date. As the results of socioeconomic surveys conducted in 2007 show, residents strongly agreed with the statements that that the MPA is a positive force for their families' futures, that it is their duty to protect the marine conservation area, that its destruction would cause future difficulties for the communities, and that they can influence decisions about the MPA.

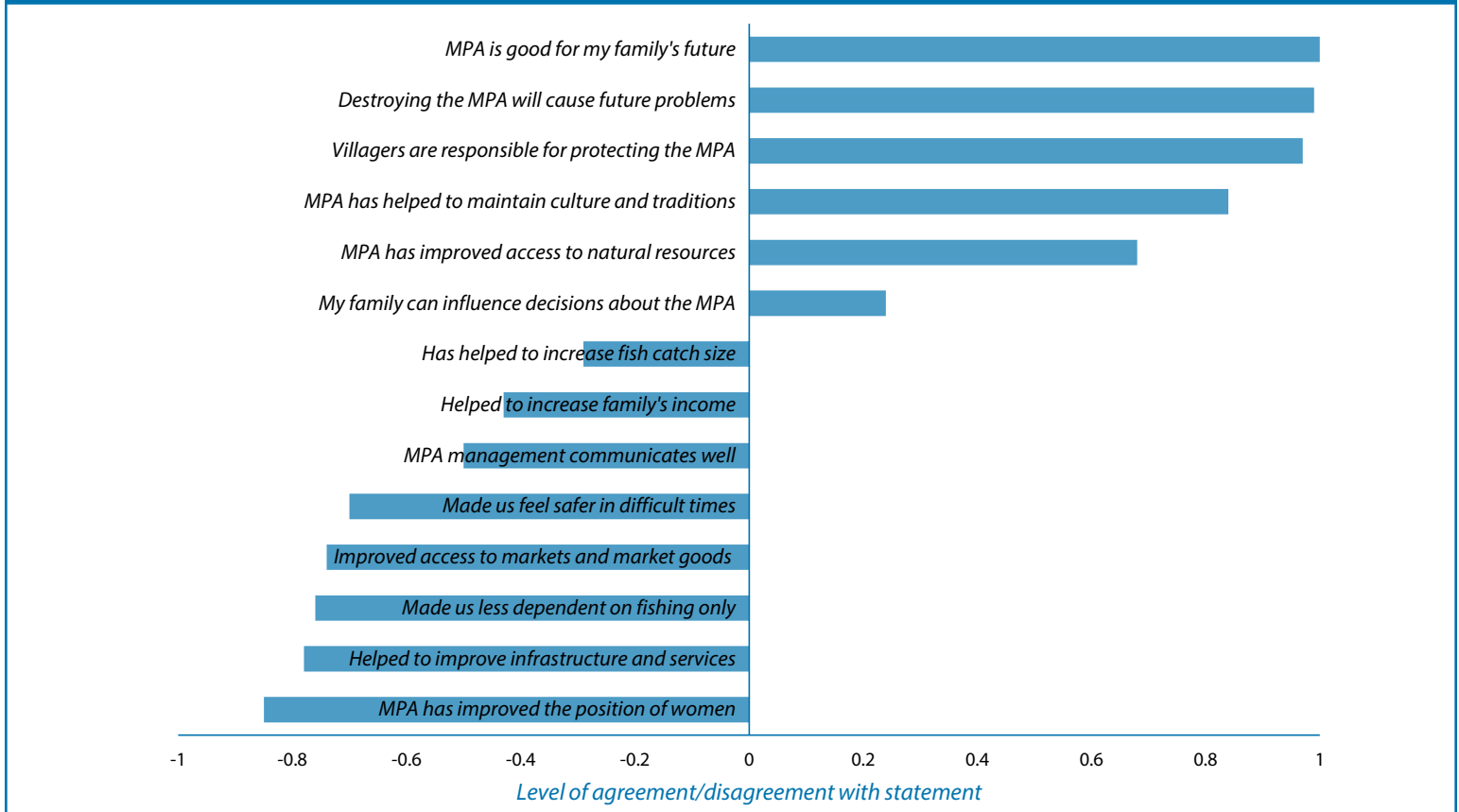
The respondents are also very positive about the contribution of the MPA in terms of the maintenance and revival of local culture and traditions. In many other aspects, however, the surveyed community members were less positive about its impacts, especially concerning local infrastructure, fish catches, access to markets, and household income. They also did not feel that the MPA management communicated effectively or had promoted the role of women within the communities.



Seaweed farming supplements household incomes for many families. Photo: Pieter van Beukering.

These results demonstrate that support for the MPA exists in spite of the relatively limited social and economic benefits it has brought the communities of Waghena, Kia, and Katupika, in part due to the failure of the fisheries centre to adequately compensate local fishers for the decrease in the price of reef fish. The project has been able to successfully communicate the idea that the MPA will deliver long-term benefits to its constituent communities; the delivery of these benefits is therefore integral to the future sustainability of the project. The re-opening of the fisheries centre and the development of the Arnavons as an ecotourism destination would both help to

Fig. 1: Community perceptions of Arnavon MCA Management Committee



Source: van Beukering et al, 2007.

ensure future economic gains for the communities' households. Two processes are critical to ensuring this long-term impact. Firstly the support of local government authorities and The Nature Conservancy has helped to ensure the project's operational success. These contributions have included training Conservation Officers, biological monitoring, and financial management, among other roles. After more than fifteen years of involvement, The Nature Conservancy is withdrawing its support. The ability of the ACMCA Management Committee to continue its role in ensuring compliance with the MPA's restrictions, maintaining relationships with local authorities and other stakeholders, and monitoring and managing the MPA's resources will decide the initiative's long-term future. To assist in this, in 2007 The Nature Conservancy established a USD 400,000 endowment to support the Arnavon Community Marine Conservation Area's core operational costs in perpetuity. This was the first instance of an MPA in the Pacific securing funds for an endowment. Between 2007 and 2010, this fund was managed as part of the Conservancy's larger endowment fund; beyond this, it is hoped that the interest earned from the fund will be sufficient to support the annual recurring costs of managing the marine conservation area.

REPLICATION

Visits to the Arnavon Community Marine Conservation Area by elders and leaders from other nearby communities have led to increased local acceptance of Locally-Managed Marine Areas (LMMAs) as a

model for conservation. LMMAs have subsequently been established in several areas of the neighbouring provinces of Choiseul and Isabel, specifically aimed at the protection of fish spawning areas vital to the maintenance of sustainable local fisheries.

PARTNERS

- The Nature Conservancy
- The Solomon Islands Government (including the Ministry of Natural Resources – Department of Fisheries and Marine Resources and the Department of Forests Environment and Conservation – and the Ministry of Reform and Planning.)
- Provincial government agencies of the Solomon Islands (including The Luru Land Conference of Tribal Chiefs (LLCTC), The Isabel Council of Chiefs (ICC), the Ministry for Natural Resources in Isabel Province, and the Department of Fisheries in Choiseul Province.)
- WWF Biodiversity Conservation Network
- Conservation International (CI)
- Wildlife Conservation Society
- Australian scientific institutions (including the Australian Institute of Marine Science (AIMS), CRC Reef Research Centre, Queensland Department of Primary Industries & Fisheries, and APEX Environmental Pty Ltd.)
- South Pacific Regional Environment Program
- Government of Japan
- Volunteer Service Abroad (New Zealand)





TETEPARE DESCENDANTS' ASSOCIATION

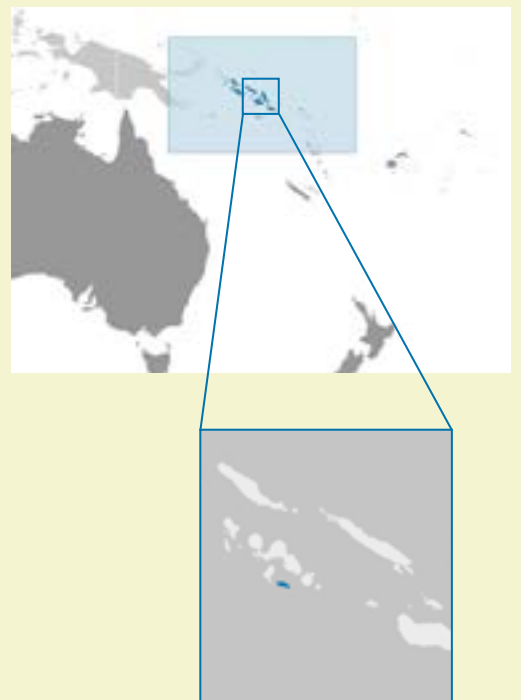
Solomon Islands



PROJECT SUMMARY

Tetepare Descendants' Association (TDA) represents the legal owners of Tetepare Island, the largest uninhabited island in the tropical Pacific and one of the last remaining unlogged tropical islands in world. To help indigenous landholders resist pressures from industrial logging companies, TDA pioneered 'community conservation agreements' whereby landholders and their communities are provided with alternative livelihood opportunities in exchange for a commitment to the sustainable management of marine and forest resources.

A marine protected area has been established as a permanent no-take zone, serving as a nursery and refuge for fish. Fish abundance has grown substantially, as have local incomes. TDA also operates a community ecotourism enterprise that provides jobs for community members. Training has also been provided in coconut oil production, marketing, and agriculture and a scholarship program has been established to enable local youth to pursue high education, trade school, and vocational training. .



Background and Context



Tetepare Island, in the Western Province of Solomon Islands, is a conservation jewel of the South Pacific. Fringed with biologically diverse coral reefs and encompassing over 12,000 hectares of rainforests and mangroves, this uninhabited island is one of the few remaining unlogged tropical islands in the world, and home to a dazzling array of terrestrial and marine life. Like much of Solomon Islands' forests, however, this natural heritage is under threat from commercial logging.

Tetepare Descendants' Association (TDA) formed in 2003 to protect the island's biological diversity, channelling international funding to provide the island's legal owners – the descendants of Tetepare's former inhabitants – with alternative livelihood opportunities in exchange for their commitment to the conservation of Tetepare's marine and forest resources.

Habitat and species richness

Tetepare's rainforest – some of the last remaining, primary, lowland rainforest in Melanesia – houses at least 73 species of bird, 24 reptile species, four frog species, and 13 mammal species, including a number that are endemic to Tetepare. Yet more species likely remain to be discovered, with scientists only recently discovering three new species of fish and one new fish genus in the freshwater rivers within the island's forests. In 2006, scientists identified some 33 taxa of butterfly, and a recent bat survey indicated the presence of as many as 18 different bat species. The island is home to the world's largest skink (*Corucia zebrata*), as well as many avian species. In fact, Tetepare lies within BirdLife International's Solomon Group Endemic Bird Area, designated for its high level of avian endemism. Birds found on Tetepare include hornbills, pygmy parrots, sea eagles, kingfishers, and the endemic Tetepare White-eye (*Zosterops tetepari*).

Tetepare's marine biodiversity is no less remarkable. The island's black sand beaches support nesting populations of three turtle species, including the critically endangered leatherback (*Dermochelys*

coriacea) and hawksbill (*Eretmochelys imbricata*) sea turtles, and the endangered green sea turtle (*Chelonia mydas*), while the surrounding waters support sharks, bottlenose and spinner dolphins, saltwater crocodiles, dugongs (*Dugon dugon*) and the coconut crab (*Birgus latro*). The reefs surrounding Tetepare host one of the world's highest diversities of coral and fish species, including bumphead parrotfish (*Bolbometopon muricatum*) and barracuda. The area is part of the Pacific Coral Triangle, recognized as a global centre for coral diversity and a high priority for marine conservation.

