



# NATURE'S INVESTMENT BANK

HOW MARINE PROTECTED AREAS  
CONTRIBUTE TO POVERTY REDUCTION

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# Acknowledgments

This study was funded by The Nature Conservancy, the Australian Government Department of the Environment and Water Resources, and the Poverty Reduction and Environment Management Program at Vrije Universiteit in Amsterdam. WWF-Indonesia provided in-kind contributions.

The work would not have happened without the early support of Scott Smith, Lynne Hale, Nigel Purvis, and Russell Leiman of The Nature Conservancy (TNC). Randy Curtis (TNC) deserves special mention because he made the critical introductions that caused the methodology and study team to coalesce.

John Reid at the Conservation Strategy Fund, Linwood Pendleton at UCLA, Marea Hatzios of the World Bank's Environment Department, and John Dixon, the former Lead Environmental Economist at the World Bank Institute, provided helpful advice at the design stage.

Prior to the fieldwork, a comprehensive literature review was conducted by Gelsey Bennett, Joey Fry, Ana María González, and Sonia Zilberman of George Washington University in Washington, DC. Irina Levshina of TNC produced the maps in the study, and Sonja Mitchell of TNC facilitated the publication design and the production of a companion film.

The fieldwork benefited from the support of many people and organizations. In the Solomon Islands, Willie Atu, Jeanine Almany and Richard Hamilton of TNC, and Bill Aalbersberg, Tammy Tabe, and David Boseto of the University of the South Pacific were most helpful. Hilda Tango and Rudi Susurua of TNC Solomon Islands made the complex logistics seem easy. In the Waghena community, the researchers benefited from the help of T. Amon, Rabaua Teiba, Francis Rotaniti, the Koría family, Teube, Teisirake Tibaua, Francis Routanis and Jack Rabaua. In the Katupika community, the researchers benefited from the help of Gilson Willy, Worini, Harrison Benjamin, and Rence Zama. The study team included the following researchers and translators with local knowledge: Rudi Susurua, Tammy Tabe, Hon. Peter Tobire, Teuaia Tangua, Teuea Karotu and Arthur Nego.

In Fiji, Patrick S. Fong, Rusiate Ratuniata, Isoa Korovulavula, Semisi Meo and Alifereti Tawake of the University of the South Pacific advised and assisted greatly with the fieldwork. At the community level, the study team included the following researchers and translators with local knowledge: Ratu Pio Radikedike, Weku Ratumaitavuki, Seru Tagivakatini, Rusi Ratuniata, Marika Tubuna, Jolame Sikolia, Seini Tawakelevu, Manoa Maleya and Patrick S. Fong. Special thanks are due to Weku Ratumainaceva, the headman from Waiqanake village, for his help.

In Indonesia, Angeliqúe Batuna, Lida Pet Soede, and Royke R. Pangalila of WWF-Indonesia graciously provided advice, background material, translations and support. Joey Fry helped with the logistics and preparation and was part of the research team. Santi Soleman, Ismail Tampi, Dian Susanto, Erol Tuerah, and Merlyn Neyland of SCREEN (a local NGO) conducted the household surveys. At the community level, for the focus group discussions and key informant interviews, the study team included the following researchers and translators with local knowledge: Rico Taramen, Ninny Ruata Barnes, and Hendrik F. Lahiwu.

In the Philippines, Alan White of TNC and Atty Liza Eisma of the Coastal Conservation and Education Foundation provided expert advice, documents and introductions. The fieldwork for this site was led by Johnny Conde Cacatian and Jens Stellinga of Vrije Universiteit. At the community level, the study team included the following researchers and translators with local knowledge: Pablo Rojas, Aubrey Rojas, Almeo Bontigao, Maria Sharon Espino, Kahlil Bermiso and Jevi Dumayang (District III, Dauin) and Joanne Matarlo, Bobbi Benitez, Rosalie Vallescas, Rodney Balagtas, Marcjan Maloon and Jinky Mendoza (Apo Island).

The study benefited from comments provided by: Scott Smith, Alan White, Lynne Hale, Sonja Mitchell, Cristina Mestre, Ian Dutton, Angie Grover, Luis Pabon, Bill Aalbersberg, Jos Pet, Paul Lokani and John Dixon. As ever, all errors and omissions are the responsibility of the authors.



## Executive Summary

This study is one of the first to empirically analyze the link between biodiversity conservation initiatives and poverty reduction. From November 2006 to May 2007, 68 people in four countries helped conduct more than 950 household interviews and more than 50 focus group discussions and key informant interviews. In total, approximately 1,100 local people were consulted to determine whether four particular marine protected areas have contributed to poverty reduction, and if so, why. The four study sites do not represent a random sample but were deliberately chosen because local experts believe they have contributed to poverty reduction.

The four marine protected areas are in Fiji (Navakavu), the Solomon Islands (Arnavon Islands), Indonesia (Bunaken) and the Philippines (Apo Island). This portfolio of sites is roughly representative of small, one-community local marine protected areas (Fiji), medium-sized, multi-community local marine protected areas (Solomons), big collaboratively managed national marine protected areas with lots of people (Indonesia), and small, co-managed national marine protected areas with few people (Philippines). In terms of area, 95% of marine protected areas globally fall between the largest marine protected area in the study (Bunaken) and the smallest (Apo Island). The four sites also have a good mix of population size and age of the marine protected area.

The findings show that marine protected areas can effectively contribute to poverty reduction. *“People in the community are now better off and this is because of the marine protected area,”* as one local person explained.

For the residents of Navakavu and Apo Island, their marine protected area contributed to poverty reduction in very substantial ways (though both sites have fewer than 700 people). In the Arnavons and Bunaken, with populations of 2,200 and 30,000 respectively, the marine protected area has also clearly contributed to poverty reduction, though by no means eliminated it. Across all the study sites, over 95% of local people support the continuation of their marine protected area.

### How did the marine protected areas contribute to poverty reduction?

**Improved fish catches.** Fish are now “spilling over” from the no-fishing zones of the four marine protected areas, and improved fish catches contributed greatly to poverty reduction at three of these sites. People in Navakavu fish just outside the marine protected area, and 80% of the people there say fish catches are better than before the marine protected area was established. The spillover effect is also strong in Apo Island but slightly less so in Bunaken. It is present as well in the Arnavons but with minimal impact. These findings support the increasingly well-documented perception of spillover effects from marine protected areas.

*New jobs mostly in tourism.* The marine protected areas' greatest boost to household incomes comes from new jobs, especially in tourism. In Bunaken and Apo Island, those who switched to a new occupation in the tourist industry earn approximately twice as much as before. Some of the people who switched were fishers originally: 16% in Bunaken and 52% in Apo Island. In both locations, tourism training for local people was done by private-sector tourism operators.

A number of new alternative livelihoods promoted by the marine protected area authorities proved unsustainable, however. Seaweed farming and deep-sea grouper fishing in the Arnavons were both hit by, among other things, dropping commodity prices at the local level. Building clay stoves and making coconut charcoal in Bunaken were hurt by the rising cost of inputs, and mat weaving in Apo Island was hampered by the high cost of inputs and lower quality as compared to competitors. At least four of these activities produced income for several years before becoming financially unrewarding. One lesson learned is that changes in the price of inputs or outputs can quickly move an alternative income generating activity from success to failure. This suggests that most alternative income generating activities are better suited for offsetting income initially lost due to establishment of no-fishing areas rather than as long-term tools to improve incomes or move people away from fishing. It is the larger, capital-intensive investments in tourism that lead to long-term gains in non-fishing income.

*Better local governance.* Marine protected areas need local communities just as local communities need marine protected areas. In all four study sites, new governance mechanisms were established for the management of the marine protected area, and all four involve communities in management decision-making. This made the marine protected areas more responsive to community needs, gave the communities a more united voice, and frequently reduced conflict within the communities and with neighboring communities. The marine protected area management committees also serve as forums for addressing other community issues. The overall result is better local governance, especially for the management of marine resources.

*Benefits to health.* Greater fish catches led to greater protein intake in Navakavu and Apo Island and a perceived improvement in children's health in particular. Greater incomes from fishing and tourism in Apo Island led to more frequent visits from off-island doctors and funding for a resident midwife. In Bunaken, visitor entry fees funded water-supply tanks, public toilets, and washing places in several villages and thus improved public health. In three sites, the increased environmental awareness from the marine protected area operation translated into better understanding and acceptance of solutions to sanitation problems.

*Benefits to women.* In all four sites, the marine protected area helped empower women economically and in some cases socially. Women are the reef gleaners in Navakavu and benefit financially by collecting and selling the shellfish just outside the marine protected area, which have greatly increased because of the protected area. In Bunaken and Apo Island, dive tourism created more high-income job opportunities for women, and residents noted an improvement in women's lives because of the marine protected area. In the Arnavons, when women became involved in seaweed farming and the making of traditional clothes to earn income, they gained a stronger voice in community meetings.

## How can marine protected areas in general contribute more to poverty reduction?

The main tools for marine protected areas contributing more to poverty reduction are an approach and some key policy incentives. The approach is simple enough: give local communities a strong voice in the marine protected area's management. It is the policy incentives, though, that are crucial for maximizing the benefits of a marine protected area to poor people. Marine protected areas can contribute to coastal poverty reduction when they include policies for:

*Investing in marine protected areas.* Like a school or a health clinic, a marine protected area needs financial support, particularly at start up. But also like a school or health clinic, a marine protected area brings proportionally greater benefits than its costs. The investment, for example, in the Navakavu marine protected area over the five years since start up has been less than US\$12,000 equivalent, and this modest investment has helped to double the incomes of about 600 people. This is why more than 120 new locally managed

marine areas have been started in Fiji since 2004. In all four marine protected areas studied, it was an external donor agency that provided the transformative funding. A large fund that provides modest grants to coastal communities to establish marine protected areas could bring dramatic benefits to local fisheries and in some cases tourism.

Funding support for marine protected areas has to be for five years or more. Establishing a marine protected area can take considerable time—several years from conception to start up is not unusual. It may take an equal amount of time for the ecological and socio-economic benefits to materialize. Marine protected areas do not always fit well with the short-term cycle of politics. In Apo Island, it took six years for total financial benefits to exceed costs since start up.

*Empower local communities.* Government policies that provide legal recognition for community management of local marine resources clearly supported community participation in three of the four study sites. The benefits of community management can be further strengthened by linking marine protected area communities together via peer-learning networks such as the Locally Managed Marine Area Network in the Pacific and SE Asia. Such networks enable cross-pollination of best practices and provide specialized training and technical resources for local communities. Community-led marine resource management is easier if a neutral actor such as a university or external NGO helps the marine protected area stakeholders reach consensus about the distribution of costs and benefits.

*Think small but integrated.* The marine protected areas with the greatest contributions to poverty reduction were the two smallest. Navakavu and Apo Island are tiny marine protected areas within sight of the beneficiary villages. Both have low operating costs and high benefits and were planned in an integrated manner. In such sites, there are fewer stakeholders to consult, and the fish spillover from these marine protected areas is easier for local communities to see. This suggests that a network of smaller marine protected areas each affiliated with a local community may contribute more to poverty reduction than a single larger marine protected area. In fact, a network of smaller marine protected areas that are ecologically connected may have the greatest potential yet for both reducing coastal poverty and conserving near-shore marine biodiversity. These smaller marine protected areas could also potentially promote tourism together to achieve greater non-fishing incomes as well.

For marine protected areas that already exist, be they large or small, it is worth keeping two attributes of success in mind: community participation in marine protected area management decisions and an emphasis on tangible benefits to local communities from the marine protected area such as greater income and better health. One can exist without the other, but the impact is magnified when both are present.

*“The marine protected area is like a bank to the people,”* noted a Fijian community leader. Opening more branches of the “bank” in developing countries can contribute to coastal poverty reduction.



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# 1 Study Rationale

Local people in several villages of a national marine park in Indonesia refer to the no-fishing zone of their marine protected area as their bank: a place where they save fish for the next generation, taking only the interest for themselves. In fact, marine protected areas are nature's investment banks—they help raise funds for the people they serve. But in the coastal areas where many of the world's poor live, can these “investment banks” help reduce poverty? The aim of this study was to answer this question.

Between November 2006 and May 2007, a study team conducted 958 household interviews and 33 key informant interviews and held 18 group discussions with approximately 120 participants. In total, more than 1,110 local people were consulted to determine whether four particular marine protected areas had contributed to poverty reduction, and if so, why. The four study sites do not represent a random sample but were deliberately chosen because local experts believe they have contributed to poverty reduction.

Understanding whether and why these marine protected areas contribute to poverty reduction can help poverty reduction and conservation agencies do their jobs better. It can show poverty reduction agencies how marine protected areas can contribute to social and economic development goals, and it can show conservation agencies how to make marine protected areas<sup>1</sup> more equitable and sustainable. For government decision-makers in particular, this study provides real-life examples of how marine protected areas have contributed to poverty reduction and a focused list

of success factors that can help realize the potential of other marine protected areas to reduce poverty.

In the regional context, this study supports the recommendation of the *Bali Plan of Action Towards Healthy Oceans and Coasts for the Sustainable Growth and Prosperity of the Asia-Pacific Community* (APEC 2005) and its call for “managing living resources sustainably.” In the global context, the study also builds on several specific recommendations adopted at the World Parks Congress for “Poverty and Protected Areas” (IUCN 2003):

1. *Protected areas should strive to contribute to poverty reduction at the local level (either directly or indirectly) and at the very minimum not create, contribute to, or exacerbate poverty.*

This study identifies key poverty reduction benefits of marine protected areas and highlights success factors.

