Socioeconomic Conditions Along the World's Tropical Coasts: 2008





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Cover: Top row, left to right- 1) Milne Bay, Papua New Guinea. Photo credit: Christy Loper. 2) Fisherman transporting his catch in Honduras. Photo credit: Angelica Ramirez. 3) SocMon interview on Agatti Island, India. Photo credit: Vineeta Hoon. 4) Community celebration in Indonesia. Photo courtesy of Stuart Campbell. 5) Fishing jetty in Dominica. Photo credit: Maria Pena. Bottom photo- Octopus fishing in Andavadoaka, Madagascar. Photo credit: Blue Ventures Conservation

Table of Contents

Gleaning at low tide in India. Photo credit: Vineeta Hoon

Executive Summary

The world's tropical coasts are home to over two billion people, many of whom live in poverty and depend on coastal resources such as coral reef fish for their livelihood, sustenance, and cultural traditions. This report synthesizes data from individual socioeconomic assessments to quantify and qualify regional and global dependence on coral reef resources, perceptions of resource conditions, threats to marine and coastal resources, and support for marine management strategies such as marine protected areas. Data are included from 49 studies, representing close to 14,000 household surveys conducted in hundreds of communities in 27 countries. This information provides evidence of the need to conserve global coral reef resources to ensure food security and contribute to poverty alleviation.

It is clear that declining quality of coral reefs negatively impacts those communities dependent on coral reefs for food, income, and revenue from tourism. However, new coral reef conservation initiatives such as the Micronesia Challenge, the Caribbean Challenge, the Coral Triangle Initiative, and the Indian Ocean Challenge will provide the opportunity to understand better the impacts of developing marine protected areas (MPAs) on livelihoods of people, both positively and negatively. Predominantly MPAs have been shown to bring positive consequences for the livelihoods of local people in the long-term, however it should be recognized that there are often negative impacts on some sectors of the local populations in the short term. These include the loss of access rights to habitual fishing grounds or increased risk of peril of travelling further to access alternative fishing grounds. Socioeconomic monitoring is needed to understand and mitigate negative impacts where needed, such as provision of alternative livelihoods.

There are now six regions throughout the world which are successfully conducting socioeconomic monitoring through the SocMon Initiative: wider Caribbean; Central America; Southeast Asia; Western Indian Ocean; Pacific Islands; and South Asia. In some regions, initiatives other than SocMon have provided the bulk of the socioeconomic monitoring data, such as the Locally Managed Marine Areas (LMMA) network which operates throughout the Pacific and in parts of Southeast Asia. The LMMA network has conducted full socioeconomic monitoring at 49 of their 342 sites. This study represents the first regional and global synthesis of SocMon data. Major findings herein include:

In the Caribbean, communities are significantly dependent on fishing; however, SocMon data indicate that tourism is rapidly changing local communities. Tourism is heavily dependent on healthy coral reefs, and is replacing fishing as the most important source of income for many communities and is seen as a viable alternative livelihood to fishing. Most communities welcome tourism development for revenue generation; however, many communities are also expressing concern over the negative impacts of tourism on their way of life.

In Central America, as with the Caribbean region, tourism is surpassing fishing as the main livelihood of many coastal communities. Based on SocMon data from 16 sites, reef-related dependence on average exceeds 50% of households in the coastal communities surveyed. Perceived threats to marine resources are very much linked to income-generating activities, including fishing, tourism development, agriculture and development of new industry and infrastructure. Support for and awareness of MPAs is generally low in Central America.

In the Pacific, LMMA data from 29 villages in Fiji indicate that most households in each village harvest marine resources on a small-scale for subsistence and to sell some excess. Commercial fishers comprise only a small portion of each village. The major threats to fishing grounds as noted from village management plans include over-fishing (resulting in the rare to non sighting of certain fish and invertebrates), solid waste washing into the sea or along the coast, sedimentation from logging and forest clearing, and nutrient loading from poor farming practices. Poaching in MPAs is also a problem, indicating the need for greater commitment to and logistics for the enforcement of MPA regulations.

In South Aisa, SocMon Guidelines were recently published in October 2008; therefore, limited SocMon data is available and is based on demonstration sites. Data from these sites indicate a strong dependence on fishery resources, particularly as a source of protein for coastal households living below the national poverty line. SocMon data has been used most often to support development of new community-based MPAs and to reduce tourist impacts on fragile coastal areas. To date, SocMon assessments have been undertaken by local NGOs; a stronger partnership between government and NGOs is recommended to ensure use of SocMon data for future sites.

In Southeast Asia, more than half of the local communities surveyed are heavily dependent on fishing as their primary source of income, underscoring the need for healthy coral reefs and associated fisheries. Destructive fishing methods such as cyanide and dynamite fishing are perceived as the most prevalent threats to the health of coral reefs and fisheries in the region. This perception indicates that efforts to eradicate these destructive fishing methods, shown to be effective in some regions based on anecdotal evidence, should be increased to ensure food security and sustainable livelihoods for all coral reef dependent communities.