The origins of TDA

For all Tetepare's marine and terrestrial biodiversity, one species that is notably absent from the island is humans. Tetepare has been uninhabited since the mid-19th century and is in fact the largest uninhabited island in the tropical Pacific. There are many theories as to why the island might have been abandoned but the reason is not known with any certainty. Scattered now throughout the Western Province of Solomon Islands, on the neighbouring islands



of New Georgia, Roviana Lagoon, Vona Vona Lagoon, Nggatokae and Ranongga, the descendants of the Tetepare Islanders retain their ties to Tetepare through customary land ownership and oral traditions.

In 1995, a group of these customary landowners formed the group Friends of Tetepare to address the threat of commercial logging on Tetepare. In 2002, this group joined forces with the Tetepare Traditional Landowners Association (TOLOA) and in 2003 the organizations officially merged to form Tetepare Descendants' Association (TDA). The association officially represents the legal owners of Tetepare and supports them in rejecting logging offers in order to conserve the island's natural resources for the benefit of all Tetepare descendants, present and future. Over 3,000 descendants of the Tetepare Islanders have joined TDA, making it one of the largest landowners' associations in the Solomon Islands.

Supporting landowners to resist commercial logging

The logging industry is the single most significant economic sector in the Solomon Islands, contributing 67% of export earnings and some 12-13% of total government revenue. As much as 50% of the employed workforce may be associated directly or indirectly with the forest sector. According to the U.N. FAO (2010), 79% or about 2,213,000 ha of Solomon Islands is forested, of which around half is primary forest. Between 1990 and 2010, however, the islands lost 4.8% of its forest cover (around 111,000 ha.) The reliance on commercial logging drives this deforestation, and has resulted in dire forecasts for the nation's forest stocks. Since 2000, the country has been warned that the volume of timber annually harvested from native forests was too high; in 2009, the Central Bank of the Solomon Islands asserted that this exhaustion of timber stocks had already occurred.

With the aim of helping Pacific island communities resist the temptation of lucrative logging contracts, the American Museum of Natural History's (AMNH) Center for Biodiversity and Conservation (U.S.) developed the use of Community Conservation Agreements (CCAs). These agreements stipulate alternative livelihood opportunities and educational benefits for communities in exchange for their commitment to the conservation of natural resources.

This work has been undertaken in Solomon Islands by the Solomon Islands Community Conservation Partnership (SICCP), a registered charitable trust founded by AMNH in 2008 that maintains direct engagement with rural landholding communities in biological assessments, landholder association development efforts, and implementation and refinement of CCA benefit-delivery mechanisms. Since its inception, SICCP has set up a fledgling pilot network of community-driven protected areas at key sites across the country. The two most developed CCA partnership areas are Tetepare Island, and the Kolombangara Coast to Cloud Forest Reserve, the largest terrestrial protected area in the Solomon Islands, modelled after TDA and considered a sister project.

The Tetepare CCA forms a framework by which the island's legal owners can maintain connectivity with their customary lands without resorting to unsustainable extraction of natural resources to meet

their cash needs; through the work of TDA, Tetepare landholders are compensated for the income they forego by choosing conservation over deforestation and resource exploitation.

The association has been able to leverage relationships with international donor agencies to establish a regional Community Conservation Trust, managed by both SICCP and the Conservation Agreement Fund, which is designed to house, invest, and disburse CCA support from all sources, including both philanthropic contributions and carbon or ecosystem services payments. Through partnership with WWF, for instance, TDA has gained access to international funding sources such as the Coral Triangle Initiative.

Decisions over the use of funding are taken in a highly participatory manner. TDA is governed by an Executive Committee composed of elected representatives of its members. The association's constitution states its aim as being to unite Tetepare's landowners to manage and conserve Tetepare and its natural resources for the benefit of present and future generations descended from Tetepare Islanders. The organization's governance and operational structures serve this mission well. Annual general meetings and quarterly executive meetings provide forums for collective decision making and the incorporation of local knowledge and data into resource management plans, empowering communities to steward their natural resources to their long term benefit. This robust governance has facilitated TDA's growth from a fledgling landowners' association to a world class community-based conservation organization, responsible for one of the largest integrated land and marine conservation initiatives in the Pacific.



Key Activities and Innovations



In accordance with the CCA system, TDA's activities combine conservation measures with the provision of educational and alternative livelihood opportunities to its members to compensate for the income they have foregone through their commitment to preserve Tetepare Island from logging. Conservation measures include permanent and temporary marine protected areas (MPA), biodiversity monitoring activities, and conservation incentive programmes. Its alternative livelihood activities include ecotourism activities, training and business support for community members, and a scholarship programme to enable local youth to pursue secondary education, trade school, or vocational training. In many cases, these conservation and livelihood aspects of TDA's work are complementary, with conservation activities providing employment for local community members, and serving to increase the health and abundance of a marine resource, for example.

Marine conservation measures

In addition to setting aside the entire island of Tetepare for conservation, TDA has established an MPA - the largest in Solomon Islands - running 13 km from the western tip of the island on Mbo Point to the eastern edge of nearby Soe Island. The MPA functions as a permanent no-take zone and serves as a nursery and refuge for fish, boosting fish numbers even outside the designated area, to the benefit of local fishers. In June 2010, TDA members elected to establish two further, temporary MPAs around Tetepare, to help fish stocks recover from increased harvesting. These MPAs operate on alternate years.

To reduce pressure on fragile reef, lagoon and estuarine fisheries, TDA is experimenting with the placement of Fish Aggregating Devices (FAD) near the shore. FADs are rafts tethered to the seabed which attract fish such as marlin, tuna, rainbow runner and mahi mahi. Placing these devices within paddling distance of specific communities that have invested in the MPA compensates them for their loss of access to the MPA as a fishing ground and simultaneously relieves pressure on commercially valuable species within the MPA.

Biodiversity monitoring

The association also carries out monitoring of Tetepare's terrestrial and marine wildlife. TDA rangers are employed from within the community and make regular patrols of the island and its surrounding area to ensure that regulations are being complied with. Individual species including coconut crabs, certain species of sea grass, giant clams, and endangered sea turtles are targeted through tailored community protection measures. For example, TDA participates in the Global Reef Check initiative, through which coconut crabs are monitored both within and outside the MPA to gauge the effectiveness of the protected area designation. 'Seagrass Watch' monitoring has been conducted annually on Tetepare Island since 2005. This is conducted by women from the neighboring Rano and Lokuru villages who have been trained in seagrass monitoring methods. TDA's operational structure ensures that the findings of monitoring activities inform action. For example, when coconut crab data indicated critically low levels of the species, TDA's Executive Committee, alongside the Tetepare communities, agreed to establish additional seasonal protected areas in which coconut crab harvesting is banned.

Economic incentives for endangered species conservation

Endangered sea turtles that nest along Tetepare's beaches are a special focus of conservation measures and monitoring. During the nesting and hatching season from September to April, TDA rangers work in shifts throughout the night to guard the nesting areas. They tag nesting females, relocate precariously located nests to higher ground, install predator exclusion cages to protect eggs from predators, and collect data on egg numbers and size, clutch size and hatching success of leatherback and green sea turtles.

The association also runs a leatherback turtle conservation incentive programme on neighbouring Rendova Island, which is home to many TDA members. This initiative, coordinated by TDA staff, rewards community members for reporting and protecting turtle nests. Anyone who reports a nesting leatherback turtle or an active nest

to their village turtle monitor receives a financial reward, which is supplemented if the nest they discovered hatches successfully. This provides an incentive for community members to guard and protect any nests they find. In addition, TDA donates money to a community fund for each nesting turtle and nest reported to the turtle monitor, and for each nest that hatches successfully.

Ecotourism and other livelihood opportunities

Apart from their obvious benefits to local wildlife and biodiversity, TDA's conservation measures provide high quality employment opportunities to community members who work as TDA staff and rangers. This is just one of a range of employment opportunities that TDA has developed to provide sustainable sources of income to the Tetepare-descended communities.

TDA also operates a community ecotourism enterprise which centres on an ecolodge on Tetepare Island itself. The lodge and its activities provide direct income to community members who work as staff in the lodge and as guides for tourism activities such as snorkelling, rainforest walks, bird watching and canoeing. To limit the impact of the ecotourism enterprise on Tetepare's wildlife, the number of visitors is limited to a maximum of 13 people at any given time. All non-descendants visiting Tetepare are charged a conservation fee of SI\$100 (approximately USD 14) to support TDA's conservation programmes.

The ecolodge and its guests also provide a market for income generation activities supported by TDA. The association has provided members with training in a range of alternative livelihood activities, including coconut oil production and marketing. It has provided drum ovens for the establishment of village bakeries, and has provided marketing assistance to local artisans. TDA also runs an ngali nut (or *Canarium* nut) programme, through which it purchases nuts from women in villages on nearby Rendova Island, for shipment to the capital, Honiara. Throughout its range of activities, TDA now employs over 50 local people, in either permanent or casual capacities, and provides opportunities for income generation to many additional community members.

In addition to the training and employment TDA provides, its scholarship programme, established in 2005, has enabled local youth to pursue secondary and higher education and vocational training. The scholarship programme assists up to 80 students each year with school fees, through scholarships awarded based on academic merit and greatest need. School fees are paid directly to schools in order to ensure these funds are used for their intended purpose. To date, scholarships have been awarded to high school students as well as for trades and vocations such as teaching and nursing.



Impacts



BIODIVERSITY IMPACTS

The Tetepare landholders' decision to conserve the entire island of Tetepare in its natural state has had immeasurable benefits for the island's rich biodiversity, which includes numerous endangered and endemic species. Tetepare's rainforest is a haven for avian biodiversity in particular, and is home to the endemic Tetepare White-eye (*Zosterops tetepari*), as well as many reptile, mammal and insect species, more of which are being discovered and identified all the time. The island's beaches support nesting populations of endangered sea turtles, while the marine area surrounding Tetepare forms part of the Coral Triangle global centre of coral biodiversity.

The association's most significant impacts, in terms of environmental and biodiversity benefits, have been through the avoidance of damage rather than improvements to species abundance and diversity. By setting aside the entire island for conservation and establishing a MPA in the surrounding waters, TDA has ensured that Tetepare remains one of the few untouched islands in the Pacific, in contrast to many neighbouring islands which have been logged and overfished. By resisting offers of logging contracts for the island, the Tetepare descendants have protected one of the region's last major refuges for endemic species. While much of the Pacific's rainforest area has been severely degraded, or even lost entirely, Tetepare's forests remain intact, in contrast to much of Solomon Islands' primary forest in particular.

Conservation informed by local monitoring

Additionally, TDA has recorded significant increases in the availability of natural resources since conservation activities formally commenced. The MPA is a good example of this. The area functions as a strict no-take zone, and serves as a refuge and nursery for fish. Ultimately, it has boosted fish numbers both within and outside the protected area by providing a safe haven for fish to reproduce and develop. TDA's monitoring has demonstrated that Tetepare's reefs

and fish populations are healthy, both within and outside the MPA, while fish abundance has grown substantially since the MPA was established.