2. *Knowledge about the linkage between protected areas and poverty needs to be improved.*

This study advances knowledge of linkages with in-depth data on four marine protected areas.

3. *Mechanisms for the poor to share actively in decision-making related to protected areas should be strengthened.*

This study demonstrates how having poor communities share actively in decision-making related to a marine protected area can contribute to poverty reduction.

<sup>1</sup> “Marine protected areas” in this study refer to areas of the ocean protected from all extractive and destructive activities (those with no-take zones).



## 2 Methodology

### 2.1 Defining and measuring poverty

Income level is the most widely used indicator of poverty, and the Millennium Development Goals enshrined this concept in the target to halve the number of people living on less than US\$1 a day by 2015. Yet defining poverty by income alone is widely recognized as too narrow an approach. To reduce poverty, greater income is important, but poverty reduction can also come from *increasing opportunities* for the poor through, for example, education and new livelihoods. It can come from *empowering the poor* in areas such as decision-making on public services and resource allocation. It can come from *enhancing the security* of poor people by reducing their risk from food shortages, natural disasters, health crises, and other catastrophic events.

Local people in the Solomon Islands refer to their marine protected area as “the foundation for improving our overall wellbeing.” It represents more than just income to them. In recognition of the fact that poverty is multi-dimensional, this study uses the World Bank’s definition of poverty which comprises three elements: opportunity, empowerment and security.<sup>2</sup> Using a single definition for all countries also helped the study team avoid analytical complications that could arise from different government definitions of poverty.

To make the definition of poverty measurable for a marine protected area, the three dimensions of poverty were subdivided into specific focal areas drawn largely from the World Bank definition of poverty. In addition,

“fish catch,” “cultural traditions” and “access and rights” were added. The first one was added because impacts on fishing catch are closely tied to marine protected areas. The second was added because local communities’ cultural traditions often play an active role in how they manage marine resources, such as designating an area where no fishing is allowed after a chief dies. The third was added because local communities often have agreements regarding customary access and rights about natural resources (such as for food supply or traditional medicines) and to maintain spiritual and cultural values (such as protecting sacred sites). Another focal area, “social cohesion,” was modified from the World Bank’s “strengthening organizations for poor people” because the most important such organizations in the study sites were expected to be community-led and thus dependent upon the strength of the social fabric. This focal area helps to ascertain the impact of marine protected areas on the social cohesion of communities—do they tend to unite communities or divide them?

Table 2.1 Poverty focal areas for the study

OPPORTUNITIES	EMPOWERMENT	SECURITY
Income	Governance mechanisms	Health
Housing	Community participation	Social cohesion
Luxury goods	Benefits to women	Cultural traditions
Fish catch	Access and rights	
Education		
Alternative livelihoods		

<sup>2</sup> Attacking Poverty, World Development Report 2000/2001. World Bank, Washington DC.



## 2.2 Preparation and site selection

Prior to the detailed design of the study, a review of the poverty-environment literature was completed. The list of documents reviewed and brief summaries for 20 of the key documents are available at [www.conserveonline.org](http://www.conserveonline.org). The literature review makes clear that this study is one of the first to empirically analyze the link between conservation initiatives and poverty reduction, including developing and testing methodologies to assess the link.

Site selection for this study was limited to the Asia-Pacific region because this is the geographic area of interest for two of the study sponsors. Within Asia-Pacific, sites were selected based on three factors. First, experts who knew a site had to agree that the marine protected area (MPA) was likely to have contributed to poverty reduction. Second, the MPA had to be in an area poorer than the national average. Third, the MPAs themselves had to be as different as possible from one another in order to give a wider basis for determining common elements of success in contributing to poverty reduction. The four sites selected were:

- FIJI** Yavusa Navakavu Locally Managed Marine Area on Fiji's main island of Viti Levu.
- SOLOMON ISLANDS** The Arnavon Community Marine Conservation Area between the large islands of Choiseul and Santa Isabel.
- INDONESIA** Bunaken National Marine Park at the northern tip of Sulawesi Island in central Indonesia.
- PHILIPPINES** Apo Island Marine Reserve near Negros Island in the central region of the Philippines.

This portfolio of sites is roughly representative of small, one-community local MPAs (Fiji), medium-sized, multi-community local MPAs (Solomons), big collaboratively managed national MPAs with lots of people (Indonesia), and small, co-managed national MPAs with few people (Philippines).

Table 2.2 Basic information on the study sites

SITE	AREA (ha.)	LOCAL POP.	MPA AGE (1/07)	MANAGEMENT REGIME
Navakavu, Fiji	3,710	600	5 years	One community of traditionally related people manages all
Arnavon Islands, Solomon Islands	15,800	2,200	11 years	Co-managed by three communities, the provincial government and an International NGO
Bunaken National Park, Indonesia	89,000	39,000	15 years	Managed by the national government with input from 2 levels of local government, communities, tourism operators, and academia
Apo Island, Philippines	74	700	20 years	Managed by the community until 1994 and thereafter by the national government and the community.

In terms of age and population, the sites are a good mix as the table above shows. In terms of size, the sites are well representative of marine protected areas globally. Of the 4,435 formally designated marine protected areas worldwide, 95% are equal to or smaller in area than the largest site of Bunaken and equal to or larger than the smallest site, Apo Island (as per [www.mpaglobal.org](http://www.mpaglobal.org)). It is a good mix of sizes that covers all but about 5% of marine protected areas globally.

## 2.3 Research Hypotheses

Once sites were selected, expert advisors for each site helped the team to access site-specific studies relevant to this study. Research hypotheses were formulated for each site based on the literature and talking with knowledgeable experts. The hypotheses as per the study proposal were as follows:

- NAVAKAVU** The no-take area has significantly increased shellfish and fish populations and was the primary cause of an average increase in household income. The management of the MPA has also strengthened local traditions and improved the community's ability to address other community problems.
- ARNAVON ISLANDS** Alternative income generating activities for fishers, especially seaweed farming, have increased local incomes and reduced poverty. The creation of the MPA has also improved the empowerment and security of the local communities by creating a management framework that improved community decision-making.
- BUNAKEN** Private-sector dive tourism and national park entrance fees have reduced local poverty in the communities of Bunaken National Park.
- APO ISLAND** Increased fish catches per unit of effort and increased tourism both resulted from setting aside an area of reef as a no-take zone. The increase in incomes and the improved management of the island resources have enabled the island to establish a sustainable development path.

## 2.4 Data Collection

The core study team was comprised of an economist, a social scientist, and a study manager, supplemented in each site by field workers, translators, interviewers, logistics assistants, and note takers. In total, 68 people helped with the fieldwork. The fieldwork lasted about 30 days per site except in Apo Island where it took only 15 days due to a smaller sample size.

To test the hypotheses, quantitative and qualitative information was “triangulated” for each study site. The first point of the information triangle was a qualitative assessment using focus group discussions and key informant interviews. In each site, the research team partnered with an NGO that is working on the ground in the MPA. Focus group discussions were conducted in small groups of 6 to 12 individuals, with local partner NGOs inviting the groups and organizing the meetings in advance. All meetings were conducted in the local language with translation for the social scientist, and the information was recorded in English by a bilingual recorder.



At each community, the local NGO or university organized in advance focus group discussions and key informant interviews with a range of people including: MPA management committees, women groups, citizens forums, youth groups, elders, fishers, school staff, health clinics, local policy or enforcement units, local government, organizations working in the communities, priests and other spiritual leaders, representatives of particular economic activities and community chairpersons. The steps and questions for reference that were used during the focus group discussions and key informant interviews are in Appendix I.

The second point of the triangle consisted of structured household interviews to compare MPA-related communities to control communities without an MPA but which are similar to the MPA communities in terms of population size, economic activities, the absence of major development projects in the local area (excluding the MPA), location and market access, and ethnic and religious backgrounds. The control sites were selected by consulting experts with in-depth local knowledge.

The third point of the information triangle was also part of the household survey but looked at perceived changes over the last 5 to 10 years (depending on the age of the MPA) and whether people believe these changes were caused by the MPA.

Local experts in several sites reviewed and helped tailor the draft household survey to local conditions. The surveys were then pre-tested in about a dozen households per site and revised as needed to ensure the questions were understood and relevant. Local survey takers in each site were then trained to conduct them. All household surveys were conducted in the local language. Appendix II shows the English version of the questionnaire used in one of the sites. Several site-specific questions were added in each location based on the research hypotheses and the pre-test results.

Table 2.3 Sample size

SITE	MPA HOUSEHOLDS INTERVIEWED	NON-MPA HHs INTERVIEWED (control)	TOTAL	MARGIN OF ERROR	NO. OF FOCUS GROUP DISCUSSIONS	NO. OF KEY INFORMANT INTERVIEWS
Navakavu, Fiji	200	100	300	5.4%	4	3
Amavon Islands, Solomon Islands	175	63	238	5.8%	6	10
Bunaken National Park, Indonesia	199	101	300	5.5%	5	14
Apo Island, Philippines	83	37	120	5.8%	3	6
TOTAL	657	301	958	--	18	33

The average household interviewed had 5 members. The average age of respondents was 44, and 90% of the respondents had an education level of primary school or higher. The gender split was 91% male and 9% female. This male bias was due to a problem with the survey form design and insufficient emphasis with the local survey staff on the need for a rough gender balance. The gender imbalance, however, does not appear to have skewed the results because there is a strong correlation between the findings of the focus group discussions and key informant interviews that did have gender balance and the findings of the household surveys that did not.

Detailed reports on each study site were drafted by the study team and vetted by experts who knew the site, including two people closely involved with Fiji's locally managed marine areas who work at the University of the South Pacific (Bill Aalbersberg and Patrick Fong), the head of TNC's Melanesia Program who oversees the project in the Solomon Islands (Paul Lokani), the former head of the Bunaken National Park Management Advisory Board (Angelique Batuna), the former head of WWF-Indonesia's marine program who oversaw WWF's work in Bunaken (Lida Pet), and a long-time researcher on MPAs in the Philippines and Apo Island who is now at TNC (Alan White). These site reports are available on the web at [www.nature.org/mpapovertystudy](http://www.nature.org/mpapovertystudy). The findings from each site presented below are the proverbial tip of the iceberg, and a wealth of additional information is presented in the site reports.



## 3 Navakavu Locally Managed Marine Area, Fiji

### 3.1 Site Description

Navakavu Locally Managed Marine Area is on Fiji's main island of Viti Levu about a half-hour's drive from the capital city of Suva. Navakavu was established in 2002 with support from the Institute of Applied Science of the University of the South Pacific and the Fiji Locally Managed Marine Area Network. It is a community-based marine protected area supported by the national government's legal framework for "customary fishing rights areas" within the Fiji Fisheries Act. Navakavu consists of the villages of Muaivuso, Nabaka, Waiqanake, Namakala and Ucuinamono with a total population of 600 residents. The key stakeholders in the MPA are the local villagers including fishers in the communities and the local clan chief. Fishing is the number one source of income for the community. The MPA itself has mudflats, seagrass beds, blue holes, and fringing and submerged coral reefs.

Fiji is a middle-income country, but it is considered to be more diversified and developed than most South Pacific countries. Its economy depends on tourism, fisheries and agriculture, with subsistence fishing and farming at the village level still an important way of life for much of the population. The economy's dependence on natural resources and the environment is an overriding feature.



Figure 3.1: Survey villages and the Navakavu Locally Managed Marine Area

Fiji has significant inequalities in wealth. In 2005, more than 30 percent of the population in rural areas was below the national poverty line (2005 ADB data). The study area is also rural with significant poverty. In early 2007, the average household income per month in Navakavu was less than half of the Fijian average (US\$251 equivalent versus US\$508 equivalent).

In general, Fiji's locally managed marine areas have proven to be successful and popular. More than 210 of them were set up by Fijian communities between 2000 and 2006 according to the Locally Managed Marine Area Network ([www.LMMAnetwork.org](http://www.LMMAnetwork.org)).

### 3.2 Opportunity and Assets

The Navakavu MPA has significantly increased opportunities and assets for local people. The radar chart (Figure 3.2) shows graphically how five key welfare variables compare between the MPA and non-MPA control areas: (1) monthly household cash income; (2) cost of the house on a scale from zero to ten; (3) the number of "luxury" items such as radios, watches, bicycles, TVs and motorcycles on a scale from zero to ten; (4) fish catch, showing the share of respondents who perceived an improvement in fish catches; and (5) income growth, showing the percentage of the respondents who have seen their economic activities and related income increase compared to five or ten years ago (depending on the age of the MPA). The details for each of these variables can be found in the site reports. In the radar chart, the five welfare indicators are normalized on the basis of the maximum score recorded in the MPA or non-MPA areas (whichever is greater). The highest scores for each welfare indicator thus forms the outer boundary of the graph.

MPA households generate the higher scores for all five indicators, but in housing there is no statistically significant difference. This is not surprising given that housing generally improves only after a number of years of higher income due to the large investments required, and the MPA was only four years old when the data were collected. The number of luxury items tends to respond much more quickly to higher incomes. Especially striking is the difference in perceived improvements in fish catch levels: 80% of the MPA fishers perceived an improvement while only 4% of the non-MPA fishers had the same perception.