In the Western Indian Ocean, SocMon data indicate a strong dependence on fishing by coastal communities. This dependence is particularly high for remote sites with limited access to infrastructure. Overall, evidence from the sites indicate that resource conditions are worsening in the Western Indian Ocean region, particularly with respect to fishery resources. The most commonly perceived threat to coastal and fishery resources in the Western Indian Ocean is illegal fishing, such as poaching in MPAs, and lack of enforcement. For sites with MPAs, satisfaction with MPAs is generally much lower than in other regions and MPAs are not perceived to have improved fishery resources, which may be due to a lack of compliance with and enforcement of MPA regulations, limiting the effectiveness of MPAs in sustaining fishery resources.

Fishermen hauling a beach seine at Gouyave, Grenada. Photo credit: Patrick McConney

Introduction

The world's coral reefs provide sustenance and resources to a wide range of coastal populations that depend on fishing and tourism for their livelihoods. Preserving this source of livelihoods to alleviate poverty through the protection of biodiversity is becoming recognized as a primary goal for world governments along with the conservation goal of protecting biodiversity. One of the primary tools for achieving conservation with resource use is the marine protected area (MPA), which will usually restrict access to fishing. To assess their impacts on the resources and resource users, and to assess the effectiveness of the MPAs themselves, countries require information on the state of the environment, on the nature and extent to which resources are being used, and on the well being and standard of living of dependent coastal populations. This information is likewise needed to assess the effectiveness of the MPAs themselves. Biological and resource monitoring are fairly well established through Reef Check, the Global Coral Reef Monitoring Network (GCRMN), and national monitoring programs. However, socioeconomic information that is relevant for coastal planning and management has been either lacking or very limited. Moreover, no consistent information has been available to inform local responses to livelihood changes due to loss of corals from factors such as climate change, or to assess the impacts or effectiveness of management responses such as MPAs, or even regional and national level policy responses.

The Global Socioeconomic Monitoring Initiative for Coastal Management (SocMon) works through regional and local partners to facilitate community-based socioeconomic monitoring. It is clear that declining quality of coral reefs

negatively impacts those communities dependent on coral reefs for food, income, and revenue from tourism and fisheries. However, with new coral reef conservation initiatives such as the Micronesia Challenge, the Caribbean Challenge, the Coral Triangle Initiative, and the South Asian Coral Reef Task Force, we need now more than ever to understand the impacts of MPAs on livelihoods- both in positive and negative ways. Overall and in the long term, MPAs have been shown to positively impact livelihoods. It should be recognized, however, that negative impacts are incurred by portions of local populations in the short term due to loss of their traditional fishing grounds or increased risk of peril from travelling further from one's village to access legal fishing grounds. Socioeconomic monitoring is needed to understand these impacts and mitigate negative impacts where needed, such as provision of alternative or supplemental livelihoods.

Since 2003, socioeconomic monitoring in the world's coral reef areas through the Global Socioeconomic Monitoring Initiative has increased exponentially. A number of chronological events precipitated this increase.

- 2000- publication of the GCRMN Socioeconomic Manual for Coral Reef Management (Bunce, Townsley, Pomeroy, Pollnac 2000)
- 2002- formation of the Global Socioeconomic Monitoring Initiative for Coastal Management (SocMon), which serves as the socioeconomic monitoring arm of the GCRMN
- 2003- publication of SocMon Regional Guidelines for the Caribbean and Southeast Asia (Bunce and Pomeroy 2003), initiation of NOAA International Coral Grants for Socioeconomic Monitoring
- 2004- translation of the Caribbean Guidelines into Spanish, translation of the Southeast Asia Guidelines into Tagalog and Vietnamese
- 2006- publication of the Western Indian Ocean SocMon Guidelines, translation into French, Kiswahili, and Portuguese
- 2008- publication of SEM-Pasifika (SocMon Pacific) Guidelines and SocMon South Asia Guidelines

As a result, there are currently six regions throughout the world that are successfully conducting socioeconomic monitoring through the SocMon Initiative: Caribbean, Central America, Southeast Asia, Western Indian Ocean, Pacific Islands, and South Asia. In certain regions, initiatives other than SocMon have provided the bulk of the socioeconomic monitoring, such as the LMMA network, which is operational in the Pacific and parts of Southeast Asia. Full socioeconomic monitoring has occurred at 49 of the 342 LMMA sites.

This report synthesizes individual MPA site assessments to determine regional and global awareness of people's dependence on marine resources, perceptions of resource conditions, threats to marine resources, use levels, and status of governance around the world. It provides access to existing data from 49 studies sites throughout the world. This information can be used to (1) better inform management decisions about MPAs, including communication with stakeholders, and (2) form a baseline for current socioeconomic conditions of MPAs and coral reef areas—future changes would be measured from this baseline. This information has never been synthesized before. As such, this report fills a critical need by advancing a global and regional understanding of human interactions with and dependence on coastal resources.

SocMon interview with fishermen on Indian coast. Photo credit: Vineeta Hoon

Methodology

Data used in this report was extracted from 49 SocMon and other socioeconomic assessments, listed in Table 1 and shown spatially in each regional chapter. Each of these reports cover varying geographic scales, ranging from single site studies conducted at small villages to national scale studies. Sample sizes for these studies ranged from 26 to 2742 household surveys per study, with each study encompassing between one and 42 local communities. SocMon studies are often— but not necessarily— conducted in coral reef areas. Some studies, for example, focused on areas dominated by mangroves or seagrasses.