The association's ranger and monitoring activities have had important impacts in terms of the sustainable management of important terrestrial (e.g. coconut crabs) and marine (e.g. trochus) species on the island and in the surrounding waters. The results of monitoring indicate a greater abundance of species inside protected areas versus harvested areas. The leatherback turtle conservation incentive programme on Rendova Island has also exhibited promising outcomes, resulting in significant increases in hatching numbers on beaches that are part of the programme.

The organization's operational structure ensures that the results of monitoring are used to best effect, with resource management plans altered according to information garnered from monitoring data. For example, when recent coconut crab data indicated critically low levels, the TDA Executive Committee and communities agreed to establish additional, seasonal protected areas in which coconut crab harvesting is banned. Monitoring also allows success to be tracked, providing ongoing indications of what methods are working and what methods are not. This helps to support community members' ongoing commitment to conservation activities, by enabling them to see clearly the results of their efforts.

SOCIOECONOMIC IMPACTS

Tetepare Descendants' Association's work is based on recognition of the fact that conservation of natural resources is fundamental to the wellbeing of the Tetepare-descendant communities, both in terms of the reliance of their traditional livelihoods on natural resources, and in terms of maintaining strong cultural connections among the various groups of descendants and their native island. By electing to conserve Tetepare, the community has made a decision to sacrifice short term cash earnings, in the form of logging concessions, in

order to preserve the natural resources that contribute to their long term wellbeing. In doing so, the communities have opened the door to more sustainable, higher level income generation opportunities that have built the capacity of community members, and promise long-term employment and earning potential. Simultaneously, the conservation measures being undertaken are resulting in increased health and abundance of the natural resources on which these communities depend.

Income gains and community benefit-sharing

The employment and income generation opportunities developed by TDA have provided sustainable livelihood opportunities for community members to compensate for income foregone due to the conservation of Tetepare. TDA employs over 50 permanent and casual local employees through its ecotourism and conservation activities, and local incomes are reported to have grown substantially as a result of TDA's work. Many of these island community members previously had little access to formal employment other than short-term logging work.

TDA also provides support and training for the establishment of small businesses by community members. This support has included the distribution of drum ovens for the establishment of village bakeries, provision of equipment and training for coconut oil production, distribution of seeds for local market gardeners, and provision of marketing assistance to local artisans. Training has also been provided in business management and book-keeping. The small businesses that TDA supports not only provide income for those who run and work for them, but also much-needed services for the remote villages in which they operate.

In addition to employment and alternative livelihood activities that provide income to individual community members, TDA directs money to community development funds to ensure that a larger proportion of Tetepare descendants benefit from the group's work. Funds paid to individuals through the leatherback turtle conservation incentive scheme are matched and deposited into a community improvement account, while the conservation fee of SI\$100, paid by visitors to Tetepare, is also directed to a community fund.

Delivering results for youth and women

TDA's scholarship programme has provided educational scholarships to over 170 students and is growing every year as TDA's conservation projects expand. Scholarships are awarded to the families of TDA members based on educational merit and greatest need. To date, scholarships have been provided for primary and high school students, training in trades, and teaching and nursing training. The scholarships represent a successful benefit-sharing arrangement, whereby the wider community, especially the younger generation, benefits from the long term advantages of receiving education that many would not otherwise be able to afford.

In terms of women's empowerment, TDA has implemented a number of requirements and activities to ensure women's needs are catered

for by its activities, and that women are well represented within the association's governance structure. TDA's constitution requires that at least two-fifths of the community representatives attending the Annual General Meeting be women and that at least three women sit on the Executive Committee. Women are employed in leadership roles throughout the Association's various activities. A number of activities cater specifically to women, including a micro-bank savings scheme that helps women to accumulate funds for major expenses.

Training opportunities have targeted women in particular, for example, a 'Women in Fisheries' workshop and a small business management course organized for women through the Solomon Islands National University (formerly the College of Higher Education.) Tetepare women have also received training in cooking, guiding and hospitality work through their employment in TDA's ecotourism and conservation activities. Women are active in monitoring efforts, and a team of women undertake seagrass monitoring through an annual 'Seagrass Watch' and giant clam survey on the island. Gender equity is a priority in the awarding of TDA's educational scholarships, ensuring that girls and boys are afforded equal access to education.

Community empowerment and representation

Finally, the social collective that TDA has built has empowered the Tetepare communities as a whole and given voice to these communities, whose voices have been represented at international forums and meetings, including at the Fifteenth Conference of the Parties (COP-15) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, as well as in meetings with the Global Environmental Facility, the Coral Triangle Initiative, the United Nations Convention on Biological Diversity's Programme of Work on Protected Areas, and the UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UNOHRLLS), among others.

POLICY IMPACTS

The association's work has helped to develop more formal recognition at the provincial and national level of traditional land tenure arrangements – TDA itself has been officially recognized as representing the landholders of Tetepare. However, this goes beyond Tetepare and has empowered indigenous landholders across the region.

At the national level, TDA was used as a model in the development of Solomon Islands' National Protected Areas Act in 2010. The Government of Solomon Islands has also recognized TDA as an exemplary indigenous institution in its official statement on REDD+ negotiations as part of UNFCCC negotiation and discussions. In Copenhagen in 2009, the government announced Tetepare as a pilot project for the development of avoided deforestation carbon credit programmes in the region, and in July 2011, TDA participated in an inception workshop for a UN-REDD readiness support programme, in partnership with the Secretariat of the Pacific Community (SPC) and Japan International Cooperation Agency (JICA), with a view to initiating a formal forest carbon inventory on Tetepare.

Sustainability and Replication



SUSTAINABILITY

Sustainability is one of the key challenges facing community organizations such as TDA. The continuity of TDA's success is enhanced by attention to governance and financial management, by embracing a broad range of advisors and supporter groups, and by increasing awareness of the challenges and successes of the organization through its website and the acclaimed book 'The Last Wild Island: Saving Tetepare', as well as through a range of documentary and other media stories.

The CCA that TDA has entered into has been successful in helping its landholder members resist pressure to sign logging contracts. The agreement has ensured that community members feel adequately compensated for the sacrifices they have made in agreeing to preserve Tetepare, and, hopefully, will allow communities to continue to resist logging in the future. Employment and income generation opportunities in ecotourism, as environmental monitors, and in the range of small businesses that TDA supports, provide a strong incentive for the continuation of conservation measures. Furthermore, conservation activities to date have resulted in improvements in resource availability for local people – a very visible incentive to persist with conservation.

The association's scholarship programme, meanwhile, has been carefully designed as a mechanism to ensure that the benefits of the ecotourism project and ongoing conservation efforts are distributed fairly among the communities which are spread throughout Solomon Islands' Western Province. The scholarship scheme is also contributing to TDA's ongoing effectiveness and legitimacy by ensuring that young members of the communities have the capacity to continue the association's work into the future.

In terms of community ownership, TDA is composed entirely of the indigenous landholders it represents, and is officially recognized as the representative organization of Tetepare descendants. The TDA constitution is inclusive of all community members, including women

and youths, with regulations set out to ensure the participation of women in AGMs and on the Representatives' Committee. Annual and quarterly meetings provide a forum for participatory decision-making and regular awareness meeting are held in member communities to explain project activities and to educate community members about TDA's work. Socially therefore, TDA has a high degree of sustainability, with strong buy-in from its member communities who enjoy clear benefits from their involvement in the association.

Financially, TDA is pursuing a range of options to secure its funding into the future. In 2010, the Tetepare Endowment Fund was established as a framework for a Solomon Islands Community Conservation Fund that would provide core funding to TDA. The fund is dependent on donations from individuals and organizations to keep conservation activities running. The conservation fee of SI\$100 for all visitors to the island helps to cover the costs of the conservation programme, alongside income from the eco-lodge. TDA has been exploring the possibility of securing sustained



financing for its conservation activities through the generation of REDD+ credits, in partnership with ClearSky Climate Solutions, the American Museum of Natural History and Conservation Agreement Fund.

REPLICATION

Tetepare Descendants' Association is officially recognized by the government as representing the landowners of Tetepare, and as such it has become a model for other landholding communities throughout Solomon Islands. Its successes have inspired similar programmes on the nearby islands of Kolombangara, Gatokae and Vangunu, and Tetepare has served as a training site for numerous resource management and monitoring initiatives throughout the country.

A 'sister project' to Tetepare was set up by SICCP on Kolombangara as part of a pilot network of community-managed protected areas using the CCA arrangement. This project, the Kolombangara Coast to Cloud Forest Reserve, was modelled after TDA, and resulted in the establishment of the Kolombangara Island Biodiversity Conservation Area which is formally listed under the country's Protected Area Act. In May 2010, TDA's Sustainable Livelihoods staff travelled to Kolombangara for a week to help the project's staff in their development of a sustainable livelihoods strategy and an ecotourism plan for Kolombangara.

PARTNERS

The association's work has been supported by a network of expert advisors, all of whom have encouraged TDA to embrace a broad range of partners and donors. Among these donors, the Solomon Islands Community Conservation Partnership (SICCP) and the Conservation Agreement Fund are core supporters: they established and help to manage a regional Community Conservation Trust designed to invest and disburse financial contributions to CCAs, including both philanthropic contributions and carbon or ecosystem services payments. The Conservation Agreement Fund has established a dedicated project endowment in partnership with Conservation International's Global Conservation Fund through a contribution from AusAID.

The association has also partnered with WWF, which facilitates TDA membership in the Coral Triangle Initiative. Australian Volunteers International, Conservation International, Conservation Ark, Global Leadership Foundation, HoneyPot Foundation, NZ Aid, Solomon Islands National University, and the Sustainable Forestry Conservation Project of the European Union have also provided support and funding for TDA's work.







AMAL-CRAB BAY COMMUNITY RESOURCE MANAGEMENT INITIATIVE

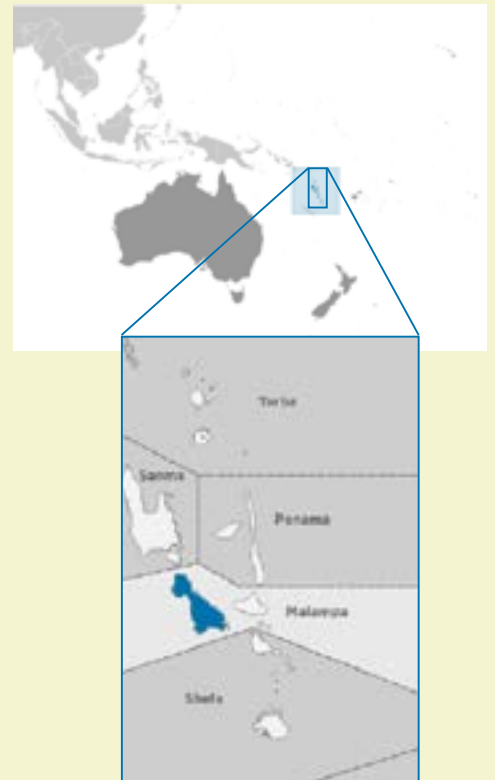
Vanuatu



PROJECT SUMMARY

The successes of the Amal-Crab Bay initiative in conserving marine resources in their tabu area, located on the eastern coastline of the island of Malekula, Vanuatu, has been underpinned by the use of a traditional resource management system and innovative awareness-raising efforts. The bay forms part of the Port Stanley mangrove area, and is home to extensive fringing reefs, sea grass beds, and a high abundance of crabs. This resource is critical for local livelihoods and food security, and has been the focus of sustainable harvesting regulations since 2002, when community chiefs instituted a ban on harvesting within the mangrove forests.