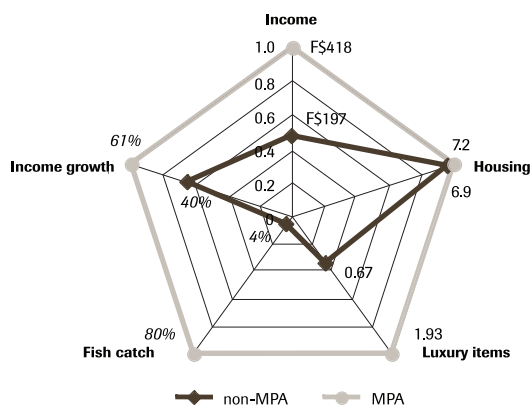


Figure 3.2: Summary of Navakavu welfare indicators for MPA and non-MPA communities

by the MPA authorities. The community does, however, have alternative income generating activities that are a direct result of the MPA. Because of the community's proximity to the capital city of Suva, the community often hosts research groups (such as the team for this study), and these groups pay a fee for food and to work in the community. Women in particular have benefited as they do all the catering for the research groups. Local fishermen have also been trained to assist with the research groups and help with ecological monitoring. Approximately 29% of household income in the MPA community comes from non-fishing sources as compared to 22% in the non-MPA communities.

With the increase in fish stocks and marine invertebrates, people are able to get enough for the whole family to eat every day. "No one returns empty" is how one local person put it.

For education, the MPA had little perceivable impact. There was no statistically significant difference between the MPA villages and the non-MPA villages regarding the percentage of children ages 6 to 15 attending school. Education levels were also about the same with little difference in completion levels for primary, secondary and tertiary education.

The Navakavu MPA is the only one of the four cases with no formal alternative livelihoods strategies promoted



### 3.3 Empowerment

The Navakavu MPA helped strengthen local empowerment by causing the community to better organize itself to manage local marine resources. This resulted in a larger number of people having a say in community affairs, financial and social benefits to women, improved management of the community's fishing areas, and legal recognition of local rights to marine resources.

The study team found that people in the MPA community are confident of their ability to influence decisions related to the MPA. Almost 90% of respondents in the MPA community felt there is more participation in community meetings now than five years ago (prior to the MPA). Through the customary fishing area management committee, the local community is empowered to determine the rules and management of the MPA. "The establishment of the committee has helped each member recognize their assigned duties and has encouraged them to perform well in their area," noted a villager. This participation is further enhanced by the strong support that community members receive from the University of the South Pacific in nearby Suva City.

Women in the community rely heavily on reef gleaning for their income. The MPA has helped them to increase incomes and given them a stronger voice in community meetings, according to the household survey results. *“Men are happy when the women are happy about the many positive changes that are observed within and/or around the MPA site. Women come home with something from the shoreline outside the MPA. If they have to return to the same spot the next day, they never return empty-handed,”* observed a man in one of the villages.

The fishing restrictions in the Navakavu MPA are legally recognized by the national government and have strengthened the community’s right to access and manage the marine resources in their traditional fishing areas. While access to marine resources in the MPA has been restricted, fishers travel on average only 5 minutes farther now than before the MPA was established.

The restriction of access and the increase in fish abundance and size in the MPA has led to problems with poaching. In church sermons, the local priest uses the MPA to illustrate the concept of temptation to the members of his congregation.

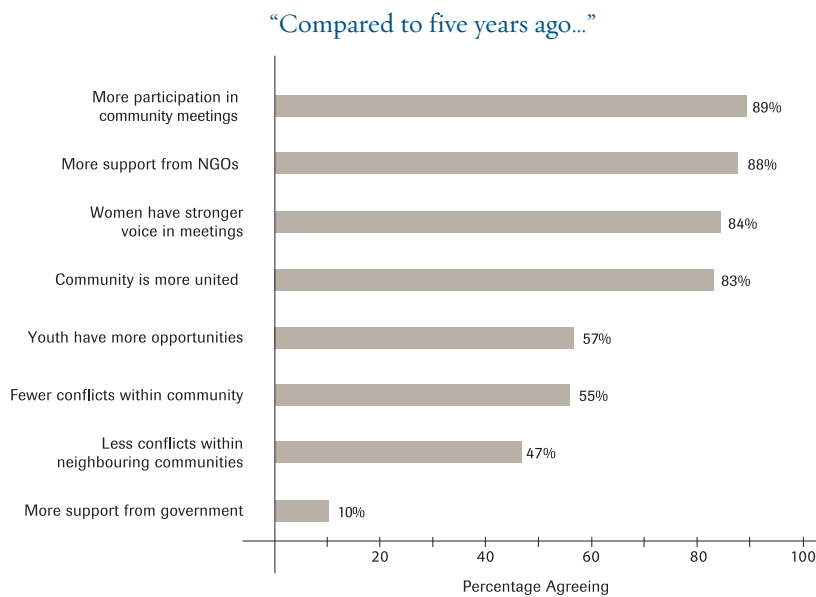


Figure 3.3: Statements about community engagement

The survey also found that local residents consider the MPA to be crucial for themselves and future generations. Almost all respondents (95%) agreed that dissolving the MPA now would cause significant problems in the future. Moreover, most of the respondents (again 95%) feel that it is their task to safeguard the MPA for the future and not necessarily the task of the government.



### 3.4 Security

The study findings show that the Navakavu MPA has increased security and reduced vulnerability by improving local health, fostering better communication among residents, reducing conflict in the community, and strengthening cultural traditions.

Approximately 75% of the people in the MPA area eat *more* fish now than five years ago (prior to the MPA). In the non-MPA area, 76% eat *less* fish now than five years ago. “Before, a pot of fish was not enough to cater for a family’s nutritional needs but at present after the establishment of the MPA, a catch of only 3 fish is enough to feed a nuclear family,” notes a village leader. There is a general perception that residents and children in particular are now able to get a more nutritious meal from fish and shellfish that spill over from the MPA. Local health has also improved from increased protein in diets and a perceived drop in colds. The increased environmental awareness from the MPA operation has translated into better understanding and acceptance of solutions to sanitation problems such as the use of pit latrines.

The improved marine conditions attract more poachers, both from inside and outside the community. This is one of the major MPA management challenges. Because the MPA is visible from the villages, though, it is easy to see when someone is poaching. The MPA can also be seen from the primary school classroom, and children are often the ones who report poachers to the village elders. This helps reduce the need for enforcement and expensive patrolling.

The MPA management committee is perceived by local people to have fostered greater social responsibility and cohesion, as the community has worked together to establish and operate the MPA. Stronger social cohesion has encouraged community members to better address social obligations such as helping families in crisis, which in turn reduces vulnerability. There is now less conflict and more cooperation among members of the community when it comes to the social obligations (*oga*) within the community.

The MPA has also revived cultural traditions. “The practice of keeping a portion of a fishing ground closed off is an age-old practice by the elders of yesteryear. The establishment of the MPA has revived this practice in a way that has affected the lives of the people in a positive way,” noted a villager in Waiqanake. Finally, as one person noted: “The marine environment is our source of income and sustenance, our form of long term investment, and future generations will benefit from this MPA.”

Opportunities		Empowerment		Security	
Income	↑	Governance mechanisms	↑	Health	↑
Housing	↔	Community participation	↑	Social cohesion	↑
Luxury goods	↑	Benefits to women	↑	Cultural traditions	↑
Fish catch	↑	Access and rights	↔		
Education	↔				
Alternative livelihoods	↑				

Figure 3.4: Navakavu summary of changes in poverty dimensions





## 4 Arnavon Community Marine Conservation Area, Solomon Islands

### 4.1 Site Description

The Solomon Islands' Arnavon Community Marine Conservation Area is located between the provinces of Choiseul and Isabel. The MPA itself consists of three small islands and their associated coral reefs. The communities of Waghena, Kia and Katupika co-manage the MPA in partnership with the provincial governments, the national government, and The Nature Conservancy (a study sponsor). Almost all livelihoods in the three communities depend on the marine environment. These include fishing, sea cucumber harvesting, trochus shell collection (for the making of buttons), and seaweed farming.



Local people have long regarded the Arnavon Islands as a storehouse for important subsistence resources and traditionally visited the islands only in times of need. When a large immigrant population of Gilbert Islanders from Kiribati was resettled nearby by the British colonial administration, over-harvesting and community conflicts followed throughout the 1980s and early 1990s, precipitating a dramatic decline in the Arnavons' once abundant resources, particularly the hawksbill turtle whose shell is of high commercial value. To reverse the decline, an MPA was legally established in 1995. The Nature Conservancy has provided technical support and funding to the MPA for more than a decade. The key stakeholders are the communities, their chiefs, the provincial governments, the national government, and The Nature Conservancy.



Figure 4.1: Survey villages and the Arnavon Community Marine Conservation Area

Poverty in the Solomon Islands is thought to be high, but no national data have been collected for more than a decade. The 2006 United Nations' Human Development Index ranked the Solomon Islands 128 out of 177 countries globally using a composite index of health, education and living standards.

## 4.2 Opportunity and Assets

Overall, the MPA communities perceive that life is harder than it was ten years ago. Yet when compared with the non-MPA control sites, in many respects the Arnavons' communities are better off. The Arnavons' communities have twice the household cash incomes as do the non-MPA communities, as well as better housing, a greater percentage of children attending school, and several new livelihoods strategies that provide some alternatives to fishing. Using the same methodology as described in Section 3.2, a summary of five key welfare indicators was created for the Arnavons and the non-MPA control sites in the chart below.

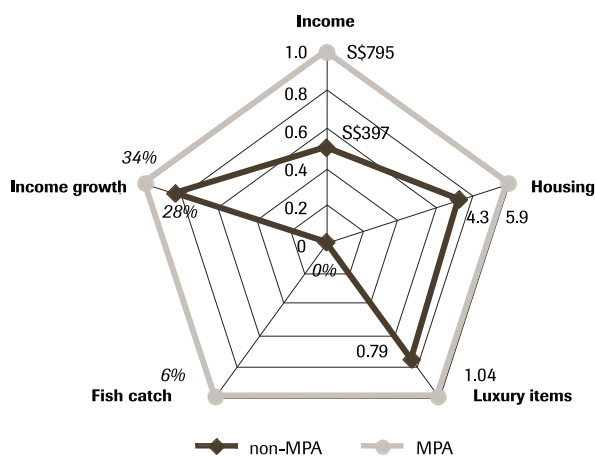


Figure 4.2 Summary of Arnavons welfare indicators for MPA and non-MPA communities

When the MPA average household monthly income of S\$795 (US\$104) is converted to per person daily income (using the average household size of 6.5), it amounts to only S\$4.02 or US\$0.53 a day. In the non-MPA communities, the average person has a cash income of just over S\$2.00 or US\$0.26 a day. The study area is very poor even by global standards, but the MPA communities still have twice the per capita income of the control sites.

Part of the reason for the poverty is that local incomes have declined in the past 10 years due to lower prices for the traditional cash crop of copra (dried coconut meat), over harvesting of sea cucumbers, a ban in the export of sea turtles carapaces, and the absence of markets for local fish catches.

The Arnavons communities are better off than the non-MPA communities largely because the MPA increased opportunities for earning income. The MPA authorities have promoted alternative livelihoods strategies in seaweed farming, deep-sea fishing, agriculture (growing vegetables), and production of handcrafts.

The farming of seaweed (used as a thickener in many products) brought new skills which are important to the entire community because women, men and children are involved. The local market price for seaweed, however, recently dropped by half, and this has caused many to stop the practice.

A donor-funded Fisheries Center trained people in deep-sea grouper fishing techniques, management of the center, and commercialization. The center, however, stopped operations due to a drop in the price of fish, a broken generator, and the need to negotiate a new agreement on target fish species with the communities.

More widespread vegetable farming and production of cultural handcrafts for sale also helped diversify livelihoods and promoted learning and exchange within the communities. Opportunities for income generation that embrace cultural traditions were noted as having caused a cultural revival with a beneficial effect on women and youth. *“Establishment of the MPA is good for regeneration of marine resources and in the meantime people have turned to traditional culture to use as a source of income such as dancing, weaving of mats and strings, sewing of traditional blouses,”* said a local person.

In the focus group discussions, people described the alternative livelihoods strategies as beneficial. This was not the case in the household surveys, however. Focus group participants tended to be more involved in the MPA and thus more aware of its impact. The differences could reflect a low level of awareness about the origin of the alternative income activities because people rated the communication efforts of the MPA as poor in the household surveys. Communications are a challenge for the MPA managers. There is almost no electricity in the study area (only a few small generators), and less than half the households have radios, so communication is largely person-to-person, and the three Arnavon communities are quite dispersed.

Around 70% of the children in the MPA between 6 and 15 years of age attend school compared to only 38% of non-MPA children, and 48% of MPA respondents have completed secondary school compared to just 17% in the non-MPA areas. Yet people found it more difficult in the MPA communities to pay school fees than 10 years ago and noted that the schools have not been upgraded over the last ten years, and that there is still a shortage of teachers. While the education indicators in the Arnavons communities are better than in the non-MPA areas, local people did not view education as having improved due to the MPA. Thus, the study team regards the MPA’s impact on formal education in the Arnavon communities as neutral.



### 4.3 Empowerment

The Arnavons MPA clearly helped empower local people to improve their lives. The MPA Management Committee empowered the communities to use this multi-stakeholder committee to voice concerns, discuss issues, and plan actions on topics far beyond the MPA itself. The management committee, for example, brought the community and government representatives into more direct dialogue, which resulted in greater government support especially for fisheries and basic health care. This improved dialogue and decision-making has helped strengthen local governance.

As women have become involved in seaweed farming, the weaving of mats, and the making of cultural dancing clothes to earn income, they have become more powerful. More than 85% of respondents in the MPA communities said women now have a stronger voice in community meetings. Women are also keen to participate more actively in the management of the MPA as they do not participate much currently.