In order to develop this study, site reports were obtained through the SocMon regional coordinators and through direct contact with study authors. Data—both quantitative and qualitative— were extracted from all of the SocMon reports to date and fed into a series of Excel spreadsheets. Where possible, these data were aggregated at the regional level; however, differences in indicators used by various sites limited the number of indicators that could quantitatively be compared to: occupation, perceptions of resource conditions and greatest threats, and support for marine protected areas. Additional studies using methods similar to SocMon were sought, including several studies using the "How is Your MPA Doing?" methodology for assessing the management effectiveness of MPAs, which includes a series of socioeconomic indicators. The LMMA Network, operational in the Pacific region, provided data from the 29 Fiji LMMA sites as well. In addition

to quantitative data, qualitative information was analyzed to determine motivations for conducting socioeconomic assessments, report conclusions and recommendations for management. Because reports often do not capture whether or not recommendations for management have been followed and have influenced management decisions, a survey of former SocMon principal investigators was created and circulated. Information from these surveys is also included in this study.

Limitations of this study:

The SocMon process, by its nature designed for local communities, reduces the opportunity for aggregation of standardized data at the national, regional, or global scale. In undertaking a SocMon assessment, a community will go through a series of eight steps, each of which limits the standardization of data and regional or global analysis:

1. Goals and objectives are defined- because SocMon is a flexible tool meant to be adapted for use at each site, each site has its own goals and objectives that are defined at the beginning of the SocMon process. These goals and objectives drive the selection of indicators for the SocMon process.

2. Sample frame and/or sampling design is defined- which may be different depending on site goals and objectives. The sample frame could include local residents, fishermen, tourists, or recreational users and surveys conducted with different groups of people may not be comparable, even when information on the same indicators is collected.

3. Survey is developed- questions are developed that will resonate with the local community and these questions are designed differently for different sites based on local colloquialisms, education level of the local community.

4. Data are collected- while the data provide information on the main issues concerning each site differences in sampling and tools used make quantitative comparisons difficult. Rarely is a statistically representative sample achieved in a SocMon study and aggregating data that is not statistically representative at the regional or global level does not yield defensible data for truly assessing socioeconomic conditions.

5. Data are analyzed- Lags exist in the data being analyzed due to limited capacity and training in statistical analysis and qualitative data analysis at the site or community level.

6. Data are written into a report- Since there is no required template for written reports, differences in reporting of the assessments can make aggregation difficult. Then, differences exist in the time and comprehensiveness of providing reports to regional and global coordinators.

7. Reports are provided to regional and global coordinators- In survey development, different indicators are selected and questions for the same indicator can be asked in different ways and with different answer choices that reduce the comparability of studies. In some cases, reports are not provided in English, which makes regional aggregation difficult.

8. Results are used in adaptive management- The final step in the process is use of results for adaptive management. Since reporting of the results usually happens right after data analysis, use of results for management is not usually included in the reports. Hence, this piece of the story is often missing in the documents.

Table 1: Studies used in this report[1]

Region	Country	Site	Institution	Year
CARIBBEAN	Anguilla	Shoal Bay and Island Harbour	Anguilla National Trust/Anguilla DFMR	2007
	Antigua	Cades Bay Marine Reserve	Antigua and Barbuda Fisheries Division	2007
	Grenada	Carriacou, Sandy Island	Carriacou Environmental Committee	2007
	Grenadine Islands	Seven islands (see map)	University of the West Indies	2007
	Jamaica	Negril Marine Park	UWI, Negril Coral Reef Preservation Society	2005
	Jamaica	Montego Bay	Jamaica NEPA/Montego Bay Marine Park Trust	2007
	Puerto Rico	La Parguera	University of Puerto Rico	
	St. Lucia	Soufriere Marine Management Area	Soufriere Marine Management Association	2007
	Tobago	Speyside	University of the West Indies	2005
CENTRAL AMERICA	Belize	Hopkins, Monkey River, Placencia	University of the West Indies	2003
	Belize	Glover's Reef Atoll	Wildlife Conservation Society	2005
	Belize	Placencia, San Pedro, Port Loyola	University of Zamorano	2008
	Colombia	San Andres Islands	Coralina	____
	Colombia	Corales del Rosario, San Bernardo	INVEMAR	____
	Guatemala	Punta Manabique	Fundary	____
	Honduras	St. Helena	Coral Cay Conservation	2007
	Honduras	Cayos Cochinos	Foundation Cayos Cochinos	____
	Honduras	Parque Jeanette Kawas	Prolansate	____
	Honduras	Cuero y Salado	Fusca	____
	Mexico	Xcalak	CONAMP/ Amigos de Manati	
	Mexico	Sian Ka'an Biosphere Reserve	Ileana Solares, Sian Ka an Biosphere Reserve	____
	Mexico	Quintana Roo	U'yo ol Che	____
	Nicaragua	Corn Island	URACCAN (Atlantic Region University)	____

[1] Citations for each of these studies can be found in the Reference section on page 49.