These community-led efforts have been strengthened with support from an array of international partners; as a result, the initiative has overseen an increase in marine and coastal resources, compiled an evidence base for the bay's mangrove ecosystem, and developed local ecotourism infrastructure.



Background and Context



Crab Bay is a critically important area for biodiversity in the Pacific archipelago of Vanuatu, situated in Malampa Province, on the central eastern coastline of the island of Malekula. The bay forms part of the Port Stanley mangrove area, and is composed of extensive fringing reefs with sea grass beds. The area is particularly well-known for its high abundance of crabs, hence its name; the bay is also home to a high diversity of invertebrate species and fin fishes, and provides roosting and feeding grounds for a variety of internationally endangered species such as turtles, dugongs, and some terrestrial mammals.

The local populations of Crab Bay and the neighbouring area of Amal totaled around 1,500 in 2005, living in sixteen communities dispersed along the eastern coastline. These indigenous Melanesian communities speak the *uripiv* dialect and share traditional customary beliefs typical of the “small Nambas” people of central Malekula. Approximately eighty percent of the population is engaged in fishing and farming to feed their families and earn cash income; the remaining twenty percent are paid workers at the area’s two large employers: a cattle ranch and a coconut plantation. A high percentage of local people use the bay’s marine resources to supplement their income and meet food security needs; the table below demonstrates the extent to which coastal communities are reliant on the area’s natural resources for their subsistence and livelihoods.

Cardisoma carnifex: a critical local resource

One important source of protein is the land crab *Cardisoma carnifex* – these are harvested daily by women who trade surplus catches for cash at the local markets. Harvesting of land crabs for subsistence dates to the 1980s; prior to this, French plantation owners had restricted local access to the Crab Bay and Amal areas, allowing the species to flourish.

With an increasing population and the advent of a cash economy

leading to an increased demand for cash income, the supply of land crabs in the bay began to decline in the late 1990s. Within a few years, crab collectors reported finding it increasingly difficult to harvest a sufficient number of crabs; their collecting methods were, conversely, seen as the cause of this decline. Collectors were using baits and nets to trap crabs, as well as digging out individuals from holes and using lights in night fishing to bundle enough crabs for sale in nearby markets. In September 2002, in response to the trend of declining land crab numbers, community chiefs instituted a *tabu* on the mangrove forests and reefs within the bay to prohibit crab collection, supported by the Malampa Provincial Authority. This use of a customary resource prohibition effectively established a temporary no-take zone, aimed at allowing the replenishment of crab resources. This created the *Amal-Krabbei Tabu Eria* (AKTE); a management committee was subsequently established to oversee its implementation, marking the beginning of the Amal-Crab Bay Community Resource Management Initiative.

The initial process of instituting the *tabu* was undertaken without providing clear information to the rest of the community about either its purpose or the rules they were supposed to observe, however. Consequently, poaching activities persisted in the *tabu* area. Weak management of the marine area was compounded by a lack of ecological information on land crabs, meaning that the evidence base for prohibiting their harvesting was lacking. Finally, existing national policies and legislation that could have supported local action were instead focused on high-value commercial species, and gave less consideration to resources such as the land crab that are used primarily for subsistence needs.

International support catalyzing improved management

In November 2003, the International Waters Project (IWP) chose AKTE as the site for its pilot programme on community resource management in Vanuatu. The IWP ran from 2000 to 2006, working with pilot communities in fourteen Pacific Island countries to find practical

Table 1: Income sources recorded by IWPDP Household Survey (IWPDP 2005) in eighteen Crab Bay villages

Village	Sources of income mentioned
Barrick	Copra, cocoa, pigs, chicken, timber
Bushman's Bay	Copra, cocoa, pigs, fish
Jinenarong	Copra, food crops, cocoa, pigs, <i>Cardisoma</i> crabs, fish, shell fish
Hatbol	Copra, cocoa, pigs, chickens, timber, pandanus handicrafts, bread & gateau, natangura thatch panels
Limap	Copra, cocoa, pigs, chickens, shell fish, timber, kava, pandanus handicrafts
Lingarakh	Copra, cocoa, chicken, timber, pandanus handicrafts, bread
Louni	Copra, food crops, cocoa, <i>Cardisoma</i> crabs, pigs, fish
Mapbest	Copra, cocoa, pigs
New Bush	Copra, food crops, cocoa, chickens
Port Nabe	Copra, food crops, pigs, chickens, <i>Cardisoma</i> crabs, fish, shell fish, pandanus handicrafts, octopus
Portindir	Copra, food crops, cocoa, pigs, chickens, <i>Cardisoma</i> crabs, fish, trochus, shell fish
Robako	Copra, cocoa, food crops
Taremb	Copra, cocoa, food crops, pandanus handicrafts, firewood
Tenbibi	Copra, food crops, cocoa, pandanus handicrafts, firewood
Tevaliaut	Copra, cocoa, food crops, pigs, chickens, fish, vanilla, beef
Tevri	Copra, food crops, pigs, chickens, <i>Cardisoma</i> crabs, fish, trochus, shell fish, pandanus handicrafts, firewood, octopus, rolls of pandanus leaves
Uri island	Copra, food crops, cocoa, chickens, <i>Cardisoma</i> crabs, fish, trochus, shellfish, mangrove, oyster, octopus, clam shell
Vilavi	Copra, trochus, pandanus handicrafts

ways to strengthen environmental management in three key areas: coastal fisheries, waste reduction, and freshwater protection. The project was funded through the Global Environment Facility (GEF) and co-managed by the Secretariat of the Pacific Regional Environment Programme (SPREP) and the United Nations Development Programme (UNDP). In Vanuatu, the IWP focused on promoting management systems at the community, provincial and national levels that would support sustainable management of inshore fisheries resources.

The combination of local ownership and international support has allowed the AKTE initiative to tackle the initial challenges it faced. As well as the lack of awareness of the need for conservation, the paucity of empirical data on ecological conditions, and the absence of institutional support, these challenges included the scattered distribution of the sixteen member communities, transport difficulties in accessing the project site, the lack of a freshwater source near the site, and rising sea levels. Financial and technical assistance have empowered local

actors to overcome many of these challenges, steadily improving the efficiency and resilience of management efforts in delivering results for the coastal economy and ecosystem.

The achievements of the AKTE initiative to date include significant increases in the abundance of marine and coastal resources, improved local management capacity, national and international recognition, and an improved evidence base for the area's mangrove ecosystem. The *tabu* area has provided a site for the regeneration of other marine species in addition to land crabs: in 2003, the Vanuatu Fisheries Department released 400 adult trochus (*T. niloticus*) specimens in protective cages for spawning within the *tabu* area. Recent work has included the development of ecotourism capabilities and the building of an information centre for the area. In April 2011, the initiative's management committee voted to extend the implementation of the AKTE *tabu* area and resource regulations until 2016.

“The communities have experienced the impacts of climate change; the communities have adapted to these changes by promoting the natural regeneration of coastline species to combat coastline erosion, planting in subsistence gardening outside traditional farming calendars; planting trees on farm land; and reviving traditional farming techniques.”

Kevin Mores, Amal-Crab Bay Community Resource Management Initiative

Key Activities and Innovations



The AKTE mandate includes two zones: the *tabu* area, in which harvesting is prohibited, and an access area that extends along the coast, in which regulations ensure that crab harvesting is conducted in a sustainable fashion. The AKTE Committee has established clear rules to govern both, on display within the bay area. The strict protection of biodiversity within the *tabu* area has spillover effects for the access area, ensuring a refuge area for breeding stocks of marine species.

Tabu area prohibitions:

- No terrestrial or marine resources, including plants and animals, may be killed or removed from the AKTE.
- No non-living resources, including dead wood, stones, shells, coral rubble, or sand, may be removed from the AKTE.
- All household waste must be disposed in disposal drums in the area.
- No person may make fires or cook food outside the area's barbecue house (constructed recently for tourism purposes.)
- No person may enter the *tabu* area without the authorization of the AKTE committee.

- Authorized visitors must pay 1,000 Vatu (approximately USD 10) per small truck and boat, or 1,500 VT (USD 16) per large truck, to enter the *tabu* area, and must be accompanied by a member of the AKTE committee. They are subject to all rules of the *tabu*.
- Passengers of yachts are allowed to swim and walk in the AKTE for a 1,000 VT usage fee. They are subject to all rules of the *tabu*.
- Members of the AKTE committee may enter for the purpose of maintenance and monitoring activities. They may cut branches on roads and paths, but are subject to all other rules of the *tabu*.

Access area sustainable use regulations:

- A person may collect max. 30 crabs to eat, and 80 to sell, per day.
- Crabs must be larger than four fingers across their carapace to be harvested.
- Crabs with eggs must not be harvested.
- The access area is divided among the sixteen local communities. Each community access area is subject to local rules and regulations, which must be respected by all community members.



Can be harvested (over 4 fingers)



Cannot be harvested (under 4 fingers)

Enforcement:

For all violations of the *tabu* area rules, a 5,000 VT (approximately USD 53) fine is levied per entrance into the area. For instance, if a group or individual enters on three separate occasions to remove crabs or sand, the fine would be 15,000 VT. This fine must be paid to the AKTE Committee within a period of two weeks. Violations of local access area rules are the responsibility of the respective local communities, however.

Enforcement of the *tabu* area regulations, from monitoring infringements to giving and collecting penalty fines, is carried out by the AKTE Committee. In the case of disputed penalties, parties may state their claim to the committee, which will then make a final decision. Ensuring that violators pay fines is delegated to individual village chiefs; where necessary, the Malampa Police Department also has the responsibility to ensure that guilty parties pay the necessary fines.

Monitoring:

As well as governing resource use, the AKTE Committee is responsible for overseeing biological and socioeconomic monitoring. In 2004, community volunteers were trained in collecting baseline data and conducting ongoing studies. Five principal methods have been employed in these efforts: reef checks, monitoring marine resources

including fish, invertebrates, and coral health; crab surveys, using regular land crab counts; market surveys, tracking sales of crabs at the local Lakatoro market; socioeconomic surveying, assessing the use of crabs and other resources at the household level; and trochus assessments, measuring stocks and harvest sizes of *T. niloticus* sea snails, a valuable local resource.



Impacts



BIODIVERSITY IMPACTS

The biodiversity benefits of the Crab Bay *tabu* area have been seen in increased populations of various marine species collected by local communities for consumption and sale in local markets, as well as marked improvements in the mangrove forests and reef ecosystems. In 2004, AKTE community volunteers took part in a stock assessment and reef check, recording the benefits of sustainable management for species including land crab, mangrove and terrestrial forests, trochus, turtle, dugong, clams, coral reefs, Crown-of-thorns starfish, humphead wrasse (*Cheilinus undulatus*), mangrove bats, and various seabird species.