For access and rights to marine resources, the MPA's no fishing zone made access a bit worse. The average travel time for a fisher increased 50 minutes over the past 10 years, though part of this is no doubt due to the overall decline in marine resources in the Solomons. The communities' rights to the marine resources in the Arnavons, however, have improved considerably. Prior to the MPA, the Arnavons was an open-access area claimed by three different communities and marine resources were in sharp decline. The three communities now have joint ownership of the legally designated protected area and share in the fish spillover benefits. Conflict within the communities and between communities, however, continues to be an issue as the chart below notes. This may be part of a national escalation of conflict over the last ten years in the Solomon Islands.

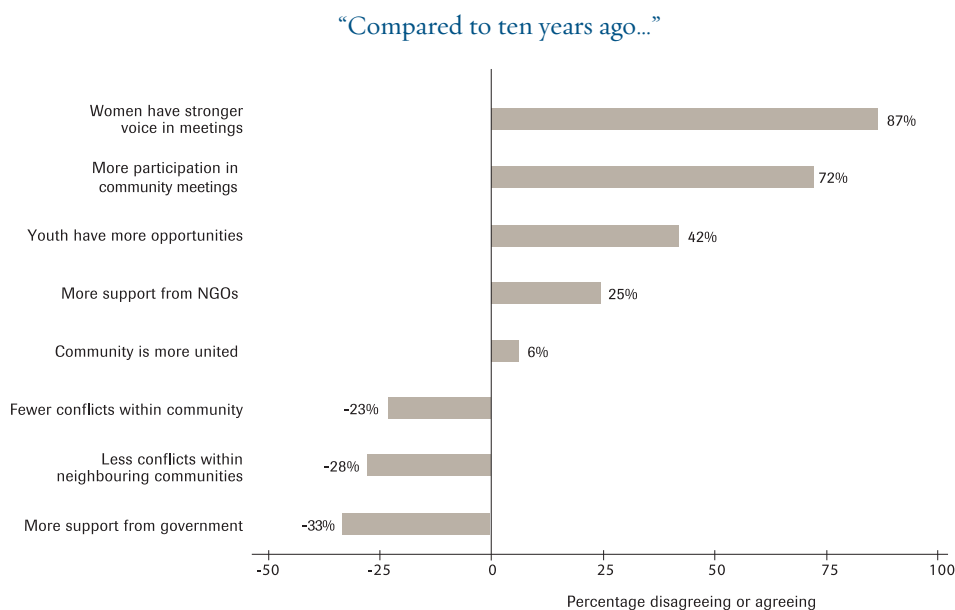


Figure 4.3: Statements about community engagement



## 4.4 Security

The Arnavons' MPA increased security and reduced vulnerability by improving health, increasing cooperation among the communities, and strengthening traditions. Health has improved due to a more diversified diet (people do more farming now rather than just relying on marine resources), less incidence of diving accidents (due to less diving to collect marine resources), and the use of MPA boats to transport severe medical emergencies to the town of Gizo. The MPA has stimulated more vegetable farming, and fishing is starting to improve after a long decline. *“Generally the Arnavons...have contributed a lot towards restocking our surrounding reef areas. This is clear in that a lot of fish are around especially on trolling gear. Thus, it helps us to be more secure in terms of availability of enough fish for family needs,”* notes a local fisher. *“Children have more variety of food now which is good for their health,”* says a local mother. The household surveys found that the same communities feel that sanitation and water quality are both worse than ten years ago, though, and it is now harder to find traditional medicines.



The MPA helped improve social cohesion among the three communities. There are many more inter-community activities, visits and exchanges since the MPA was established. Most of these are facilitated by the community representatives sitting together on the MPA's management committee. This is a significant achievement because of the considerable physical distance between some of the communities and the mix of Melanesian and Micronesian cultures represented on the committee. Social cohesion has clearly improved due to the MPA but how much is debatable. As mentioned previously, survey respondents perceived that levels of conflict are worse now than ten years ago.

Culturally, people have a greater sense of belonging because of the revived production of traditional mats and clothing and revitalized youth dancing groups.

Finally, people were unanimous in their support for the continuation of the MPA. As one local person noted, *“The MPA is good for the long-term sustainability of livelihoods and health status of people and also for preserving our marine resources and the environment.”*

Opportunities		Empowerment		Security	
Income	↑	Governance mechanisms	↑	Health	↑
Housing	↑	Community participation	↑	Social cohesion	↑
Luxury goods	↑	Benefits to women	↑	Cultural traditions	↑
Fish catch	↔	Access and rights	↔		
Education	↔				
Alternative livelihoods	↑				

Figure 4.4: Arnavons summary of changes in poverty dimensions



## 5 Bunaken National Marine Park, Indonesia

### 5.1 Site Description

Bunaken National Marine Park is located at the northern end of Sulawesi Island near the center of Indonesia. Manado international airport is 60 minutes away. The park was established in 1991 by a national government decree. Some 30,000 people live in the 22 villages inside the national park. Fishing and farming are the traditional livelihoods strategies in the area, but tourism has recently become a driving force in the local economy. The park is home to some of the best coral reef diving in the world, and more than 38,000 people visited the park in 2004. The MPA is split into two sections. The southern part is mostly mangroves and the northern part contains five islands and a number of coral reefs.



Figure 5.1: Survey villages and Bunaken National Marine Park

Bunaken is collaboratively managed by the national government and an advisory board. The management advisory board is made up of the key stakeholders, with 19 members representing the national, provincial and city governments, local communities, private-sector tourism operators, and academia. From 1991 to 2003, the national park benefited

from the USAID-funded Natural Resource Management Program ([www.nric.net/](http://www.nric.net/)). This project was responsible for many of the innovative features of Bunaken's operation and helped move this large MPA towards sustainability. Poverty in Bunaken varies considerably from sub-district to sub-district. Several of the islands in Bunaken and the sub-districts adjacent to the park have poverty rates of greater than 30 percent based on the national poverty line (2004 data). The sub-districts in nearby Manado City, however, had poverty rates of less than 10 percent in 2004. Nationally, about 18 percent of Indonesians were below the government poverty line in 2006 (2006 World Bank data).

## 5.2 Opportunity and Assets

Bunaken National Marine Park has increased local opportunities for employment in the tourism sector and for farmers and fishers to sell their harvests to the tourism sector. On the park's Bunaken and Siladen Islands, for example, direct employment at the resorts and income generation through the sales of produce and products to tourists benefit a substantial number of households. A study by Tyler Blake Davis (2005) shows that the tourism sector employed more than 30% of the villagers on Bunaken Island in 2005. The high level of local employment is largely due to the commitment of the North Sulawesi Watersports Association—a group of 18 Bunaken resort owners and dive operators—to hiring 80% of their staff from the local population.

The tourism opportunities, however, have not benefited all communities in the park equally. Villagers on Manado Tua Island, for instance, have seen little benefit from the growth of tourism, though their island is near Bunaken and Siladen Islands and has several popular dive sites. (People on this island were against the establishment of the national park and have opted out of many park activities.)

Overall, the household survey shows that tourism has made local people better off: 81% of the people now in tourism increased their incomes compared to their previous jobs, and 32% said their incomes “increased substantially.” 16% of the respondents now in tourism had switched from fishing. The 2005 Davis study found that 1,063 “identifiable jobs” have been created in the Bunaken tourism sector since 1998, which is significant in a working population of approximately 15,000 people.

The MPA and non-MPA areas are similar in terms of fishing. There is no statistically significant difference between the areas in income, fishing techniques, types of fish caught, or perceptions of changes in fishing compared with 5 years ago. The big difference is in the time spent fishing. MPA fishers spend less time per fishing trip and go less frequently compared to non-MPA fishers even though their travel time to the fishing areas has increased. In fact, MPA fishers spend approximately 50% less time per year fishing than fishers in the non-MPA area, yet their income is roughly equal, so their return on time invested is about double.





Fishers in the MPA have also benefited from new opportunities for selling their catch. “Local fishers and farmers can sell their products to the resort at a good price,” noted a local leader.

Using the same methodology as described in Section 3.2, a summary of five key welfare indicators is provided for Bunaken in the radar charts below. The comparison of MPA and non-MPA household welfare indicators (left side of Figure 5.2) shows that the MPA group generates the highest score for four of the five indicators, but the differences are small and not statistically significant. The right side of Figure 5.2 shows the radar chart comparison of fisheries and tourism-based households in both MPA and non-MPA areas. Fishing is the traditional source of cash income in the park and remains the dominant livelihood strategy in the area. Tourism is the number two source and is growing. It is the future of Bunaken’s MPA—hence the comparison between the two alternatives of fishing and tourism. Because only the fisher households answered the fish catch question, an alternative indicator is used here: family welfare. This indicator represents the perceived changes in family welfare in the last five years ranging from “decreased substantially” to “increased substantially” with three gradations in between. As expected, fishers earn substantially less than people working in the tourist sector. Especially striking is the difference in changes in “welfare gain”: 75% of the tourist-workers experienced an increase in their families’ welfare compared to only 18% of fishers.



Figure 5.2: Summary of Bunaken welfare indicators



Villages inside the MPA benefited for many years from a scholarship fund created by the North Sulawesi Watersports Association, which paid for the school costs of more than 150 children. This program ended when the government increased funding for education in the area, making school more affordable. The association now sponsors environmental education activities instead. The scholarships are a well-known and tangible benefit many people perceive as being linked to the MPA though they are only indirectly linked. (The tourism companies benefit from the existence of the MPA by having pristine places to take dive tourists). There was no statistically significant difference between the MPA and non-MPA areas for formal education levels or school attendance. Church groups and spiritual leaders have also played an important role in enhancing awareness of environmental issues in the national park. One such leader said: *“Almost every week, during my speech in the church or in other church meetings I mention how to take care of and maintain the national park.”* Overall, the study team rated the MPA’s impact on education as neutral.

Several donor-supported alternative income-generating activities were introduced at Bunaken, including high-efficiency clay stove production and coconut charcoal making. Unfortunately, neither of these activities provided more than short-term financial benefits. The clay stoves require a boat trip to Manado City to buy materials, and when the cost of the trip increased, the stoves became only marginally profitable. The price of green coconuts also increased, and it became more advantageous to sell whole coconuts in Manado City.

### 5.3 Empowerment

The MPA improved local empowerment by making MPA management more responsive to local needs. The park’s Management Advisory Board has been quite successful in creating a forum for discussing issues, for achieving consensus on decisions, and for instilling a democratic process for the running of the park. A “Citizens’ Forum” (*Masyarakat*) was also created and is composed of representatives from each of the park’s villages. Participants in the Bunaken National Park Management Advisory Board and the Citizens’ Forum benefited by improving their skills in participation and management more generally. A greater say in management decision-making for the MPA has led to major reductions in conflict levels. More than 70% of MPA respondents say that the communities are more united now than five years ago and that there is less conflict within and among the communities.

Employment in the resorts has afforded some women more respect and power in their households, and overall, tourism has opened up job opportunities for women that were not there before.

The survey also shows that local residents consider the MPA a crucial element for themselves and future generations. All respondents agreed that abolishing the MPA now would cause significant problems in the future. Moreover, the large majority of respondents feel that it is their task to safeguard the MPA for the



future and not necessarily the task of the government. This survey result shows that the communities feel responsible for and to some degree empowered to manage the MPA.

Regarding access and rights to marine resources, Bunaken’s fishing and no-fishing zones have not yet been fully implemented, but access to a few prime fishing areas has already been limited. Several communities perceive that they have fewer rights to local marine resources because of the MPA. Some communities noted that they have bad luck because the fish spawning aggregation areas are right in front of the village, and these areas are now closed to fishing.

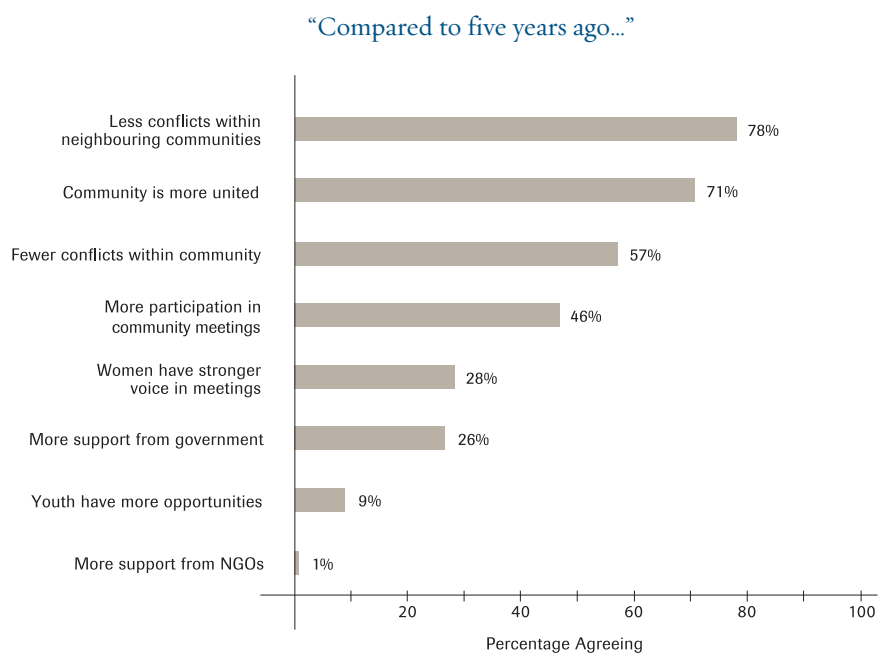


Figure 5.3: Statements about community engagement

## 5.4 Security

Security for the people within the MPA was improved by modest gains in health, strong gains in social cohesion, and a slight reduction in vulnerability to natural disasters.