Region	Country	Site	Institution	Year
SOUTHEAST ASIA	Indonesia	Komodo & Wakatobi National Parks; Raja Ampat and Derawan Districts	TNC - SEA Center for MPAs	2006
	Indonesia	Bunaken National Park	World Wildlife Fund -US	2006
	Indonesia	South Sulawesi	Bogor Agricultural University	2007
	Indonesia	Karimunjawa National Park	Wildlife Conservation Society	2006
	Indonesia	Seribu Islands	Terangi: The Indonesian Coral Reef Foundation	
	Philippines	Cebu, Philippines	Coastal Dynamics Foundation	2008
	Philippines	Mactan and Olango Islands	Coastal Dynamics Foundation	2004
	Philippines	Palaui Island and Puerto Galera	MERF, Inc./Dept. of Env. and Natural Resources	2006
	Thailand	Andaman Sea MPAs	UNESCO - Bangkok	2005
	Vietnam	Tuan Chau, Hung Thang	Ministry of Fisheries/IUCN-Vietnam.	2003
SOUTH ASIA	India	Mahatma Gandhi Nat'l Park	Andaman and Nicobar Environmental Team	2002
	India	Agatti Island, Lakshadweep	CARESS	2002
	India	Gulf of Mannar	Indian Coral Reef Monitoring Network	2002
	Maldives	Vaavu Atoll	Ministry of Fisheries, Ag., and Marine Res.	2003
	Sri Lanka	Bar Reef		2002
WESTERN INDIAN OCEAN	Comoros	Grande Comore	Community Centered Conservation (C3)	2008
	Kenya	Tana Delta	Kenya Wildlife Services/Kenya Marine Forum	____
	Kenya	Diani-Chale	CORDIO East Africa	____
	Kenya	Msambweni	Kenya Fisheries Department	____
	Kenya/Tanzania	Shimoni/Tanga transboundary	Kenya Marine Forum/TCZCDP	____
	Madagascar	Andavadoaka	Blue Ventures/Wildlife Conservation Society	2008
	Mauritius	Riviere Banane, Rodriques	Shoals Rodrigues	2008
	Mozambique	Quirimbas Marine National Park	WWF- Mozambique	2008
	Tanzania	Tanga	TCZCDP	2008
	Tanzania	Rumaki Seascape	WWF- Tanzania	2006
	Tanzania	Mnazi Bay-Ruvuma Estuary	Tanzania Marine Parks Unit	2004

Size of fish preferred by consumers in Negril, Jamaica. Photo credit: Patrick McConney

Caribbean

The insular Caribbean region includes all of the island Caribbean nations bordering on the Caribbean Sea, including all of the Greater and Lesser Antilles. The region's 37.5 million people inhabit 13 sovereign states and 16 overseas-dependent territories of the US or European Union. A majority of the region's residents speak English with a number of exceptions, including Spanish (Cuba, Puerto Rico, Dominican Republic and others), French (Guadeloupe, Martinique, and Haiti), and Dutch (Aruba and the Netherlands Antilles).

Of the six SocMon regions, the insular Caribbean has the highest standard of living and gross domestic product (GDP) per capita (Whittingham et al. 2003).

Where has socioeconomic monitoring occurred?

In the insular Caribbean, socioeconomic monitoring has occurred in nine sites, as shown in Figure 1. Additional monitoring is underway at 11 sites, shown on the map but not part of the analysis used in this report. Over 1050 households have been surveyed in dozens of communities in eight Caribbean countries. SocMon in the Insular Caribbean is coordinated by the Centre for Resource Management and Environmental Studies (CERMES) at the University of the West Indies, located in Barbados. CERMES has successfully carried out a number of projects and has also been successful in teaching the SocMon methodology to

graduate students who have then worked with local communities to complete SocMon assessments as part of their graduate work.

What issues have commonly motivated socioeconomic monitoring?

As shown in Table 2, an assessment of the motivating reasons for conducting SocMon assessments in the region indicates that sites conduct monitoring in order to collect baseline data against which to measure future changes. Almost half of the sites indicated that measuring impacts of MPAs on livelihoods and assessing perceptions of MPAs were also very important. Additionally, a number of sites undertook a socioeconomic assessment to determine current awareness levels of MPAs and other regulations on marine resources in order to design targeted communication strategies. Other reasons include gaining an understanding of the management capacity of stakeholders, informing management plan development or review, assessing perceptions of resources, and assessing use patterns.

Aerial view of Fisheries SocMon study area, Rose Place, St. Vincent. Photo credit: Maria Pena

What common trends are we seeing in socioeconomic factors?

% of residents dependent on fishing

Only two of the nine communities surveyed provided data on fishing as an occupation; these two estimates were on opposite ends of the spectrum in terms of fishing dependence- from 5% in Grenada to 76% in Negril, Jamaica. This figure cannot be extrapolated to all coastal communities of the Caribbean due to the small sample size.