Resource use regulations have positively benefitted the AKTE target species of land crabs, as demonstrated by regular surveys of *Cardisoma* crab harvests taken from the project's access areas. Between 2005 and 2010, the crab harvest increased from 27,760 to 119,300, representing an increase of around 430%. This steady increase in annual harvests has validated the efficacy of the *tabu* and access area regulations for the Crab Bay and Amal communities, and has resulted in the extension of the AKTE period until 2016.

SOCIOECONOMIC IMPACTS

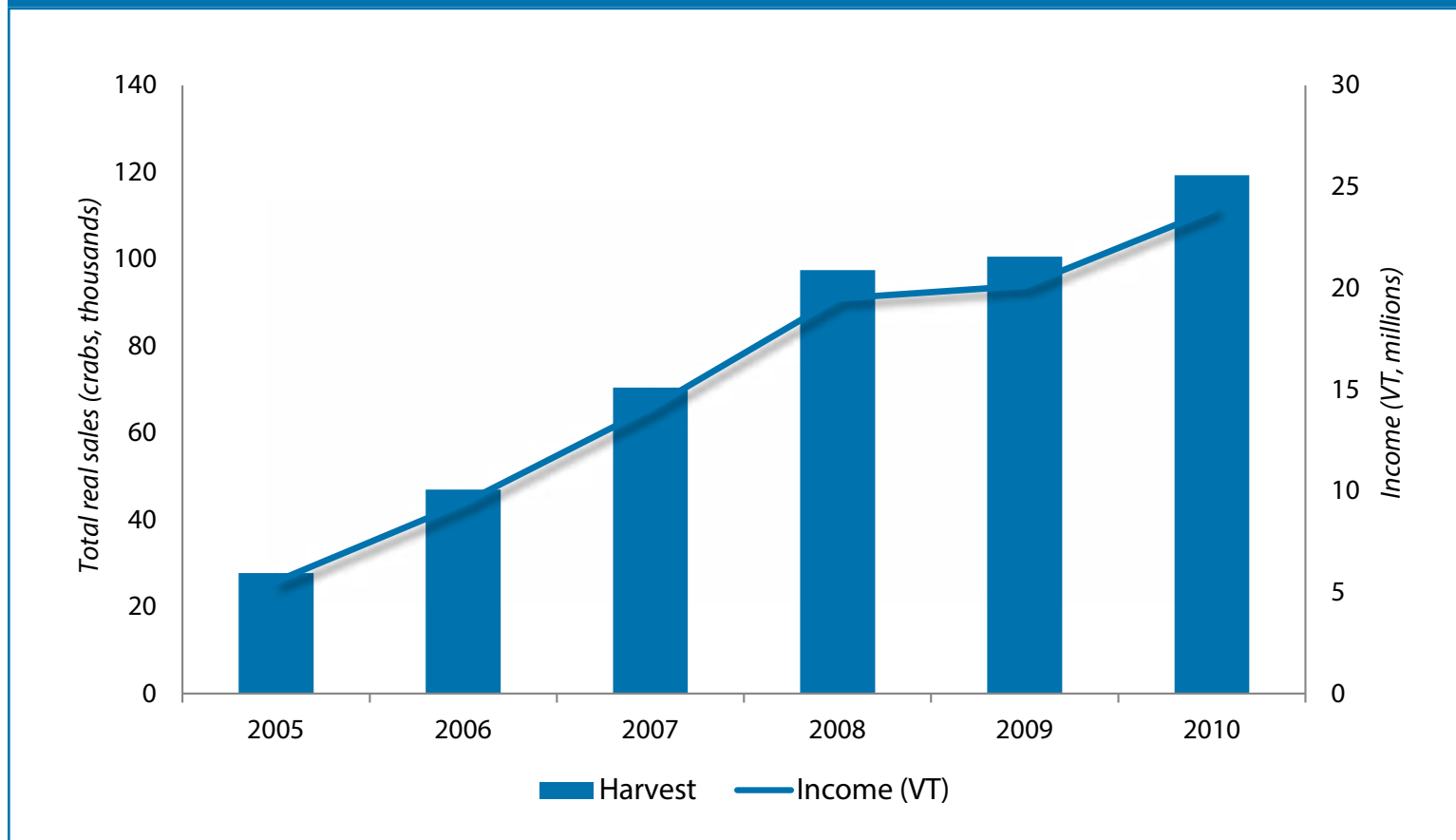
The AKTE initiative has generated economic benefits for the members of its constituent communities through two main channels. The organization collects money through fees for access to the conservation site, as well as an anchorage fee for mooring yachts in the access area. This is an income stream that the project hopes to exploit through the further development of ecotourism. The AKTE Committee has also begun collecting revenue from the use of the newly-constructed information centre. These revenues have been reinvested in building a water system at the project site.

The second source of economic benefit for the communities of Amal and Crab Bay has come through increased sales of land crabs at

market. The increase in harvests noted between 2005 and 2010 of 430% has translated into an increase in annual sales from 555,200 VT (USD 6,019) to 2,386,000 VT (USD 25,868) over the same period, emphasizing the substantial benefit of sustainable crab harvesting to local communities. *Cardisoma* crabs are also a common source of meat for villagers within the project area. While most meats are eaten a few times a month, *Cardisoma* are typically gathered 1 to 4 times a week by 95% of local households; the increase in their availability has therefore also improved local food security.



Fig. 1: Annual Land Crab Harvests, 2005-2010



Source: AKTE.

The economic value of the area's natural resources extends beyond cash income realized from the sale of commercial species. For instance, several types of mangrove and other tree species are used as door posts, fence posts, poles in gardens, place markers, bows, arrows and spears, axe handles, and house rafters. Socioeconomic surveys conducted in 2004 and 2005 detail the high degree of reliance on coastal and marine biodiversity for a variety of uses; the sustainable management of these resources since 2002 has ensured that communities have continued to benefit from Crab Bay's range of provisioning ecosystem services.

POLICY IMPACTS

The Amal-Crab Bay Community Resource Management Initiative has had a significant impact on policies aimed at the sustainable management of marine and coastal resources within Vanuatu, forming a key component of the International Waters Project strategy for the country and within the Pacific region. This has been solidified by the presence of three representatives of the AKTE communities being given positions in the Vanuatu Department of Forestry, Fisheries and Agriculture. Technical experts from the department in these respective fields have also visited the site to provide assistance.

The profile of the group has been boosted in recent years by its inclusion in the IUCN Mangroves Ecosystem for Climate Change and Livelihoods (MESCAL) project, with support from UNDP in Vanuatu. The MESCAL project focuses on activities in five Pacific Island Countries – Fiji, Solomon Islands, Tonga, Vanuatu and Samoa – to address key challenges for mangrove management and conservation. The Crab Bay initiative has been selected as a pilot site for this project, running from 2011-2013, in recognition of the positive impacts of community-based conservation efforts for the area's mangrove ecosystems, seen as vital for local adaptation to climate change. In turn, this has supported the group's claim for legal recognition of the conservation site by the Vanuatu government.

In addition to having an impact on national policy, AKTE Committee members play important roles in local institutions. The organisation is represented by thirteen members on the boards of two local secondary schools and four primary schools, while two representatives work in private enterprises in local coconut plantations. At the level of Malampa province, five AKTE Committee members sit on the Provincial Authority's Technical Advisory Committee. The initiative's sixteen village chiefs are members of the provincial Malmetenvanu Council of Chiefs, an umbrella body bringing together the province's traditional leaders.

Sustainability and Replication



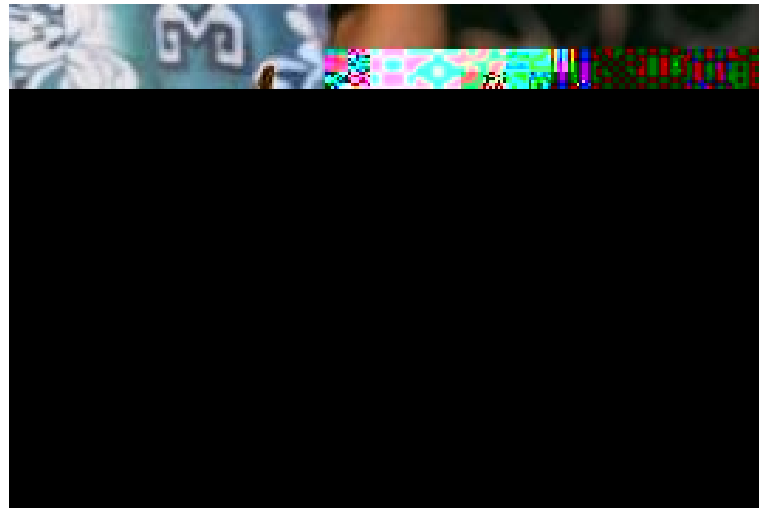
SUSTAINABILITY

The sustained impact of the AKTE initiative is largely based on the strong support it enjoys among its sixteen constituent communities. This is evidenced by the internal replication of the tabu approach to conserving the area's natural heritage. Five member communities have established similar restricted access arrangements to their river resources, replicating the success of the AKTE model on smaller scales.

In addition to this social sustainability, the organisation is attempting to become financially self-sustainable through the development of ecotourism. Beginning in 2008, the AKTE Committee's Eco-cultural Tourism Project used funding from the Global Environment Facility to start work on the AKTE Information Centre. This was supplemented by funds raised from a one-time harvesting of trochus in 2009; these funds were used to begin the construction of a barbecue house that will serve tourists. In 2010, the outer walls of both constructions were completed, while an AKTE community member has participated in an eco-guide workshop. An increase in tourism numbers over the next few years would generate revenue from conservation area entrance fees and associated enterprise growth.

Environmental education and awareness-raising

Another strategy being employed to improve long-term sustainability is that of environmental education. With the support of the provincial government authority and from international JICA volunteers, AKTE has developed a pilot Crab Bay Environmental Education programme. The organization educates young pupils from local schools and communities about traditional methods of conservation. Designated community representatives act as knowledge resources for this programme, while the management committee has recently identified future representatives to succeed the sixteen current representatives of the member communities. In 2010 and 2011, the organization provided environmental training



to five schools and all sixteen communities with funding from the provincial government.

This has also used traditional drama to convey educational messages on conservation, supported by the Wan Smolbag Theatre group. This Vanuatu-based group of actors works with communities on social, health, human rights and environmental issues, and has successfully developed an awareness-raising 'River Play', emphasizing the importance of community conservation of coastal rivers and streams as freshwater sources.

PARTNERS

The various partners to the AKTE initiative have clearly defined roles and responsibilities; the multi-stakeholder approach to sustainable management has been a key factor in the project's sustainability.

- AKTE Committee: the central actor in the initiative; responsible for implementing management and monitoring activities, keeping financial and event records, accompanying visitors into

tabu area, maintaining roads and paths in tabu area, enforcing the tabu, disseminating information from committee meeting decisions to local communities, making changes to rules and management decisions of the tabu, and recommending any changes of AKTE Committee membership to chiefs.

- Village Chiefs: approve changes in the AKTE Committee membership after consulting communities; assists the AKTE Committee in enforcing rules and regulations.
- Fisheries Department: provides advice and technical support for the management of AKTE and collecting monitoring data.
- Forestry Department: provides advice and technical support for management of AKTE.
- Environment Department: provides advice and technical support for the management of AKTE and analyzing data.
- Provincial Authorities and police: provide enforcement support to the AKTE Committee, if necessary.
- Mapest and Bushman's Bay plantations: two private plantations play a role in monitoring entrance into access areas.
- Local facilitators: provide information on management decisions and tabu regulations to the communities.
- Local communities: assist in monitoring activities and consent to management decisions taken by AKTE.