Between 2001 and 2004, the equivalent of US\$420,000 was generated by national park entrance fees, with international visitors paying approximately US\$6 a day or US\$17 for a one-year pass. The Natural Resource Management Program in the MPA supported an innovative mechanism whereby the national park sets aside 30% of the entrance fees to be divided equally among the 30 communities in and near the park to help with infrastructure development projects. The community projects funded included the construction of a water-supply tank, public toilets, and washing places. This directly improved public health in a number of villages. In some villages, there are now beach cleaning programs and garbage bins are provided. Local people attributed this to the greater environmental awareness fostered by the national park. People in the villages are also more aware that they can get sick by eating fish caught using *wori* leaves and cyanide, so they have stopped using these destructive fishing methods.

Both the park's Management Advisory Board and the Citizens' Forum have contributed to social cohesion among stakeholders. The majority of residents perceive that the MPA has reduced conflicts between neighboring communities. This has helped to increase security and decrease vulnerability.

The positive social cohesion, however, is counter-balanced by feelings of envy in some villages. People on Manado Tua Island, for instance, have neither supported nor benefited much from the MPA.

People remark that the new mangrove trees planted by the MPA authority and partners shield some villages from the west wind that is believed to cause illness. The new mangroves also help people in several villages feel more secure than five years ago because their beaches are now protected from erosion and the westerly monsoon. Moreover, the park's store of supplies helps the communities to feel more secure in case of emergency.

The survey found that local people have positive views of the MPA's impact on culture and traditions, though specific impact was not explored in detail during the fieldwork. Thus, the study team rated the MPA as neutral in its impact on poverty in this regard.

Opportunities		Empowerment		Security	
Income	↔	Governance mechanisms	↑	Health	↑
Housing	↑	Community participation	↑	Social cohesion	↑
Luxury goods	↔	Benefits to women	↑	Cultural traditions	↔
Fish catch	↑	Access and rights	↓		
Education	↔				
Alternative livelihoods	↑				

Figure 5.4: Bunaken summary of changes in poverty dimensions





## 6 Apo Island, Philippines

### 6.1 Site Description

Apo Island is a small island located near Negros Island in the central part of the Philippines. The Apo Island Marine Reserve was formally established by municipal ordinance in 1986, with support from nearby Silliman University after local fish stocks had largely collapsed. It was given national protection in 1994. Apo is co-managed by the national government and elected community members. Key stakeholders include the island leaders, the mayor of the local municipality, and the national government.

Apo Island is a volcanic island 74 hectares in area surrounded by coral reefs with about 700 residents. Fishing followed by tourism are the primary livelihood activities. It is located in the province of Negros Oriental, which is one of the poorer provinces in the Philippines with 37 percent of families living below the national poverty line in 2003 compared with the national average the same year of 24 percent (2003 Final Provincial Poverty Estimates). Prior to the establishment of the MPA, poverty rates on the island were perceived by local people to be higher than in other parts of Negros Oriental Province.

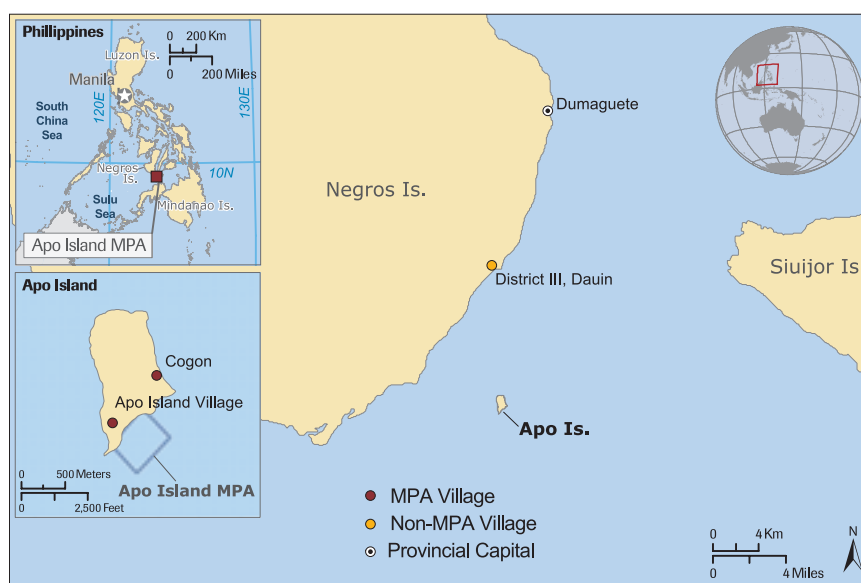


Figure 6.1: Survey villages and Apo Island Marine Reserve

Both the MPA and the control site are located in Dauin municipality. The municipality is 15 kilometers southwest of Dumaguete City, the capital of Negros Oriental Province. According to the 2004 census, the municipality has a population of 22,698 people or more than 4,500 households. The Dauin municipality has 23 barangays—the lowest local-level government unit in the Philippines. Eight of these barangays are coastal including Apo Island and the control site (District III, Dauin). These coastal barangays have established nine MPAs. District III is the lone coastal barangay without an MPA in the municipality. The reason for this is that fishers in District III believe an MPA will deprive them of their livelihood. District III is, however, bordered by barangays with MPAs, and all barangays within the municipality have access to all municipal waters except for the no-take zones of the MPAs and the waters around Apo where a permit is required. Thus, in principle, all the fishers in the municipality benefit from fish that “spill over” from the MPA no-take zones.

## 6.2 Opportunity and Assets

More than 90 percent of the people on Apo Island depend upon fishing as their primary livelihood strategy. The qualitative assessment found that the MPA had increased local fish catches, and the spillover effect of the MPA is widely perceived to be the cause. *“Fishers have to spend fewer hours fishing now and this is because of the [MPA]. I have observed this myself being a fish trader in this community,”* a local resident said. The former MPA superintendent notes: *“Before, the average catch was 5 kg a day. Around 2005, there were times that the catch could reach 20 kg in just a few hours.”*

The MPA also has created new livelihoods strategies mostly related to tourism. There are now two resorts on the island, bed-and-breakfasts, t-shirt vendors, fishing boat charters, dive masters, and guards for the MPA. Tourism now generates more cash income than fishing for the island, and just over half of Apo households are involved in the island’s tourist trade.

Tourist numbers are limited by the MPA authority, and each tourist pays the equivalent of US\$7.60 a day for access to the MPA. The national government keeps 25% of the entrance fees and returns 75% to the community but often more than a year after the revenue has been collected.

The purchase and use of household appliances has increased considerably on the island compared to ten years ago despite the limited electrical supply. Many people on the island say that this can be attributed to increases in income from tourism and fishing.

Comparisons with the control site are problematic, however. While District III is similar to Apo Island in many regards (other than the MPA), there are MPAs on either side of it, and local fishers benefit from the fish “spill over” of these MPAs. Many District III households also work in tourism, which is booming partly because of Apo Island. Thus, District III households are in effect “free riders” on the neighboring MPAs including Apo Island.



District III is also a short drive away from major markets in Dumaguete City and has better access than Apo Island to education and health services. While data from the control site do accurately portray current welfare conditions in the area, the similarities between the two sites mean the household surveys were not able to separate out the impact of the MPA from other impacts. Thus, all quantitative findings on differences between the MPA and the control site should not be taken as robust. Data on changes on Apo Island over the past ten years, however, are not affected by this issue. Using the same methodology as described in Section 3.2, a summary of five key welfare indicators is provided for Apo Island and the non-MPA control site in the radar chart below.

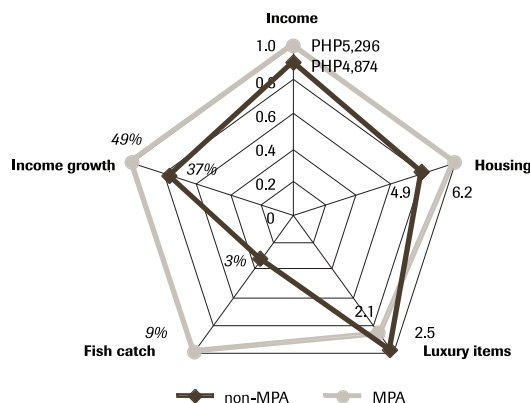


Figure 6.2: Summary of Apo welfare indicators for MPA and non-MPA communities

The MPA is perceived by many residents to have had a strong positive influence on education. Children now have more time and parents more funds for school. Prior to the MPA, fish catches were declining and families needed the children to help in order to put food on the table. Few children attended school. As fish catches improved and tourism revenues started to flow, investments were made in new schools and teachers, and education for children became compulsory. There is now a high school on the island.

In terms of alternative livelihood strategies, a donor-funded mat-weaving project was implemented on Apo Island in 1984 and 1985. Mat weaving has long been a traditional livelihood strategy on the island, and the objective of the project was to restart this activity as a way of providing an alternative source of income, particularly for women. A number of people were trained in mat weaving, but the cost of the inputs made their mats more expensive than those of competitors, and the quality was perceived by many to be relatively low. The benefits to islanders from the project were minimal.

### 6.3 Empowerment

The Apo Island MPA has had a mixed impact on local governance mechanisms. In 1985, co-management of the MPA started with the community and local government, but in 1994, it switched to the national government and the community. Apo community members feel less empowered to manage the MPA than they did prior to the national government's taking over. The mayor of the local municipality noted, "co-management should be between the local government unit and the community and not with the national government. The national government is very bureaucratic."

The Apo community feels there is now more participation in community meetings and the community is more united than 10 years ago. Conflict among community members, however, is perceived by the community to be slightly worse. This is partly due to the contested issue of who should make decisions about the management of the MPA and partly due to the influence of tourism revenues on a small island community.

On the gender side, Apo Island has been well studied by researchers for more than 20 years due to its close relationship with Silliman University in Dumaguete City. A lot of people and organizations have visited the island and helped raise awareness, particularly among women about their rights. As a Silliman University professor said, *“Even though they are not well educated, by listening to other people, this inspires [women] to assert their rights.”* Women are perceived to have a stronger voice in community meetings compared to ten years ago, and there are now women dive guides and MPA guards. The islanders’ contacts with people from other parts of the Philippines and other countries have encouraged local people to look for opportunities outside Apo as well, and a number of women and men have found work off the island.

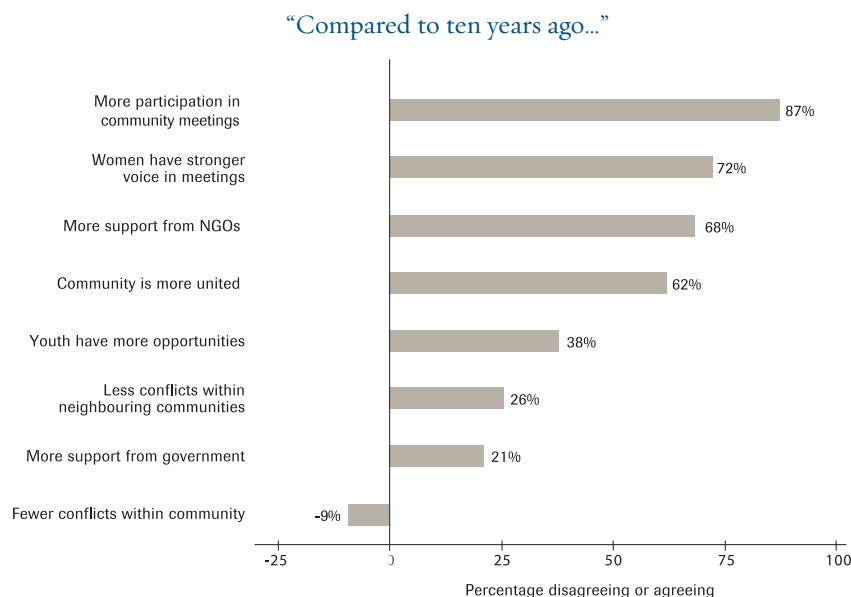


Figure 6.3: Statements about community engagement

Everyone in the community has the same access and rights to marine resources. Some community members argue that due to the MPA, their fishing grounds have been reduced. Nevertheless, they recognize the spillover benefit of the MPA. Local people’s rights to the marine resources around Apo Island are now legally recognized by the government. This helps to ensure that residents’ welfare gains from access to Apo’s marine resources are sustainable.

## 6.4 Security

The Apo Island MPA has improved security for residents through better health and stronger community life. The community’s health has improved largely because greater fish catches have resulted in better nutrition. Protein intake has increased, and selling the surplus fish allows families to buy provisions such as rice, vegetables and fruits. The local island leader observed, *“before the [MPA] there were times when fishers had to work twice as hard and they still could not catch enough fish to provide at least one proper meal per day for their families.”*

Tourism revenues have been used to improve local healthcare on the island by funding doctor visits and an island midwife. Compared to ten years ago, the MPA community is in agreement that health has improved, and there is now better access to medical services. The MPA’s stock of medicines has also become the de facto local pharmacy. As the MPA superintendent explains, *“we buy medicine (first aid) for the employees, but somehow the whole community has access to it.”*

The formation of several committees related to tourism and the MPA has helped to strengthen the social fabric of the community by providing forums for discussion and consensus making. Committee meetings give an opportunity for members to voice their opinions on issues concerning the community, though it is clear the chief issue is the perennial question of who should control the MPA's management.