Figure 1: Caribbean Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

Table 2: Common objectives of SocMon Caribbean studies

Study	understand management capacity of stakeholders	inform management plan development or review	assess perceptions of resource	assess use patterns	determine awareness levels/design communication strategy	assess impacts of MPA on livelihoods & resource users	assess perceptions of MPA	baseline study
Anguilla	◆			◆	◆		◆	
Grenadines								
St. Lucia							◆	◆
Grenada				◆	◆			◆
Antigua		◆			◆	◆	◆	◆
Jamaica	◆	◆	◆	◆				
Jamaica								
Puerto Rico								
Tobago			◆		◆		◆	
FREQUENCY	2	2	1	3	3	1	3	3

% of residents involved in tourism industry

Many of the studies provided evidence of the local communities being very dependent on tourism for income; however few studies provided data on tourism dependence. This is because occupational data does not lend itself to clear dependence on tourism. There are some data available at the regional and national level on tourism as a percentage of GDP. During 1999, travel and tourism accounted for 43% of regional GDP. The industry's contribution to national economies ranged from a high of 69% in St. Lucia to a low of 13% for Trinidad and Tobago. SocMon data from Anguilla indicate that residents feel the current level of tourism is too high (63% of respondents who answered question) as compared to those who feel the level of tourism is appropriate (21%) or too low (16%)

Perceptions of resource conditions

A majority of respondents surveyed (71%) indicated that resource conditions such as coral reefs and fisheries are in poor condition and/or have degraded over the past several years; however, this question was only asked in three of the nine studies.

Support for marine protected areas

SocMon studies are often conducted prior to establishment of MPAs to determine support for various marine conservation strategies. SocMon is also undertaken to determine a baseline for perceptions of resource conditions, as well as after MPA establishment to measure impacts on livelihoods and resource conditions.

Evidence from La Parguera, Puerto Rico suggests that fishermen are polarized about MPAs. Respondents recognized and agreed with the benefits of MPAs, with over 75% of respondents agreeing or strongly agreeing that MPAs protect spawning aggregations, restores habitat quality, and increase the abundance of fish both inside and outside the MPA. However, almost half of respondents indicated that MPAs create problems for communities and less than 30% agree that MPAs create investment or employment opportunities.

How has socioeconomic information been used for management?

In general, socioeconomic monitoring undertaken in the Caribbean has provided baseline data on social, economic, cultural

Table 3: Common Recommendations from SocMon Caribbean Studies

Study	develop management plans	increase surveillance and enforcement	changes to MPA designation or boundary	establish co-management scheme	form community-based organization	strengthen legal institution, including penalties for illegal fishing	repeat survey in 5-10 years to measure changes	fishermen need alternative livelihood & training programs	involve community more in decision making	more education and awareness
Anguilla			◆						◆	◆
Grenadines								◆	◆	◆
St. Lucia							◆			◆
Grenada										
Antigua	◆				◆	◆	◆		◆	◆
Jamaica	◆			◆	◆			◆	◆	◆
Jamaica										◆
Puerto Rico										
Tobago							◆			◆
FREQUENCY	2		1	1	2	1	2	2	4	6

and political characteristics of communities. As shown in Table 3, most studies have recommended increase roles for stakeholders in decision making and increasing education and outreach programs—common recommendations from coastal management projects.

With the exception of the use of socioeconomic data collected during monitoring at the Negril Marine Park (NMP) in Jamaica, to address the information needs for the first Fisheries Management Plan (FMP) for the NMP (Blackman 2005), there has been little feedback as to how SocMon data has been used to inform or adapt management in the other SocMon study areas. Whether this reflects a deficiency in follow-up or whether monitoring was not sustainable in the first place is debatable. Most likely, not enough time has passed since completion of the studies for true follow-up, since the bulk of the studies were completed in 2007. Due to the lack of fully functional integrated coastal management decision-making mechanisms in the SocMon study areas, it is not clear if or how the socioeconomic information will be used in coastal management in the Caribbean region. Further follow-up is recommended.

Fishers mending nets in a Dominica west coast fishing village. Photo credit: Maria Pena

Regional Summary

In the Caribbean, communities have traditionally been dependent on fishing for livelihoods; however, SocMon data indicate that tourism is rapidly changing the face of local communities. Tourism—heavily dependent on health coral reefs—is replacing fishing as the most important source of income for many communities and is seen as a viable alternative livelihood to fishing. Most communities welcome tourism development for revenue generation; however, many communities are also expressing concern over the negative impacts of tourism on their way of life.

Case study: Use of socioeconomic data in Negril Marine Park Fisheries Management Plan