International support has come from UNDP, the Global Environment Facility (GEF), and the International Waters Project (IWP) through the Departments of Forestry and Fisheries. The project has also benefitted from the support of international volunteers through JICA, the Japanese International Cooperation Agency.

Wan Smolbag Theatre was created in 1989 by a group of part-time actors to work with communities on social, health, human rights and environmental issues. With only one small bag to carry a few costumes ('Wan Smolbag' in Bislama, pidgin English), the troupe produces plays and drama sketches, and conducts participatory drama workshops in Vanuatu's most remote villages. The success of the theatre has triggered interest from government agencies, non-governmental organizations and development programmes looking to raise awareness about sustainable development. The Wan Smolbag Theatre has produced short (20- to 50-minute) theatre pieces and videos on environmental, health, human rights and population issues in remote villages located on more than seventy islands.







NGUNA-PELE MARINE AND LAND PROTECTED AREA NETWORK

Vanuatu



PROJECT SUMMARY

This network of marine and terrestrial protected areas spanning the Vanuatu islands of Nguna and Pele has brought together local, national and international actors in a diverse partnership for the conservation of the area's unique biodiversity. The network comprises sixteen indigenous communities engaged in the conservation of more than 3,000 hectares of marine and terrestrial resources.

The project has become a case study for best practice in community marine conservation within Vanuatu and the Pacific islands for its strategies of proactive conservation, resilient management, and locally-appropriate awareness-raising. Among more than 60 different partner organizations are local and regional NGOs, government ministries, international volunteer organizations, research institutes, and tour operators who promote the islands as an ecotourism destination.



Background and Context



The Nguna-Pele Marine and Land Protected Area Network is a non-governmental organization which brings together sixteen indigenous communities on the islands of Nguna and Pele in the central Shefa province of the Republic of Vanuatu. The initiative promotes the sustainable use of marine and terrestrial resources in over 3,000 hectares of community-managed reefs, sea grass beds, mangrove forests and intertidal lagoons, coordinating a network of fishing communities in conducting biological monitoring, environmental education, waste management, and alternative livelihood projects. The project has become a case study for best practice in community marine conservation within Vanuatu and the Pacific islands for its strategies of proactive conservation, resilient management, and locally-appropriate awareness-raising.

The Republic of Vanuatu, an archipelago of 84 islands in the South-West Pacific, has a population of over 220,000 people, 80% of whom engage in artisanal agriculture and 77% in small-scale fisheries. The islands of Nguna and Pele lie just north of the larger island of Efate, and were home to approximately 1,100 people at the time of the national census in 2000. The population is spread unevenly among sixteen communities, ten of which are located directly on the coast; these villages are no more than a three-hour walk from one another.

A hereditary paramount chief presides over each village, assisted in governance duties by one or more lower chiefs. These chiefs largely deal with the preservation and promotion of local custom. Day-to-day affairs and administration of the community falls, however, to democratically elected village councils, as is common in other parts of Vanuatu. The councils are often themselves made up of several specialized committees. The advent of this system can be traced back to the influence of Christian missionaries in the 1870s, which resulted in a reorganization of local social structures; a shift from a clan-line elected system of governance to a hereditary royal-family chiefly system.

An unclear land tenure context

In Vanuatu all land belongs to customary owners by decree of the national constitution. However, the definition of customary ownership remains vague; customary land owners are not usually individuals, a trait that existing statutory land policy does not appropriately capture. Communal right of access to natural resources is typical of many Pacific island societies, and is especially relevant in the marine context. While there has been a legal trend away from group and toward private land ownership in Vanuatu, encouraged by regional policies and investor-driven land acquisition, few legal deeds have been granted over parts of Nguna and Pele; some land areas and garden plots have relatively clear boundaries, but ownership tends to lie with families rather than individuals. Village boundaries are perceived differently to family land areas, however. A strong sense of communal identity typifies village membership on Nguna and Pele – belonging to a community or village provides a critical safety net by ensuring access to resources for those without hereditary entitlements. Geographical boundaries of a community are therefore treated with importance on the islands; due to dynamic settlement trends and the uncodified nature of communities, village boundaries are typically unclear and often disputed. These disputes have occasionally led to hostilities when benefits of tourism or infrastructural development were at stake.

A history of cooperation in Nguna and Pele

Despite these infrequent tensions, the Nguna-Pele area is locally renowned for a history of inter-community collaboration. Villages on the two islands share a unique dialect as well as similar cultural and customary practices. Inter-marriage between island villages ensures social connections remain strong. Another legacy of the presence of missionaries is the existence of robust networks that span the two islands, such as the Nguna-Pele Presbyterian Session uniting elders from each community, the Nguna-Pele Council of Chiefs (NAPE), and the Nguna-Pele Shefa Provincial Councilor Technical Advisory Group.

This history of cooperation on the issue of resource access and territory demarcation was the context for marine resource management efforts in Nguna-Pele. Each island is surrounded by fringing reefs, typically extending 10 to 200 metres from the shoreline. While few individuals or households on Nguna and Pele make an exclusive living from the sea, most are involved in opportunistic fishing and reef gleaning. The importance of sea resources for household diets varies across the islands. In contrast to land ownership, areas of reef are not demarcated for use by families or groups, but are rather open for use by all members of a particular community. Access to marine resources is typically allowed for subsistence or small-scale commercial needs. Large-scale commercial harvests, however, require permission of the chief and the village council. Village members may make a monetary contribution to the council when undertaking a larger-than-usual harvest from village marine tenure area. Boundaries are defined in many different ways – one common definition is the outer edge of the reef – but the use of these boundaries to exclude non-community members from using village resources is a de facto practice on Nguna and Pele. Permission must always be sought before reefs can be used by an outsider. One role of village chiefs is to grant or revoke permission for outsiders to use a community's reef resources, in their customary roles as community stewards. In practice, the village council holds the responsibility of defining the uses, developments and restrictions within the community's sea tenure area.

Resource conservation rooted in local tradition

The design and implementation of marine closures to meet social, cultural, or conservation needs is a common feature of many Pacific island communities. Traditional *tabu* declarations prohibit harvesting within defined community marine access areas, and may last for weeks, years, or indefinitely. Some of these *tabu* periods incorporate short-term harvests dictated by economic, social, or cultural processes. Rotational or periodic harvests within marine closures have been shown to allow for increased biomass or abundance of target species. In Vanuatu, communities have traditionally declared marine closures more often for resource conservation than for sustainable harvesting purposes; in the past, closures employed by communities on Nguna and Pele were enacted to stockpile resources in preparation for a celebration or community event such as a wedding or chiefly ordination. Closure duration was pre-decided, and was often independent of the quality or quantity of resources available on the reef. Reserve implementation, regulation enforcement, size, type, and location are typically governed by the local community with advisory support from national government departments.

More recently, however, marine closures in the Nguna-Pele and surrounding areas have been established with the clear objective of resource maintenance or conservation. This has been driven by the perception of declining marine resources on communities' reefs, as well as awareness of the global state of marine resources. Local communities have witnessed changes in their marine and land resources resulting from human and environmental pressures: improvements in fishing methods and technologies, population growth, and increased urbanization in the capital of Vanuatu have driven increases in the demand for seafood resources, while cyclones,

earthquakes, coral bleaching, and the impacts of invasive species have posed environmental challenges to resource sustainability.

Origins of the Nguna-Pele Network

In the 1990s, the Vanuatu Fisheries Department began working with communities on the north coast of Efate Island to encourage marine area closures for trochus stock recovery. After some initial success, the Vanuatu-based Wan Smolbag Theatre group created the "Turtle Monitor" network as a tool for engaging Vanuatu's local communities in conserving endangered turtle species. The Nguna-Pele chiefs subsequently enacted an area-wide ten-year ban on turtle harvesting across the two islands. In 1998, the community of Mere-Sauwia created a terrestrial permanent protected area; the following year, the community of Utanlangi established the first marine *tabu* area on Nguna. In 2002, the Pele community of Piliura began work on creating a permanent marine closure area. The momentum created by these cumulative efforts led the chiefs of the Piliura, Worearu, Unakap and Taloa communities to establish an informal network called the Nguna-Pele Marine Protected Area in 2003. In 2011, this designation was changed to the Nguna-Pele Marine and Land Protected Area (MLPA) to incorporate its dual marine and terrestrial conservation focus.

Since its creation, the Nguna-Pele MLPA has referred to a network of both marine and terrestrial community-managed areas, rather than a single protected area. This network now includes sixteen communities across the two islands: the chiefs and people of the member communities have each set aside an area of village-owned reef or forest as a *tabu* resource reserve. These community reserves are small, typically measuring less than 0.05km², and cover between 15-45% of the available marine tenured area. Although the goals and objectives of individual marine closures are similar, their form and expression is highly diverse across the islands. Three closure designs are common in the Nguna and Pele area: permanent, rotational and periodically harvested reserves. Permanent reserves are those in which the community indefinitely closes all harvest. Rotational reserves do not permit harvest during their closure period, but are designed to be permanently opened in the future. Periodically harvested reserves may allow infrequent and controlled harvests at any time, but generally not more than on one or two occasions per year. Reserves of all kinds commonly restrict harvesting of all the species within them, although reserve openings and harvests may selectively target specific organisms.

Member communities have elected volunteer MLPA representatives to conduct reef surveys, biological monitoring, and ongoing environmental awareness. A representative of each community takes part in monthly meetings of the network's Management Committee to make decisions guiding the current and future management of the MLPA network. The committee is headed by a Chairman and Project Coordinator. Each member community takes decisions on how to conserve and protect their resources, with the broader MLPA network supporting and guiding these individual projects. The network has engaged international and local researchers, volunteers, and educators in collaboration with their members, and has provided opportunities for peer-to-peer learning and knowledge sharing.

Key Activities and Innovations



Decisions over *tabu* implementation, regulations, and enforcement are taken by individual communities, with guidance from Vanuatu's Department of Fisheries and Department of Environment. The Nguna-Pele MLPA network gives technical support where needed to assist communities in their decision-making processes, enforcement and *tabu* demarcation.

Marine Protected Area governance

The decision to implement a marine reserve is taken democratically in the majority of cases. Each community's village council has established a conservation committee; this body commonly proposes resource prohibitions in a village meeting, which is then followed by public debate among residents. If a closure is approved, residents discuss potential locations and the type of *tabu* to be implemented. Final approval by residents to declare a reserve can take up to a year of detailed planning by the conservation committee.

Marine reserve declarations are attended by customary ceremonies. The village chief, as the symbolic resource steward, proclaims the area off-limits under the terms set by the community. The paramount chief will generally evoke ancestral protection over the area. Boundaries of the closed area are demarcated with recognizable objects; on Nguna and Pele, a *namele* palm leaf tied to a stake is the most commonly-employed marker, though large white stones, pig jaws and painted signs are also used. Each village conservation committee is responsible for the maintenance and regulation of terrestrial and marine resources. Conservation committees propose and adapt the specific rules for use of the reef. These committees report to and follow the mandates of the village council, which in turn works under the guidance of the paramount chief. It is considered the responsibility of all community members, including residents, the conservation committee, village council and chiefs, to comply with village marine regulations and to report trespassers.