The people of Apo Island perceive the importance of the MPA in providing food and livelihood opportunities, and this makes them more united in protecting it. The villages on Apo self-police compliance with MPA rules, and this has helped strengthen social cohesion. As the MPA superintendent explained, *“There are community members who serve as sea wardens tasked to guard the MPA, and women are also involved in guarding the area during the day. So far there was no incidence of community members being involved in illegal practices.”*

There was no conclusive evidence of MPA impacts on cultural traditions.

Opportunities		Empowerment		Security	
Income*	↑	Governance mechanisms	↑	Health	↑
Housing*	↔	Community participation	↑	Social cohesion	↑
Luxury goods*	↑	Benefits to women	↑	Cultural traditions	↔
Fish catch*	↑	Access and rights	↑		
Education	↑				
Alternative livelihoods	↑				

\* Unlike the other three sites, the summary of changes in poverty in these focal areas is based on qualitative information rather than quantitative data due to the control-site issue.

Figure 6.4: Apo summary of changes in poverty dimensions







## 7 Conclusions

In the four study sites, the MPAs undoubtedly contributed to poverty reduction. “*People in the community are now better off and this is because of the MPA,*” as one person from Apo Island explained.

For the residents of Navakavu and Apo Island, their MPA contributed to poverty reduction in very substantial ways (though both sites have fewer than 700 people). In the Arnavons and Bunaken, with populations of 2,200 and 30,000 respectively, the MPA has clearly contributed to poverty reduction, though by no means eliminated it. Looking at how each of the study focal areas contributed to poverty reduction shows why these MPAs benefited local poor people.

### 7.1 Opportunity

*Income, housing and luxury goods.* Household incomes were better in three of the four sites. In fact, Navakavu and the Arnavons’ incomes were more than double those in the control sites. Not surprisingly, in sites where incomes increased, so too did the number of household “luxury goods” such as radios, watches, TVs and motorcycles. Housing also improved in two sites but not in the youngest or the oldest MPA. The youngest MPA (Navakavu) was only five years old, and it takes time for a household to save the funds required to upgrade housing. In the oldest MPA (20 year-old Apo Island), locals upgrade houses more than a decade ago, but this was outside the study timeframe of 10 years. Regardless, increased incomes plainly contributed to poverty reduction.

*Fish catches.* The MPAs directly benefited fishers in the four sites. All four sites have areas that have been closed to fishing for at least four years, and the fish in the protected area have increased in size and abundance to the point that they are spilling over from the no-fishing zones into accessible waters. People in Navakavu fish just outside the MPA, and 80% of the people there say fish catches are better than before the MPA. The spillover effect was also strong in Apo Island but slightly less so in Bunaken. It was present as well in the Arnavons but had less impact because the MPA is an hour by boat from many of the villages, and fuel is expensive in this remote part of the Solomon Islands. MPA fish spillover has clearly contributed to poverty reduction at three of the MPAs. These findings support the increasingly well-documented perception of spillover effects from MPAs.

*Education.* Environmental awareness, with a strong element of education, increased in all four sites due to the MPA. In Apo Island, increased incomes helped fund more schooling for children. There was little impact on formal education attributable to the MPA in the other sites. Formal education is one area that may deserve more attention by MPA managers because of its known poverty reduction impact. This should, however, be based on a community's stated needs and not driven by well-meaning but poorly grounded intentions.

*Alternative livelihoods.* While the fisheries benefits were significant in the MPAs, the greatest boost to household incomes came from new livelihoods, especially in tourism. In Bunaken and Apo Island, those who switched to a new occupation in the tourist industry earned approximately twice as much as before. Some of the people who switched were fishers originally: 16% in Bunaken and 52% in Apo Island. In both locations, tourism training for local people was done by private-sector tourism operators. While tourism contributed to a better quality of life for many people in Bunaken and Apo Island, tourist numbers fluctuate dramatically. Both Bunaken and Apo Island suffered tourism downturns after in-country terrorism attacks and during events such as the SARS epidemic.

The often-used tool of alternative income generating activities for MPA fishers proved to have less impact than expected. Outside of tourism and working for the MPA, most of the alternative income activities in the MPA were not sustainable. Seaweed farming and deep-sea grouper fishing in the Arnavons were both hit by, among other



things, dropping commodity prices at the local level. Building clay stoves and making coconut charcoal in Bunaken were hurt by the rising cost of inputs, and mat weaving in Apo Island was hampered by the high cost of inputs and lower quality than competitors. At least four of these alternatives produced income for several years before becoming financially unrewarding. One lesson learned is that changes in the price of inputs or outputs can quickly move an alternative income generating activity from success to failure. This suggests that most alternative income generating activities are better suited for offsetting income initially lost due to establishment of no-fishing areas rather than as long-term tools to improve incomes or move people away from fishing. It was the larger, capital-intensive investments in tourism that led to long-term gains in non-fishing income.

## 7.2 Empowerment

*Governance mechanisms.* In all four study sites, new governance mechanisms were established for the management of the MPA, and all four involve communities in management decision-making. These new governance mechanisms made the MPAs more responsive to community needs, and thus contributed to poverty reduction. The MPA management committees also serve as forums for addressing other community issues. This helped to strengthen local governance and reduce conflict. Accountability and transparency of community representatives on these management committees is still an issue, however, as is the low involvement of women and youth in the committees.

*Community participation.* MPAs need local communities just as local communities need MPAs. The findings suggest that community support for starting an MPA may be greater if there is a perceived crisis in fisheries. In all four sites, the realization by local communities that marine resources were in steep decline provided an incentive for changing the status quo. Problems with the current marine resources management regime made the communities more willing to try something new like an MPA even if it had short-term costs.

It is also apparent from the fieldwork that local people need to understand the link between a healthy ecosystem and quality of life if they are to support the MPA. Local people made observations such as, “I never thought that the conservation area has so much to do with how we live as a community,” and “I thought the marine protected area is something to do with helping the environment but did not understand until recently how much it also helps people.” Such understanding is crucial to sustainability.



Government policies that provided legal recognition for local community management of marine resources clearly supported community participation in three of the four sites. Community-led marine resource management is also easier if a neutral actor such as a university or NGO helps the MPA stakeholders to reach consensus about the distribution of costs and benefits. In all four sites, a university or an NGO played a catalytic role in getting the MPA established and helping it move towards sustainability (often with the support of an outside donor). External organizations can also help communities build on local traditions for managing fish stocks. This helps generate community support for the MPA and ensures time-tested local fisheries traditions are not overlooked.

*Benefits to women.* In all four sites, the MPA helped empower women economically and in some cases socially. Female-headed households are often among the poorest in a community, and helping to improve the welfare of women can have significant poverty reduction benefits. Women are the reef gleaners in Navakavu and benefited financially by collecting and selling a portion of the large increase in shellfish from just outside the marine protected area. In Bunaken and Apo Island, dive tourism created more high-income job opportunities for women, and residents noted an improvement in women’s lives because of the marine protected area. In the Arnavons, when women became involved in seaweed farming and the making of traditional clothes to earn income, they gained a stronger voice in community meetings.

*Access and rights.* Local people perceive that the MPAs made access to marine resources worse in one site, and in two sites, restricted access to resources but gave them long-term rights to the resources. In all four sites, the MPA caused fishers to spend more time traveling to fishing areas than before but often with higher fish catches.

## 7.3 Security

*Health.* In all four MPA sites, health improved because of the MPA. Greater fish catches in Navakavu and Apo Island led to greater protein intake and a perceived improvement in children’s health in particular. Greater incomes from the MPA in Apo Island led to more frequent visits from mainland doctors and funding for a resident midwife. The MPA speedboat is used as the water ambulance in the Arnavons, and in Bunaken, visitor entry fees funded water-supply tanks, public toilets, and washing places in several villages and thus improved public health. In three sites, the increased environmental awareness from the MPA operation translated into better understanding and acceptance of solutions to sanitation problems.



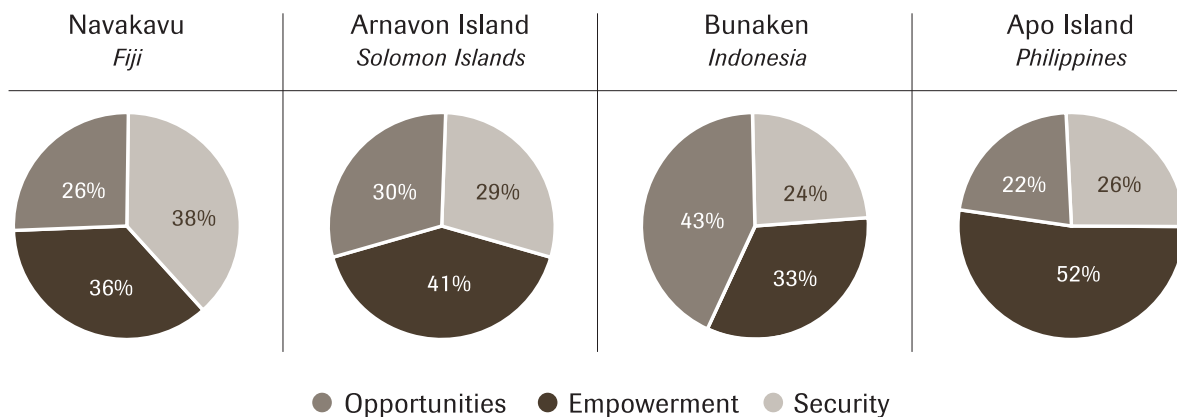
**Social cohesion.** The MPAs strengthened the unity and social fabric of the communities. In the Arnavons, stronger social cohesion help to bring together different cultural groups and gave the communities a more unified voice in requesting services from the provincial government, who in turn provided more support for fisheries and basic health care. In Navakavu, greater social cohesion made community members more likely to fulfill their social obligation to help other members in times of need. In three of the sites, conflict with neighboring communities is perceived to have been reduced because of the MPA. This both contributes to and benefits from the improvements in social cohesion. In short, stronger social cohesion increased security for community members in all four sites.

**Cultural traditions.** In Navakavu, the MPA helped revive the traditional practice of closing a portion of the fishing grounds. In the Arnavons, people cited a greater sense of belonging and safety because of production of traditional clothing and revitalized youth dancing groups. There was no solid evidence of MPA impact on cultural traditions in Bunaken or Apo Island.

## 7.4 What contributed most to poverty reduction?

Using multi-criteria analysis (see [www.nature.org/mpapovertystudy](http://www.nature.org/mpapovertystudy) for a paper detailing how this was done), it is clear that the MPAs' contributions to poverty reduction were in roughly equal proportions to the increases in *opportunity*, *empowerment* and *security*, except in Apo Island. In all four sites the contributions by the MPA to poverty reduction came from more than the expected better opportunities for income in fisheries and tourism. Stronger social cohesion, benefits to health and to women, and better local governance also contributed to reducing local poverty via greater empowerment and security.

Figure 7.1: Relative contribution to poverty reduction from the three elements of poverty



## 7.5 Policy recommendations

To maximize the benefits of an MPA to poverty reduction, policy makers should: invest in MPAs; empower local communities; and think small but integrated.

*Invest in MPAs.* Like a school or a health clinic, an MPA needs financial support, particularly at start up. But also like a school or health clinic, an MPA has significantly more benefits than costs. The investment, for example, in the Navakavu MPA over the five years since start up has been less than US\$12,000 equivalent (half of this was for a boat), and this modest investment has helped to double the incomes of about 600 people. This is why more than 120 new locally managed marine areas have been started in Fiji since 2004. In all four MPAs, it was an external donor agency that provided the transformative funding. A large fund that provides modest grants to coastal communities to establish MPAs could bring dramatic benefits to local fisheries and in some cases tourism. A number of marine scientists now believe that setting aside 30% of coastal areas in a string of ecologically connected MPAs could well ensure sustainable marine fishing and tourism in perpetuity even in the face of global threats like over fishing and climate change.<sup>3</sup>

Establishing an MPA can take considerable time—several years from conception to start up is not unusual. It may take an equal amount of time for the ecological and socio-economic benefits to materialize. MPAs do not always fit well with the short-term cycle of politics. Financial and technical support needs to be for a minimum of five years. In Apo Island, it took six years for total financial benefits to exceed costs since start up.

In all four sites, a university or an NGO played a catalytic role in getting the MPA established and helping it move towards sustainability. A neutral actor who is not allied with any interest group helps the MPA stakeholders to reach consensus about the distribution of costs and benefits. The external organizations in all four MPAs also helped channel funding support for the MPA and ensured financial transparency. Funding policies that encourage the involvement of external organizations are vital to ensuring MPAs start off right and contribute to local poverty reduction in the medium to long term.

Across the four sites, people noted that understanding the link between ecosystem health and wellbeing was important for their continuing support of the MPA. “*We can now better understand the link between the marine protected areas and our lives,*” noted one local person. This understanding is critical for sustainability. Funding for environmental awareness activities needs to be built into support for MPAs. Communities that engage in the actual MPA monitoring activities tend to develop environmental awareness more rapidly.



<sup>3</sup>For more see: Fernandes, L. et al., 2005. Establishing representative no-take areas in the Great Barrier Reef: large-scale implementation of theory on Marine Protected Areas. *Conservation Biology*: 1733-1744. Bohnsack, J.A., et al., 2000. A rationale for minimum 20-30% no-take protection. *Proceedings of the 9th International Coral Reef Symposium, Bali, Indonesia 23-27 October 2000*. Vol. 2: 615-619.