by Patrick McConney and Maria Pena, University of the West Indies

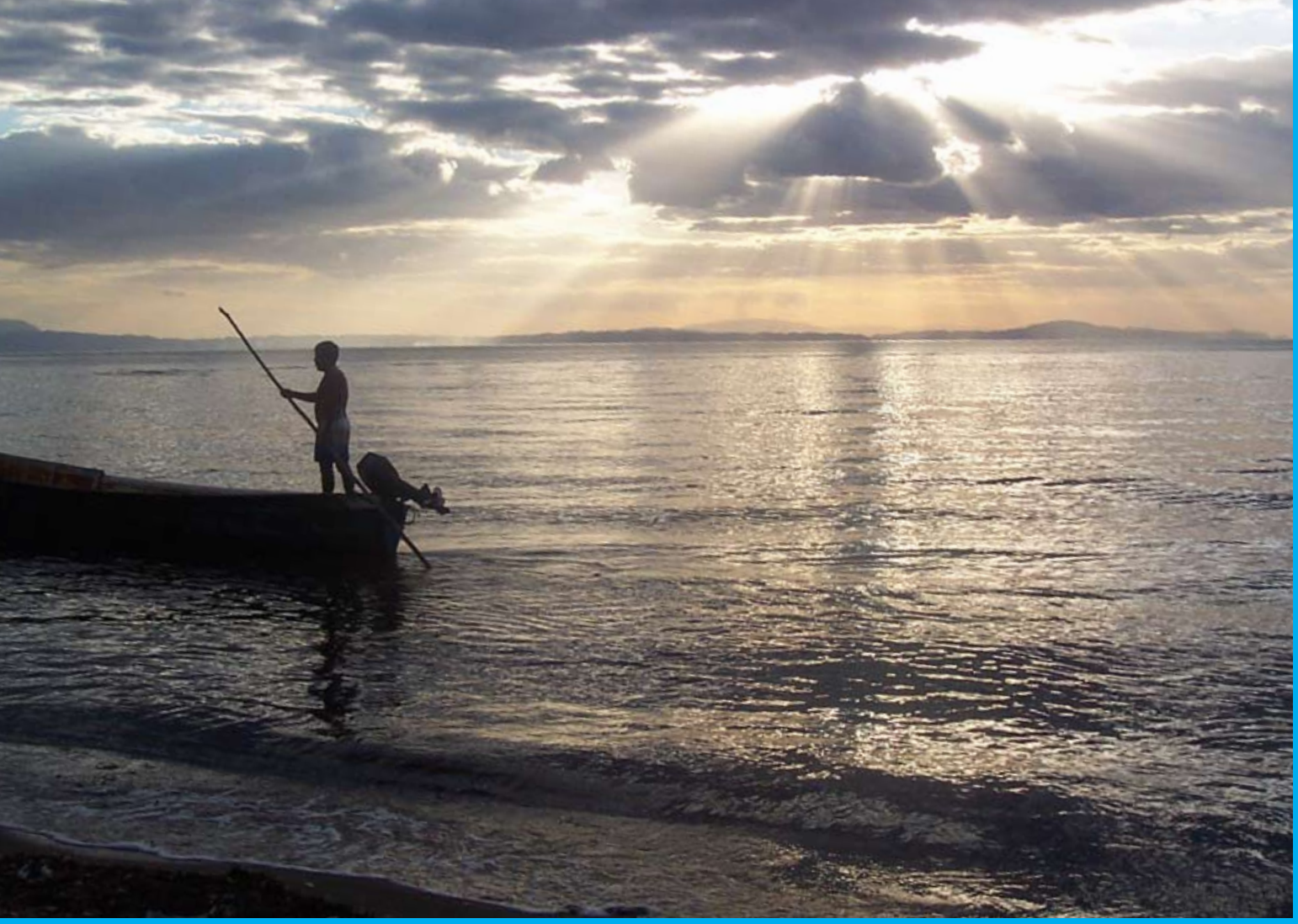
Negril fishers meeting.
Photo credit: Patrick McConney

World renowned for its long white sand beaches, Negril is a resort town located at the western end of Jamaica. Negril's natural resources have been degraded mainly due to the rapid and expansive development of the tourist industry without adequate strategies and/or mitigating measures to protect its resources. From 2004-6, the Negril Coral Reef Preservation Society and the University of the West Indies conducted a SocMon study in the Negril Marine Park (NMP) (including a survey of 88 households in ten settlements in and bordering the NMP) to incorporate socioeconomic information into the first fisheries management plan for the Park.

Over 75% of survey respondents were fishers with no secondary income. The surveys showed that local knowledge of the resource condition is consistent with scientific evidence which documents deterioration of coastal and marine resources. However, although communities have recognized that there have been declines in fishery resources, a majority of respondents indicated the amount of fishing within the Park was 'just right.' This perception implies that the harvesting of the fishery resources is still within the sustainable levels.

As fishing is the mainstay of community livelihoods adjacent to the NMP, full and part-time fisher families from communities in and around the NMP may be affected by possible restrictions on fishing with the implementation of the Fisheries Management Plan. Displacement of these fishers (who represent the poorest fishermen in Negril) due to management regulations will have a significant impact on their income generation capabilities. In terms of alternative income generation strategies, 23% of respondents would like to engage in tourism-related activities; however 39% had no other alternative income generation opportunities. The barrier to this alternative income is mainly financial reasons (60%). Most of the respondents (88.2%) were not involved in training for alternative or supplemental occupations. Some 35% believe that training is not necessary, while 25% said no opportunity existed for them and 13% noted that age constraints prohibited them from participating in job training. Specifically, new strategies must be developed to deal with the older fishers. Emphasis should be placed on educating them on sustainable fishing practices and introducing the concept of complimentary livelihoods.

The study identified opportunities for increased roles of fishermen in continued co-management of the NMP. Information on education, perceptions of resource status, management responsibility and participation, communication, interactions between fisheries and tourism and among fishers, income sources and livelihood strategies was incorporated into the NMP Fisheries Management Plan. The study also recommended that order to be effective, approaches to public education should be carefully chosen or designed to cater to both the literate and illiterate members of these communities. This recommendation is crucial given that the majority of respondents have only a primary level of formal education. Participation may be encouraged through several methods such as regular community meetings at appropriate venues for the fishing community, community liaisons, developing community outreach programs to raise the awareness and enhance the public's participation and developing stable organizations for stakeholders in the harvest sector (e.g. charter boat fishers) and those within the post-harvest sector (e.g. restaurant owners, seafood outlets).