Enforcement and surveillance is not difficult in most cases as reef areas are visible from the village. In cases where the reef is located further away from the settlement area, however, trespassing is often more frequent. Rule infringements generally invoke a fine payable to the chief, which is then divided among the village council and conservation committee. Infractions that involve non-community members are dealt with directly by the chief or village council of each respective community. Fines for non-community members are generally higher as these offenses are viewed as more severe.

Land conservation areas have been more difficult to establish and to maintain due to conflicts over land ownership, although some



cases have succeeded. In Mere village on Nguna Island, for instance, despite disputes over the *tabu* land area, the community has managed to maintain a conservation area in which flying foxes and small birds are protected.

A supportive network

The role of the Nguna-Pele MLPA network has been to coordinate and facilitate action between a large number of community sites; the network has brought together communities that would not otherwise work together to discuss conservation issues and work together on management solutions for their individual communities. In addition to this, the initiative is engaged in ongoing negotiations with the national government for greater local rights to manage and access natural resources that will better support community-level action. The network also oversees comprehensive campaigns on raising environmental awareness, waste management, developing mariculture livelihoods, and conducting environmental assessments. To date, the Nguna-Pele initiative has undertaken a number of noteworthy projects, including an attempt to breed trochus and giant clams – both endangered species – and a turtle-tagging project that has enabled monitoring of hundreds of turtles. Supported projects include school education programs and working with international

universities in biological monitoring. The MLPA network fuses local custom and modern management styles, by maintaining and respecting traditional practices alongside a scientific approach to marine management. Finally, the MLPA network has focused on developing ecotourism projects on the two islands to promote create alternative sustainable sources of income for the member villages.

The Nguna-Pele MLPA has a constitution and a democratic organizational structure. Each community has elected one or two volunteer representatives to conduct regular reef surveys, tag sea turtles, plant coral and run continuous environmental awareness sessions. A Management Committee, comprised of representatives from every community, meets monthly to make decisions guiding the current and future management of the overall MLPA network; this Management Committee is led by a seven-person executive committee, which is elected by village representatives to serve for a two-year term and chairs monthly meetings. All representatives on the management and executive committees are volunteers. The Network Manager and four part-time staff assist village representatives to carry out day-to-day administration. The MLPA network has infrastructure on the two islands, including an office and survey equipment, which is collectively owned by all community members.



Impacts



BIODIVERSITY IMPACTS

The Nguna-Pele MLPA network incorporates eleven marine and two forest conservation areas on the two islands, collaboratively managed by sixteen communities. Each area employs locally-adapted strategies for conservation and management, although some approaches are common to multiple sites. In Unakap village on Nguna Island, for instance, the chiefs have set aside three different marine conservation areas: a permanent reserve, a periodic reserve, and a general use zone. The permanent reserve does not allow any type of fishing activities, but is open to tourism activities and clean-up campaigns for crown-of-thorns starfish. The periodic reserve is closed to harvesting until the area is needed for community events such as celebrations or fundraising for community development projects, when high-value species are collected for sale or consumption. Lastly, the general use zone is open for public access subject to prohibitions on destructive fishing practices and over-harvesting. One indication of the efficacy of *tabu* area implementation is that none of the terrestrial and marine areas originally set aside for conservation has been reversed; the MLPA approach is seen as an appropriate solution to the twin challenges of conserving threatened species and preserving local culture.

Conservation of flagship species

One example of this is that of the sea turtle, undoubtedly Vanuatu's most iconic species. Throughout the south-west Pacific, where sea turtles have traditionally been hunted for millennia, these species are now at precipitously low levels, with many biologists predicting their imminent extinction unless harvesting is reduced dramatically. Green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricate*) sea turtles are common to the Vanuatu archipelago, while leatherback turtle nesting sites have also been reported. Green sea turtles are listed as endangered species on the IUCN Red List; hawksbills and leatherbacks are critically endangered. There have been many attempts to reduce harvesting of these species on Nguna and Pele,

including attempts to raise conservation awareness and engage local fishers in monitoring species population numbers. In 1995, the Wan Smolbag Theatre group distributed turtle-tagging equipment to many communities to promote tagging of nesting turtles in response to the South Pacific Regional Environment Program's (SPREP's) 'Year of the Turtle'. A network of villagers, initially called Turtle Monitors, was established to directly link community representatives to Wan Smolbag. Members were required to tag at least three turtles per month. Now known as the Vanua-Tai network, this organization serves as a major conduit of conservation information and discourse between remote communities.

In Nguna and Pele, these efforts have been supplemented by an approach to turtle monitoring that integrates ecotourism and local communities. Sea turtle hunting is not undertaken purely for consumption; the act of catching sea turtles and the close association between islanders and sea turtles has strong cultural roots. The species is also an important attraction for ecotourism visitors. The MLPA network has therefore developed a programme that encourages traditional hunters to continue practicing this custom, but for conservation rather than consumption purposes: for a fee, tourists are able to tag and release these wild-caught turtle specimens. Turtle Sponsors are presented with a certificate recognizing their financial contribution and detailing the biological particulars of their individual turtle. The name of the sponsor and the turtle are placed on the Nguna-Pele MLPA's website, and the information contributes to an international conservation database. Sponsorship fees are divided among the individual hunter, the village conservation committee, and the Nguna-Pele MLPA, providing a regular and sustainable source of income for villages and the network.

The annual number of sea turtles tagged has quadrupled since the introduction of this initiative, with sea turtle sponsorships contributing to increases in household incomes. The initiative has maintained the cultural identity surrounding turtle hunting

and encouraged younger generations to follow these customary practices. As an indicator of progress of this programme and associated awareness-raising activities, the number of sea turtles consumed among all villages on the two islands has declined to under five each year.

Quantifying the evidence base for conservation

Partnerships with universities and research institutes have provided a broad evidence base for the positive benefits of community approaches to conservation. A study in 2009 of reserves on Nguna, Pele and Emao islands found that permanent and periodic reserves were of benefit to local marine ecosystems. The study showed that species of fish that are commonly fished by local communities had higher abundances in periodic reserves in comparison to open areas. Vulnerable species such as Trochus and Giant Clams were identified as species that were not suited to periodic harvesting, however. The positive impacts of marine protected areas in Nguna and Pele was also demonstrated by the fact that fish biomass and marine invertebrate abundance in community reserves was significantly larger than in unmanaged areas. In addition, live coral cover is significantly greater within marine reserves due to protection from destructive fishing activities such as small-mesh gill netting and reef trampling. The MLPA network has worked with Reef Check International's regional initiative to coordinate monitoring of the islands' coral reefs. Reef check monitoring occurs between one and four times per year, with results entered into the Reef Check Vanuatu database.

Community perceptions of the benefits of marine conservation have largely reflected empirical ecological studies of marine health. A study in 2009 used surveys to assess local resident's perceptions of conservation efforts: the report found that responses corroborated the hypothesis that permanent reserves were more effective than periodic closures in enhancing target fish biomass, trochus abundance, and live coral cover. In particular, higher perceived coral cover inside permanent reserves was validated by underwater surveys, while perceptions of the abundance of giant clams inside reserves also matched reef check results. The study concluded that as management decisions in the Pacific are commonly made in the absence of empirical ecological or fisheries data, the accuracy and validity of local perceptions can play an important role in influencing management approaches.

Combating an invasive species

The network has also provided evidence for the efficacy of community-based approaches to invasive species eradication. A study from December 2009 to March 2010 (Albers 2010) found that the Nguna-Pele area was under threat from the invasive species crown-of-thorns starfish (*Acanthaster planci*); the study showed that an outbreak was likely to occur in the village of Unakap, with the number of juvenile *A. planci* increasing and levels of hard coral cover simultaneously decreasing. The MLPA network subsequently coordinated a 'land and sea clean-up campaign'. This was organized as a competition between communities: in total, over 10,000 starfish, including 3,000 from within the Unakap village land boundary, were collected, along with more than 53,000 African snails.

SOCIOECONOMIC IMPACTS

Since the initiative began in 2002, there have been marked improvements in both the household income and community wellbeing of Nguna-Pele's villages. This is largely attributable to increased ecotourism, improvements in the involvement of women and youth in governance and decision-making, and a resurgence of local cultural and linguistic traditions through inter-village partnerships.

Combating income poverty

A measurable quantitative outcome of the work of the Nguna-Pele MLPA has been the doubling of average incomes as the villages have shifted from fishing to ecotourism as an alternative livelihood activity. The marine conservation areas have acted as spurs for tourism to the islands, as Nguna and Pele have gained a reputation within Vanuatu for the ecological diversity of their marine sanctuaries, while an indicator of the growth in ecotourism is the quadrupling of turtle-tagging by tourists since the inception of the programme in 2002.

Catalyzing collective action

In qualitative terms, the wellbeing of local residents has benefitted from the empowering nature of self-initiated community conservation. Communal management of natural resources has had a catalytic effect in stimulating other attempts to improve local standards of living. Involvement in community development projects has nearly tripled since the MLPA network began encouraging communities to engage in community mobilizing. Additionally, sustainable resource management efforts have built local organizational and administrative capacities, providing the foundation for further community-level development.

Improving local governance and democracy

Prior to the establishment of the MLPA network, community governance systems on Nguna and Pele were weak, with little accountability or democratic transparency, and while inter-community cooperation was conducted on a sporadic basis, this was not formalized within an institutional arrangement. Now, in order to be accepted as a member of the network, each village is required to have a democratically elected conservation committee and the full endorsement of the chief and village council. The creation of a multi-community executive committee has facilitated a forum for exchange, collaboration and capacity-building. Through regular attendance at MLPA events and meetings, village chiefs and councilors can learn from and support one another in different aspects of local development.

Empowering community voices in development dialogues

Social justice has also been a critical element in the establishment of the Nguna-Pele MLPA, both in correcting the imbalance in prevailing conservation and development discourses at the national level, and in empowering marginalized groups within communities. Previously, communities felt they had little voice in the sustainable

development discourse dominated by government and international NGO approaches; community-centred approaches to resource management – while supported by government departments and international partners – have helped to empower communities as autonomous actors and root development in local capacities.

Growing social equity

Empowerment of marginalized groups has followed from the initiation of communal action, beginning in village councils and conservation committees, and then spilling over to village men's, women's and youth associations. The region is well known for its male-dominated culture, with most, if not all community decisions typically taken by men. The Nguna-Pele MLPA network recognized that women in Vanuatu play a critical role in the use and management of biodiversity, deciding what marine and terrestrial resources are harvested and in what quantities for sale in markets. Empowering women through participation in conservation committees and leadership roles, the network has been able to effect change at the individual and household level. Many more village women are also taking leadership positions within community organizations due to their success within the MLPA committee structures.

As well as environmental education in local schools, ensuring that students have a greater awareness of conservation and waste management issues, the Nguna-Pele MLPA has also facilitated activities for those island youth no longer in school, such as biological monitoring and clean-up competitions. Due to the initiative's emphasis on inclusive participation of marginalized groups, broad improvements to social equity have been witnessed.