*Empower local communities.* The four MPAs in the study have empowered local communities in marine resource decision-making. This led to lower costs—especially for enforcement—and greater benefits. MPAs need local communities just as local communities need MPAs. Government policies that provided legal recognition for community management of local marine resources clearly supported community participation in three of the four study sites. The benefits of community management can be further strengthened by linking MPA communities together via peer-learning networks such as the Locally Managed Marine Area Network in the Pacific and SE Asia ([www.LMMAnetwork.org](http://www.LMMAnetwork.org)). Such networks enable cross-pollination of best practices and provide specialized training and technical resources for local communities.

Understanding and respecting customary use and access rights is crucial to gaining support from and ownership by local communities. To the extent possible, build on what already exists in the community. In Navakavu, the Arnavons and Bunaken, traditional marine resource management systems were incorporated into MPA management to varying degrees. This helped strengthen community support for the MPA and built on time-tested fisheries management mechanisms. In Navakavu, the MPA establishment was supported by the traditional custom of temporarily closing a fishing area. In the Arnavons and Navakavu, the MPA strengthened customary relationships within the community. Policy incentives are needed that encourage seeking out and building on a community's marine resource customary usage and management traditions.

*Think small but integrated.* The MPAs with the greatest contributions to poverty reduction were the two smallest. Navakavu and Apo Island are tiny MPAs within sight of the beneficiary villages. Both have low operating costs, high benefits, and were planned in an integrated manner. They also have fewer stakeholders to consult, and the fish spillover from the MPA is easier for local communities to see. This suggests that a network of smaller MPAs each affiliated with a local community may contribute more to poverty reduction than a single larger MPA. In fact, a network of smaller MPAs—be they locally managed marine areas or community conserved areas—that are ecologically connected may have the greatest potential yet for both reducing coastal poverty and conserving marine biodiversity. Kimbe Bay in Papua New Guinea is one example of how a network of about a dozen MPAs can be designed around community and local government co-management to help sustain the area's fisheries and ensure individual MPAs are resilient to climate change.

For MPAs that already exist, be they large or small, it is worth keeping two interrelated attributes of success in mind: community participation in MPA management decisions and an emphasis on tangible benefits to local communities from the MPA such as greater income and better health.

*“The marine protected area is like a bank to the people,”* noted a Fijian community leader. Opening more branches of the “bank” in developing countries can contribute to coastal poverty reduction.

# Appendix I. Qualitative assessment

Environmental conservation through marine protected areas, in general, aims at the provision of better environmental services, species protection, maintenance of cultural and spiritual sites and values and better infrastructure and mechanisms for management of the natural resources. Poverty is a multi-faceted condition including several usually interconnected economic, social and cultural dimensions (lack of assets and income; lack of opportunities; lack of voice and empowerment; and vulnerability and lack of capacity).

The objective of the Focus Group Discussions (FGD) and Key Informant Interviews (KII) was to provide a qualitative base of information to complement quantitative information provided by socio-economic analysis through Household Surveys (see Appendix II). The idea was to understand the perceptions of community members with respect to the impact of a marine protected area on the many dimensions of their daily lives and on the management of natural resources. The focus of the discussions was on the linkages between a given conservation initiative and poverty eradication in each site. This methodology aimed to address predominantly social, cultural and governance dimensions of community life whilst also attempting to canvass information related to livelihoods that would complement the Household Survey. It also helped, in some instances, to understand the dynamics of community life and how to best implement the Household Survey in each community. Focus Group Discussions and Key Informant Interviews were conducted only in MPA communities.

## A.1 Content

The Focus Group Discussions and Key Informant Interviews addressed the following specific areas:

1. Peoples' general perceptions about the marine protected area
2. Peoples' general perceptions of the effect of the marine protected area on their livelihoods
3. Education
4. Health
5. The role of women and men and opportunities for youth
6. Governance and social cohesion
7. Access to and use of resources and rights
8. Vulnerability (including maintenance of cultural and spiritual values)
9. Livelihoods and opportunities

## A.2 Methodology

**Focus Group Discussions.** These were conducted in small groups (6 – 12), with national team counterparts and/or national institutional partners notifying the communities and organizing the meetings in advance. Each meeting took on average 2 - 2 ½ hours. The composition of the groups (and whether they were homogeneous or heterogenous) depended on what was most appropriate for each community and MPA but was discussed and agreed in advance with national team counterparts and/or national institutional partners. There were two facilitators for each meeting (the social scientist and a national counterpart/translator) as well as one bilingual note taker.

The philosophy of the Focus Group Discussions was to facilitate in-depth discussion of issues of particular interest to participants and then move on to other issues that may not have been as salient to that particular group but were also relevant to the study. The idea was to maintain as much as possible a natural flow of discussion, with talk about one issue leading easily to another. Thus, reference questions (below) not necessarily asked in the order given, and not all the questions were addressed in every FGD. Particular attention was given to ensuring a full participation by all group members. All meetings were conducted in the local language with translation for the social scientist. The information was recorded in English by the bilingual recorder. Data recorded was entered into the computer soon after the conclusion of the meetings.

### A.3 Steps for FGD and KII

**Key Informant Interviews.** The objective of the key informant interviews was to provide more in-depth qualitative information on areas 1-9 above. Thus, for instance, in each community KIIs were held with staff from the health clinic, from the school and from a youth group to understand in greater detail whether the MPA has had any impact on health, education and the lives of young people.

1. Explain the purpose of the study and of the FGD/KII
2. Individual introduction of participants
3. Ask participants a general question about what the marine protected area has done for their lives and their community – can be either positive or negative (ask each participant to write the 3-4 most important things on a card)
4. Give people time to think and write on the cards
5. People individually present their points and place them on a board/wall
6. Two participants and the facilitator then group them logically
7. If there is any omission of general areas important for discussion than the facilitators may also include some cards
8. Start discussing some of the groups bearing in mind the reference questions below to stimulate discussion

### A.4 Reference Questions for FGD and KII

#### *Education/new skills*

Has the marine protected area had any effect on the availability of education for children in this community?

Has the marine protected area had any effect on people being able to afford to pay school fees?

Has the marine protected area contributed to members of this community being able to learn new skills?

Has the marine protected area contributed to teaching children in this community about any cultural or traditional values?

#### *Health*

Has the marine protected area helped or hindered access to the practice of traditional health? In what ways?

Has the marine protected area contributed or not to having more health care available in this community? In what ways?

Has the marine protected area contributed or not to health in general in this community? In what ways?

Do you think everyone has sufficient food to eat every day and a mixture or a limited amount of food items?

Does the marine protected area contribute or not to the food supply in your household?

Have there been any improvements to sanitation in this community since the declaration of the marine protected area?

#### *Governance and social cohesion*

Have there been other committees or community groups established since the declaration of the marine protected area?

Is anyone in this group a member of any committee related to the management of the marine protected area? Which one?



Is anyone in this group involved in any other activity related to the management of the marine protected area? In what ways?

Do members of this group feel that in general they can influence decisions related to the management of the marine protected area? Are there mechanisms for more general participation in decision-making?

Do members of this group feel that in general there is transparency in the way decisions are made related to the management of the marine protected area?

Do members of this group feel that in general they are properly informed about decisions related to the management of the marine protected area?

How often are there meetings related to the management of the protected area? What things are addressed in those meetings?

Has the formation of committees and groups related to the management of the marine protected area helped this community in any way?

In your perception, has the marine protected area helped the community to be more united?

In your perception, has the marine protected area created more conflict amongst community members?

In your perception, has the marine protected area created more conflict between neighboring communities?

#### ***Role of women and men and the lives of children***

Has the marine protected area changed what a woman does for daily activities in this community?

Has the marine protected area changed what a man does for daily activities in this community?

Has the marine protected area changed anything about how children grow up in this community?

#### ***Access to and use of resources, rights and ownership***

Has the marine protected area had an effect on access to natural resources by members of this community (e.g., fisheries, water, and timber)?

Has the marine protected area had an effect on the ownership of, and rights to, natural resources by members of this community?

#### ***Vulnerability***

Do you feel that the marine protected area helped this community to have a better natural environment with more plants, animals and environmental resources such as cleaner water?

Does the marine protected area give your family a sense of greater or less security when you go through difficult times or when there is an environmental disaster?

Has this community received more or less support from the government or from other organizations because you live in or near a marine protected area?

Has the marine protected area helped this community to maintain traditional and spiritual customs, or not?

#### ***Livelihoods and opportunities***

A range of specific questions tailored to the economic and subsistence activities and opportunities of the community was posed during the cards exercise (see above). In particular, understanding was sought on the socio-cultural impact of alternative or new activities attributed to the MPA.

# Appendix II. Quantitative assessment

## Household survey Bunaken (Indonesia)

I. Name Interviewer:		V. Duration of the interview	
II. Date of interview:		VI. Name data enterer:	
III. Location of interview:		VII. Date of data entry	
IV. Coordinates - (lat / long)		VIII. ID number:	

### Section1: Household, education & housing

0. Interviewer Record the main material of the walls and roof of the house *without asking*

<b>a. Walls</b>	<b>b. Roof</b>
1 Bamboo	1 Thatch/leaves
2 Wood	2 Tile
3 Corrugated iron	3 Corrugated iron
4 Brick/cement	4 Concrete
5 Other, please specify _____	5 Other, please specify _____

I would like to make a complete list of all the people who normally live and eat their meals together in this house beginning with your immediate family and then the extended family

**[Start filling with the respondent]**

	1. NAME	2. SEX	4. AGE	5. SCHOOL	6. LEVEL	7. FEE
ID CODE		Male, 1 Female, 2	How old is [NAME]?	Is [NAME] attending school now? Yes, 1 No, 2 <if "2", continue to next member>	What is the highest level of education by [NAME]? See bar below	What is currently the yearly school fee for [NAME]?  (IDR/year)
	NAME	SEX	YEARS	SCHOOL	LEVEL	SCHOOL FEE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

**Box for codes: Highest schooling**

- |                 |              |                    |
|-----------------|--------------|--------------------|
| 1. NO SCHOOLING | 3. SECONDARY | 5. OTHER (SPECIFY) |
| 2. PRIMARY      | 4. TERTIARY  |                    |

**8. Do all the children between the age of 6 and 15 in your household attend school?  
And, if not, why not?**

- 0 Yes, they all go to school
- 1 No, because we cannot afford the school fees
- 2 No, because we need the children to help out at home/at work
- 3 No, because the school is too remote
- 4 No, other reason (specify) \_\_\_\_\_

**Statements on Education:**

Now I would like to read a list of statements on education. Can you indicate to what extent you agree or disagree with each of these statements?

Compared to 5 years ago...

**(Tick one option for each statement)**

0 Don't know  
1 Disagree  
2 Neutral  
3 Agree

9.	It has become easier for our children to go to school				
10.	We are now better able to afford school fees				
11.	My family has learned new and practical skills to earn an income				
12.	It is important for my children to attend school				
13.	My children have become more aware about our culture and traditions				
14.	The chance of going to school is the same for boys and girls				

- 15. Were you born here? [0=no, 1=yes]
- 16. If not born here, where were you born? (Please fill)
- 17. If not born here, when did you arrive here? (Please fill)

Could you indicate whether your household has the following Items [a], and if yes, when you obtained these [b], and whether it involved a replacement of an old item or whether it was the first time the item was present in the house[c]?

	a. Present in household [0 = No, 1 = Yes]	b. How long ago purchased [Years]	c. Replacement or first time present [0 = replaced, 1 = new]
18.	Running water inside house		
19.	Electricity		
20.	A radio		
21.	A TV set		
22.	Satellite Dish		
23.	A watch or clock		
24.	A canoe		
25.	A bicycle		
26.	A boat without motor		
27.	A motorised boat		
28.	A motorcycle		
29.	A car or a truck		

**30. Please indicate your family's monthly expenses on non-fishing items.**

Cost category	a. Amount (Indonesian Rupiah)	b. Unit [0=per week, 1=per month, 2=per year]
1. Food		
2. Fuel/Kerosine		
3. Housing		
4. School fees		
5. Transport		
6. Electricity		
7. Cigarettes/beetle nuts/lime		
8. Drinks		
9. Donations		
10. Other, please specify		

**Section 2: Health & Diet**

31. How often does your family eat fish/seafood? We eat fish/seafood...[Circle one]

- |   |                  |   |                 |
|---|------------------|---|-----------------|
| 1 | Every Day        | 5 | Every two weeks |
| 2 | Every two days   | 6 | Once a month    |
| 3 | Every three days | 7 | Never           |
| 4 | Once a week      |   |                 |

32. Did your family's fish/seafood diet change over the last 5 years?

- 1 Eat less fish
- 2 No change (skip following question)
- 3 Eat more fish
- 4 Don't know

33. What is the most important reason that your family's diet of fish/seafood had changed?  
And what is the second most important reason?

	a. 1st most important	b. 2nd most important
1. We fish less/more		
2. We fish the same amount of time but we catch less/more		
3. There is less/more sharing of fish between family, friends, etc.		
4. Change to other foods (e.g. spam)		
5. The price of fish has decreased/increased		
6. Availability of certain local species changed		
7. Preference for fish has changed (don't like fish as much)		
8. There is more easy access to markets than a few years ago		
9. Other, specify...		
10. Don't know		

**Statements on Health:**

Now I would like to read a list of statements on health. Can you indicate if you agree or disagree with each of these statements?

Compared to 5 years ago...

**(Tick one option for each statement)**

0 Don't know  
1 Disagree  
2 Neutral/same  
3 Agree

34.	It has become easier to find traditional medicine				
35.	We are now better able to afford school fees				
36.	My family has better access to medical services				
37.	It is important for my children to attend school				
38.	The variety of our daily meals have improved				
39.	The chance of going to school is the same for boys and girls				
40.	There is more easy access to markets than a few years ago				
41.	Sanitation (toilets, etc.) is cleaner and better				

**Section 3: Fishing**

42. Please indicate in which activities your family participates? Also specify if this is mainly for own consumption or for cash and how this compares to five years ago.