Fishing at sunset in Honduras. Photo credit: Angelica Ramirez

Central America

Within Central America, Mexico, Belize Guatemala and Honduras are the four countries that border the Mesoamerican Barrier Reef System (MBRS). The coastal zone of the MBRS contains mainland reef formations, mangroves, wetlands, sea grass and cays. It plays an important role in the economies of the four countries. Sites in Nicaragua and Colombia are also included in the SocMon Central America region. During the last decades, Central America has suffered huge human impact, largely driven by the increasing population and proportion of people living in the zone. The impact includes overfishing, sedimentation and pollution, which have resulted in a decrease of coral cover. The increasing tourist sector also provides an over-arching stress to marine resources since most tourists spend time in the coastal zone. These impacts represent substantial threats to the ecological balance and health of reef ecosystems which, if left unrestrained, will ultimately lead to reduced income for coastal communities and other stakeholders relying on fishing and marine-based tourism.

Where has socioeconomic monitoring occurred?

Fourteen SocMon and/or management effectiveness assessments have been carried out in Central America in Belize, Honduras, Guatemala, Nicaragua, Colombia, and Mexico. The implementation of the SocMon methodology is done directly by local partnerships at the sites and is coordinated through the University of Zamorano in Honduras. Most partner organizations who have participated to date (listed in Table 1) are local NGOs who are co-managers of the marine protected areas. They depend on international funding for the execution of management plans; normally they do not receive financial support from their governments.

What issues have commonly motivated socioeconomic monitoring?

The selected partner organizations have as their principal goal the management and conservation of the protected areas. Monitoring and evaluation efforts have focused on "traditional" biological and marine related topics such as biodiversity, water quality and habitat extent; socioeconomic monitoring has not been a major focus. However, the changes during the last decades in the coastal zones of Central America, and the institutional complexity of the sites, has forced the management organizations to include more information on the communities in or nearby the protected areas, and also engage in more participatory management.

In Honduras, Guatemala, and Mexico, the SocMon methodology was seen as an important tool to stimulate a more effective community-based management of the area. The participatory approach of SocMon involves community cooperation in all stages of the research and is a useful tool to support this process. In the case of Belize, the SocMon methodology was applied to set up a socioeconomic baseline for a new project executed by WWF on climate change. The SocMon approach was adjusted to include questions about the adaptive management capacity of the coastal communities to climate changes. Other studies used in this region have focused on assessing management effectiveness of MPAs.

Child plays on a debris-strewn beach in Guatemala.
Photo credit: Angelica Ramirez

In all cases, SocMon was used to integrate marine conservation and development by engaging stakeholders in developing management strategies as a means of integrating communities for the resource management problem, raising awareness of the development consequences and generating support for decision making. SocMon has resulted as an interesting approach to stimulate and reinforce social institutions at the local level and possible collective action.

Figure 2 : Central America Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

Table 4: Common motivating factors for SocMon Central America studies

Study	understand management capacity of stakeholders	inform management plan development or review	assess perceptions of resource	assess use patterns	determine awareness levels/design communication strategy	assess impacts of MPA on livelihoods & resource users	assess perceptions of MPA	baseline study
Belize								◆
Belize			◆	◆		◆	◆	
Belize		◆				◆	◆	
Belize					◆	◆	◆	◆
Honduras								
Mexico			◆			◆		◆
Mexico								
Colombia			◆		◆	◆		◆
FREQUENCY		1	3	1	2	5	3	4

What common trends are we seeing in socioeconomic factors?

Because SocMon has been applied in six different countries, it is not easy to generate general conclusions about the socioeconomic and demographic trends in the coastal zone of Central America. The utilization of the coastal-marine resources has been traditionally the principal livelihood of communities located in the coastal zones. These resources have over time become increasingly important within the framework of sustainable development, since fishing and tourism have become a focus of the coastal zone. The poorly planned marine exploitation over the years and the increasing development of the tourist industry has caused damages that have affected the sustainability of the ecosystems; the degradation and reduction of the resources upon which the people of the coastal zone depend.

The majority of the coastal communities find themselves in a transition period between fishing and tourism. The occupations have changed significantly since the 1980's when the form of protecting the natural resources led to the creation of protected areas with their management model of shared responsibilities between non-government organizations, the government as well as the local communities.

The creation of protected areas, through the application of restrictions to protect the natural resources, started a change in occupation of the populous from fishing to tourism. Presently, 30 to 40% of coastal residents are dedicated to fishing, and 60 to 70% live from an income obtained as a result of the good conditions of tourism industry and its derivative services. The artisan fishermen migrate to zones with well-developed tourist industries to improve their income by supplying the local demand for marine products and offering tourist services such as tour guiding.

Infrastructure development has been very intense in the past few years, and, in general, it has not considered the social nor environmental costs; that is to say, without respecting the local culture, with scant interest in the development of the local communities and at the cost of destroying the natural resources.