POLICY IMPACTS

The Nguna-Pele MLPA network has had a dynamic effect on national level policies concerning environmental conservation. The network is the first nationally recognized example of a community-managed network of marine reserves and conservation activities in Vanuatu, and has acted as a model for other community-led development initiatives in the island nation. The network was also an important influence in the drafting of government policy and legislation recognizing community



conservation areas, through the Environmental Management and Conservation Act (2002). Underpinning this is the recognition of communal rights to resources enshrined in Vanuatu's national constitution, which gives all land to Vanuatu customary owners and their descendants along with the duty to "protect and safeguard" national resources and the environment.

Tension and ambiguity characterize the relationship between village, provincial and national-level marine policies, however. While higher levels of government recognize local governance institutions such as Island Courts and Land Tribunals, village councils themselves are not formally endorsed by national legislation. And while the Environmental Management and Conservation Act recognizes marine regulations set by village councils, it does not provide for enforcement to support community-level conservation. In practice, resource management occurs in a local context where the state neither supports nor significantly impedes community-based approaches. Employing innovative and adaptive management techniques, village-level conservation approaches have flourished in this space, leading to their rapid replication and extension.

The hybridization of marine management discourse

The success of the Nguna-Pele example has led to calls for a more nuanced government policy approach to devolving resource management to the local level. The islands' diversity of approaches to marine conservation in particular has lent support to the view that the "protected area categories" discourse does not sufficiently capture the varieties of local innovation and adaptation that underpin real community-based resilience. Bartlett et al (2009) argue convincingly that the multiplicity of experiences and blurring of distinctions between customary approaches and modern protected area terminology in Nguna, Pele, and other Vanuatu islands provides evidence for the view that conservation area strategies should be tailored to fit local needs. The study cites the use of terms such as *tabu*, conservation area (adapted to *konsevesen eria* in Bislama), and marine protected area in the cases of Nguna-Pele's communities, emphasizing that their local uses have diverged from their standard definitions during the process of expansion and replication across the islands. The result is a wide range of endemic, novel, and hybridized community conservation approaches that have achieved a high degree of success in conserving biodiversity and improving local social and economic wellbeing.

Given that externally imposed management approaches may be socially disruptive and/or locally inappropriate, alienate local stakeholders from active management, fail to recognize the complexity of local knowledge, or derive from an incompatible worldview, the study argues that interventions should focus on 'hotspots of protected area hybridization where management institutions embrace the overlapping concepts of past, present, local, foreign, colloquial and scientific.' In supporting active local experimentation with closure practices, Vanuatu has demonstrated its flexibility and adaptive capacity in the face of environmental and social change. The Nguna-Pele cases support the conclusion that 'hybridization of protected area operational rules and rhetoric, combining Western scientific and traditional ecological knowledge, likely presents a valuable policy option for the Pacific region.'

Sustainability and Replication



SUSTAINABILITY

The tailoring of conservation solutions to local need helps to explain the sustained success of community conservation on Nguna and Pele since the mid-1990s. The management of individual sites depends largely on volunteers whose commitment to conservation activities is evidence of the social and environmental benefits they obtain in return. The sustained impact of local resource management on household incomes, livelihoods, and on general local wellbeing is therefore critical to the continued sustainability of these initiatives.

This is also enhanced by existing social structures and traditional institutions. Nguna and Pele island communities' shared language, history, and strong cultural and familial links increase motivation for collective action. A tradition of cooperation between the islands includes networks such as the Nguna-Pele Presbyterian Session that unites the elders from each community, the Nguna-Pele Council of Chiefs (NAPE), and the Nguna-Pele Shefa Provincial Council Technical Advisory Group.

Into the future, the network plans to build more partnerships with local youth and women's groups as a means of ensuring organizational sustainability and renewed leadership. The network is also exploring additional ecotourism project ideas as a method of maintaining financial sustainability. A strong partnership of stakeholders in the project has also been an important factor in aiding sustainability, bringing together government, NGOs, communities, international donors, and research institutes. The re-naming of the initial MPA network as the Nguna-Pele Marine and Land Protected Area is an acknowledgement of the substantial scaling-up of initial conservation activities during the 1990s to meet a large set of challenges to marine and terrestrial resource management across the two islands. In recent years this has also included a widespread tree-planting campaign, as Vanuatu communities have been encouraged to help meet the challenges of climate change through targeted awareness-raising.

REPLICATION

The pattern of rapid replication of community conservation approaches across Nguna and Pele since 1995 is testament to a process that has been documented in conservation literature as the 'prodigious multiplier effect', in which villages or individuals copy the actions of their neighbours after observing the positive benefits that can result. A similar concept known throughout the Pacific islands is that of "copycat entrepreneurship"; this copycat approach to conservation strategies has been an extremely valuable process for facilitating rapid and widespread replication of closure strategies that are locally perceived to be effective.

Since 2002, this replication process has been enabled by the development of the Nguna-Pele MLPA network, which has brought together representatives from each community to discuss, coordinate and collaborate on marine and terrestrial natural resource issues of wide relevance. Networking also enhances the political bargaining power communities have with the national and provincial government, and will continue to benefit advocacy attempts for greater enforcement and financial support.

The benefits of collaboration are locally recognized within the network, with villages often willing to adopt management strategies that may be most valuable to neighboring, "downstream" communities. For instance, the crown-of-thorns starfish outbreak was successfully contained because area representatives planned and implemented a cross-tenure clean-up strategy. Meetings of the network's representatives have also influenced the positioning of new reserves, particularly when they share boundaries with other communities, in order to create larger cross-tenure reserves. The network has also aided in some cases of conflict over disputed tenure boundaries. The islands' widespread collaboration represents Vanuatu's first attempt at ecosystem-level conservation planning.

The total area now managed by the Nguna-Pele Marine and Land Protected Area is over 3,000 hectares, including sea grass, intertidal lagoons, coral reefs, and land protected areas. Due to the overwhelming success of the initiative in Vanuatu, the Foundation for the Peoples of the South Pacific Vanuatu (FSP) has begun a series of pilot conservation projects on a nearby island. The MLPA network has also joined the Pacific's Locally Managed Marine Area Network, within which it hopes to exchange lessons learned with other community-conservation sites in Fiji, Indonesia, the Philippines, and other Pacific island states.

PARTNERS

The Nguna-Pele MLPA has benefitted from a far-reaching range of partnerships it has formed with provincial, national and international actors. In particular, the Nguna-Pele MLPA has received critical support from the Vanuatu Environment Unit, Vanuatu Fisheries Division, Wan Smolbag Theater, Vanuatu Cultural Center, Foundation of the Peoples of the South Pacific, Wan Tok Environment Center, Peace Corps Vanuatu, Live and Learn, the NAPE Council of Chiefs, and Shefa Provincial Office.

Local and regional non-governmental organisations

Wan Smolbag Theatre Group works with remote communities in Vanuatu to produce educational theatre productions on sustainable development themes. This partner played a critical role in the initial process of raising awareness on conservation in Nguna-Pele, leading to the first prohibition on marine resource harvesting in 1995, and established the Vanua Tai turtle monitoring network. Many of Nguna-Pele's leaders and conservation champions emerged from this turtle monitor network. Another example of a local NGO working closely with the Nguna-Pele network is the Foundation for the Peoples of the South Pacific (FSP-Vanuatu), a not-for-profit working with the Pacific's indigenous communities on sustainable development through effective project management, training and local capacity building.

Governmental

The Environment and Fisheries Departments have been consistent supporters of the Nguna-Pele initiative since its initiation, while the Vanuatu Environment Unit has provided technical assistance. The Government of Vanuatu has recognized the Nguna-Pele area as the first example of a community-managed network of marine reserves and conservation activities in Vanuatu.

International

U.S. Peace Corps Vanuatu has provided volunteers for project sites. The BBC has shot a number of documentaries focusing on the area and its conservation activities.

Academic

Researchers from James Cook University have focused on adaptive community conservation in Nguna-Pele, while the university

has supported local technical capacity for social and ecological monitoring. University of the South Pacific is another research institute that has conducted studies within MLPA conservation areas. Reef Check International has collaborated with the Nguna-Pele network to conduct reef assessments.

Private sector

To facilitate ecotourism, the Nguna-Pele management team partnered with Sailaway Cruises, a tourism agent located in Vanuatu's capital, to bring visitors to the islands.

Additional partners

- Australian Centre for International Agricultural Research (ACIAR)
- Australian Institute of Marine Science
- Center for Tropical Aquaculture
- Changemakers Net
- Coral Reef Alliance
- Coral Reef Initiative for the South Pacific
- Coral Triangle Initiative
- Digicel Vanuatu
- Efate Land Management Area
- Global Coral Reef Monitoring Network
- Global Environment Facility - Vanuatu
- Google Earth & Oceans
- Great Barrier Reef Marine Park - Australia
- Indiana University Workshop in Political Theory and Policy Analysis
- International Coral Reef Action Network (ICRAN)
- International Waters Project (IWP)
- IUCN Climate Change Group
- Live and Learn
- Melanesia Interest Group
- MPA.gov
- NOAA coral bleaching satellites
- Ocean Revolution
- Pacific Asia Tourism Pty Ltd
- Pacific Institute of Public Policy
- Pacific Island NGOs - PIANGO
- Project Aware
- Protected Areas learning network
- Reef and Rainforest Research Center
- Reef Research Center
- Seacology
- South Pacific Commission
- South Pacific Regional Environment Program (SPREP)
- UNESCO World Heritage - Vanuatu
- Vanuatu Aelan Walkabaot
- Vanuatu Cultural Center
- Vanuatu Daily Post
- Vanuatu Meteorology Office
- Vanuatu National Statistics Office
- Vanuatu News
- Vanuatu Tourism Office
- Wan Tok Environment Center
- World database on protected areas

THE ROAD AHEAD

The fourteen case studies presented in this compendium demonstrate the power of local action in addressing the threats and challenges faced by communities in small island developing states across the globe. Recognizing the value of local knowledge is vital to ensuring sustainable development for all. Our goal is to support and replicate community innovation so that small island communities have the skills and tools to better manage resources while living on the frontlines of climate change and the natural disasters that occur with increasing frequency.

The Equator prize winners highlighted in this book are champions of local development. Their stories show us that community based action can deliver the social, economic, and environmental benefits of sustainable development.

A key demand emerging from communities from around the world is to facilitate the exchange of knowledge peer-to-peer as communities learn best from each other. Peer-to-peer knowledge exchange is cost effective and can lead to great change. The Equator Initiative is responding to this demand by developing WIN – the World Network of Indigenous and Local Community Land and Sea Managers, a platform to support peer-to-peer learning and alliance building for environmental management.

Community empowerment and partnerships are key components to building resilience. Partnerships enable communities to widen their influence and connection with a diverse set of actors; and ensuring the participation and engagement of local stakeholders in decision-making enhances people's livelihoods.

Guided by the principle of joint learning and ensuring that on-the-ground practice influences policy, we are committed to bringing visibility to local innovative solutions; supporting learning across communities and strengthening the network in order to meet the goals of the post-2015 development agenda. To do this we will support leading local and indigenous community land and sea managers from small islands who are ready to confront the issues of critical concern to the SIDS head on.

Join us in carrying out our plan of action. Help leverage the power of local action for sustainable development!







The Equator Initiative brings together the United Nations, governments, civil society, businesses and grassroots organizations to recognize and advance local sustainable development solutions for people, nature and resilient communities.

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