		[0 - no, 1 - yes]			
		a. Own consumption	b. Cash	c. Cash Income Generated [in IDR / month]	d. Compared to 5 years ago [0 - less, 1 - more, 2 - no change]
1.	Fin fish fishing				
2.	Sea food collection (e.g. shells/mud crab/oysters)				
3.	Seaweed cultivation				
4.	Fish/aqua/mariculture				
5.	Trade of sea food/fish				
6.	Reef fishing				

! Note for interviewer: If the respondent expressed to be active in fishing [option 1 to 4], continue to question 43. Otherwise skip questions 43 to 52 !

**43. What is the 1st most important and 2nd most important fishing techniques you use now? And what were they 5 years ago?**

		Now		5 years ago	
		a. 1st	b. 2nd	c. 1st	d. 2nd
1.	Reef fish				
2.	Reef invertebrates (octopus, shellfish, crab, etc)				
3.	Bottom fish				
4.	Pelagic fish				
5.	Others, specify...				
6.	Gill net				
7.	Snorkel spear fishing				
8.	Scuba spear fishing				
9.	Foraging the reef (shell, crabs, etc)				
10.	Trapping (octopus, crabs, etc)				
11.	Hand spear				
12.	Other techniques, specify...				

44. How often do you fish or collect seafood? [Circle one answer]
- |   |                  |   |                 |
|---|------------------|---|-----------------|
| 1 | Every Day        | 5 | Every two weeks |
| 2 | Every two days   | 6 | Once a month    |
| 3 | Every three days | 7 | Never           |
| 4 | Once a week      |   |                 |

45. On average how much time is spent actively fishing per day? [Circle one answer]
- |   |           |   |             |
|---|-----------|---|-------------|
| 1 | 0-3 hours | 4 | 9-12 hours  |
| 2 | 3-6 hours | 5 | 12-16 hours |
| 3 | 6-9 hours | 6 | >16 hours   |

**46. How much time do you spend to travel to your primary fishing ground?**

Hours and  Minutes (or can't recall [tick "0"]):

**47. How much time did you spend traveling to your primary fishing grounds 5 years ago?**

Hours and  Minutes (or can't recall [tick "0"]):

**48. Can you indicate 1st most and 2nd most important reasons why you go fishing?**

	a. 1st most important	b. 2nd most important
1. I really enjoy fishing		
2. I really need the fish to feed my family; sharing is a part of our culture		
3. Giving catch to others strengthens bonds		
4. I really need the money from the fish I sell		
5. Tradition: My family has always fished. Fishing is my life!		
6. Fishing strengthens the bond with my children/family		
7. Fishing strengthens the bond with my fellow fisherman		
8. I go fishing to catch fish for fiestas/parties		
9. Others, specify...		
10. Don't know		

**49. What is the 1st most important and 2nd most important fish/seafood that you catch/collect now and five years ago?**

Type of catch	Now		5 years ago	
	a. 1st	b. 2nd	c. 1st	d. 2nd
1. Reef fish				
2. Reef invertebrates (octopus, shellfish, crab, etc)				
3. Bottom fish				
4. Pelagic fish				
5. Others, specify...				

**50. Has fishing or seafood collection become easier or more difficult since the last five years, or has there been no change?**

- 1 Fishing has become easier
- 2 No change
- 3 Fishing has become more difficult

51. What do you think is the main reason for this change? Please indicate the 1<sup>st</sup> most and 2<sup>nd</sup> most important reasons.

		a. 1 <sup>st</sup> most important	b. 2 <sup>nd</sup> most important
1.	Because I am more/less efficient		
2.	Because fish availability has changed (quantity and size)		
3.	Because fish species has changed		
4.	Because competition has changed		
5.	Because fishing areas have changed significantly		
6.	Because I use better/worse boats or techniques		
7.	Because I can/can't afford to buy more fishing equipment		
8.	Other, specify...		
9.	Don't know		

52. Please indicate your average yearly expenses on fishing related items.

Cost category	a. Amount (Indonesian Rupiah)	b. Unit [0=per week 1=per month 2=per year]
1. Fuel & oil		
2. Fishing Equipment (e.g. nets, lures, lines and hooks)		
3. Boat rent		
4. Scuba tanks		
5. Lienses		
6. Other, specify...		
7. Don't know		

#### Section 4: Other activities

53. Please indicate in which activities your family participates? Also specify since when you are involved in this activity and how this compares to five years ago.

	a. Involved [0=no, 1=yes]	b. Since when? [year]	c. Average cash income generated [ In IDP/month]	d. Compared to 5 years ago [0-less, 1-more, 2-no change]
1. Tourist boat operations				
2. Tourist boat building				
3. Handicraft manufacturing				
4. Souvenir selling				
5. Dive/snorkel/marine operations				
6. Service (hotel, restaurants)				
7. Farming Staple Foods				
8. Farming Vegetables/coconut				
9. Other Income from non-fish sources, specify _____				

! Note for interviewer: If the respondent expressed to be active in tourism [option 1 to 6], continue to question 54. Otherwise skip questions 54 to 56 !

54 What was the main source of income for your household before you entered these types of activities?

- |   |              |   |                    |
|---|--------------|---|--------------------|
| 1 | Fishing      | 4 | Civil service      |
| 2 | Farming      | 5 | Others, specify... |
| 3 | Construction | 6 | Unemployed         |

55 What was the main reason for your household to enter these types of activities?

- |   |                                    |   |                           |
|---|------------------------------------|---|---------------------------|
| 1 | Original income was insufficient   | 4 | Constant source of income |
| 2 | No prospect in original occupation | 5 | Learn something new       |
| 3 | We had to migrate here             | 6 | Others, specify...        |

56 Has your family's welfare increased since you entered these tyoes of activities?

- |   |                         |   |                         |
|---|-------------------------|---|-------------------------|
| 1 | Decreased substantially | 4 | Increased somewhat      |
| 2 | Decreased somewhat      | 5 | Increased substantially |
| 3 | Remained the same       | 6 | Do not know             |

## Section 5: Marine Environment and Community

57 How often do you encounter people using illegal fishin practices( for example, dynamite, cyanide, fishing in marine reserves, etc.) or find evidence that people have recently used illegal practices in an area? *[Circle only one]*

- |   |              |   |                                        |
|---|--------------|---|----------------------------------------|
| 1 | Regularly    | 3 | Rarely                                 |
| 2 | Occasionally | 4 | Never <i>[skip following question]</i> |

57a How does illegal fishing compare to the situation 5 years ago? *[Circle only one]*

- |   |                          |   |                          |
|---|--------------------------|---|--------------------------|
| 1 | Decreased substaintially | 4 | Increased somewhat       |
| 2 | Decreased somewhat       | 5 | Increased substaintially |
| 3 | Remained the same        | 6 | Don't know               |

58. If you do witness these practices, who are the violators?

- |   |                                                                          |                                                          |
|---|--------------------------------------------------------------------------|----------------------------------------------------------|
| 1 | People from the community                                                |                                                          |
| 2 | People from outside the community, specify from which village/community: | <input style="width: 200px; height: 20px;" type="text"/> |
| 3 | Don't know                                                               |                                                          |

In your opinion, how has the quality of the following components of the marine environment in your area changed during the last 5 years?

		1. Increased	2. Remained stable	3. Decreased	4. Don't know
59.	Live coral abundance				
60.	Fish abundance				
61.	Fish size				
62.	Fish species diversity				
63.	Water quality				

64. Are you or any of your family members involved in a committee on the management of the marine protected area?

- 0 No
- 1 Yes, namely \_\_\_\_\_ [Name committee]



**Statements on the Community:**

Now I would like to read a list of statements on the community. Can you indicate to what extent you agree or disagree with each of these statements?

Compared to 5 years ago...

**(Tick one option for each statement)**

	0 Don't know	1 Disagree	2 Neutral	3 Agree
65. Members of my family are more often taking part in community meetings				
66. Women are more often involved in community meetings				
67. The youth has more voice and opportunities in our communities				
68. The community has become more united				
69. There are more conflicts amongst community members				
70. There are more conflict between neighbouring communities				
71. Support from the government has improved				
72. Support from other organizations has improved				

**NOTE TO INTERVIEWER: If you are interviewing reference communities who are not affected or influenced by a marine protected area, do skip questions 73 to question 88.**

**Statements on the Maqrine Protected Area:**

Could you indicate to what extent you agree or disagree with the following statements on the Marine Protected Area or Reserve and its effect on the community?

**(Tick one option for each statement)**

	0 Don't know	1 Disagree	2 Neutral	3 Agree
73. Destroying the reserve now will cause problems in the future				
74. The protected area has helped my family's income				
75. Since the start of the reserve we are less dependent on fishing only				
76. Fish catch has improved because of the protected area				
77. There are more conflicts amongst community members				
78. My family can influence decisions about the protected area				
79. Decisions by the management of the reserve are well communicated				
80. Access to natural resources has worsened since creation of the reserve				
81. Villagers are responsible to protect the reserve				
82. The reserve has helped us to maintain our culture & traditions				
83. Due to the reserve we feel safer in difficult times (disasters, bad weather)				
84. The reserve has helped to improve infrastructure and services for us				
85. The reserve has led to better access to markets in sell/buy our products				
86. It is good for the future of my family that there is a protected area				

**Thank you for your cooperation!**

---

**87. Any other response by the respondent can be filled out here**

---

**88. Any other relevant observation by the interviewer can be filled here (optional)**

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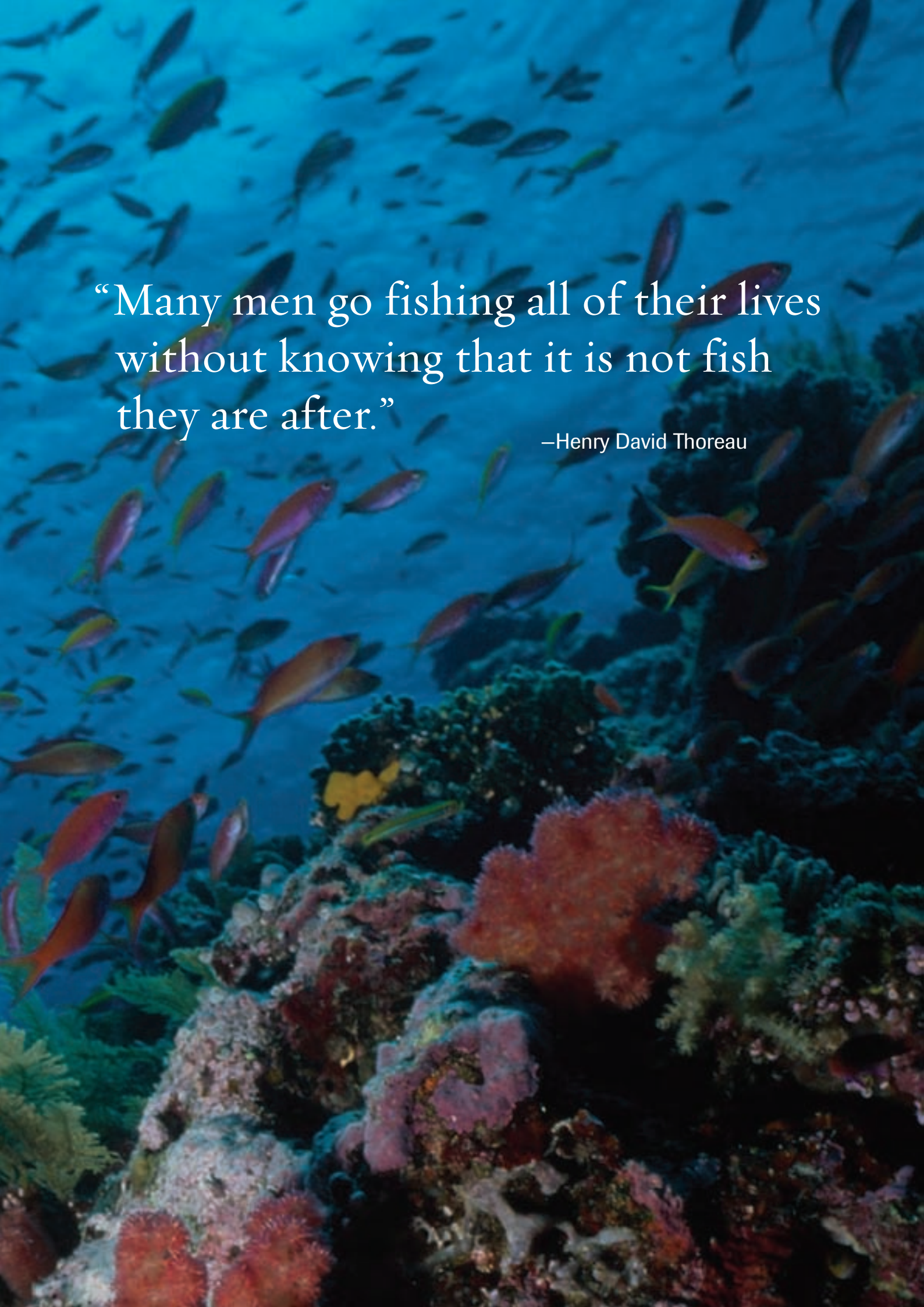
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“Many men go fishing all of their lives  
without knowing that it is not fish  
they are after.”

—Henry David Thoreau

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