% of residents dependent on fishing

Nine of the 16 communities surveyed provided data on fishing as an occupation, representing 1318 household surveys in Honduras, Guatemala, and Belize. A meta-analysis of the data suggest that 29% of those surveyed are dependent on fishing as their main income. This figure cannot be extrapolated to all coastal communities of the Central America due to the small sample size.

Table 5: Major perceived threats to marine resources in Central America region

Threat[2]	# of studies listed (n= 14)	Average % of respondents listing threat
illegal fishing/lack of enforcement	6	26%
overfishing	6	12%
tourism	6	7%
coastal development/construction	6	7%
weather/climate	4	21%
pollution	4	15%
others (including agriculture)	4	14%
lack of info/awareness	1	12%
dredging	1	12%
overpopulation/crowding	1	6%

% of residents involved in tourism industry

The creation of protected areas, through the application of restrictions to protect the natural resources, started a change in occupation of the populous from fishing to tourism. The artisan fishermen migrate to zones with well-developed tourist industries to improve their income by supplying the local demand for marine products and offering tourist services such as tour guides, boat trips, scuba diving, etc.

Seven of the 16 communities surveyed provided data on tourism-related activities as an occupation, representing 885 household surveys in Honduras, Guatemala, and Belize. A meta-analysis of the data suggest that 25% of those surveyed are dependent on tourism-related activities as a major source of income. This figure cannot be extrapolated to all coastal communities of the Central America due to the small sample size

Perceptions of resource conditions

Over half of the studies for Central America asked respondents about perceptions of marine resource conditions. About one quarter respondents reported negative perceptions regarding the current state of the coastal environment; however, a majority (69%) reported that marine resources have been disappearing in recent years.

Fishermen preparing their catch for sale in Honduras.
Photo credit: Angelica Ramirez

Perceived threats to marine resources

In Central America, perceived threats to marine resources are very much linked to income-generating activities, including fishing, tourism development, agriculture, and development of new industry and infrastructure. Unlike in Southeast Asia, no destructive fishing practices (e.g. cyanide or dynamite fishing) were mentioned in any of the surveys. Climate change and or hurricanes/weather were mentioned in four studies, an increase over the other regions.

How has socioeconomic information been used for management?

The information obtained through socioeconomic monitoring of the coastal communities serves as a

[2] It is difficult to know how reflective these threats are of local conditions since in some studies this issue was addressed by close-ended questions in which fixed choices were provided. Inclusion of such fixed choices (responses), although simplifying data analysis, can bias respondents towards those threats provided in the questionnaire.

Case Study: Tourism changing way of life in coastal community of Belize

by Arie Sanders and Sara Brune, University of Zamorano

Picturesque beach in Placencia, Belize.
Photo credit: Sara Brune

As a result of its rich natural resources and a relatively small population, (approximately 370,000 inhabitants), the socioeconomic conditions in Belize are much better than in neighboring countries. Belize's economy was traditionally based on agriculture, logging and fishing. Due to increased tourism, there has been a significant change in occupations since the 1980s from fishing to tourism. Many older fishermen, however, still practice traditional fishing and, in general, fill the needs of the local market. Placencia is a tourism-dependent coastal community enjoying high levels of community participation and strong interest in coastal management.

Driven by increased tourism, intense infrastructure development (particularly large hotels) has caused the destruction of natural resources over the past two decades. Much of this development does not respect environmental norms and requirements, and little interest in community development. The local community perceives a loss of control over their territory. Most properties that line the beach are foreign-owned and it is nearly impossible for locals to buy land because the prices are geared towards the foreign market.

In Placencia, the tourism increase, although in many ways positive, is viewed negatively by the local population because of the degradation of the marine resources for which they depend. The income from tourism is seasonal, about USD500-1200, and is above the average for the countries within the region, but this does not signify that they have a better standard of living because the cost of living is much higher. Seventy-six percent of the people in Placencia feel that their life is endangered by the lost of the natural resources in the region. The perceptions in terms of the management organizations are likewise not very positive. The fishermen perceive that the protected areas are only for the benefit of the tourism industry. For this reason many of them consider that their condition of life has not bettered much as a result of the management organization and on the contrary they had been affected negatively.

In conclusion, infrastructure development has not taken into account social or environmental concerns. Weighing the diverse efforts that Belize has carried out to try to promote an integrated management of land use activities and the conservation of the coral reefs, integrated management has been stymied by weak enforcement with respect to development activities. MPAs do not include within their management plan activities taking place on land. However, Placencia's strong local capacities, high awareness of the importance of the natural resources and high educational level present an opportunity to better integrate management activities. But it is necessary that the MPA co-managers involve, to a greater degree, the community in the management of the local resources.

Table 6: Common management recommendations from SocMon Central America studies

Study	develop management plans	increase surveillance and enforcement	changes to MPA designation or boundary	establish co-management scheme	form community-based organization	strengthen legal institution, including penalties for illegal fishing	repeat survey in 5-10 years to measure changes	fishermen need alternative livelihood & training programs	involve community more in decision making	more education and awareness
Belize (Placencia)							◆	◆	◆	◆
Belize (Port Honduras)								◆	◆	◆
Belize (Glovers)		◆	◆			◆		◆	◆	◆
Colombia (San Bernardo)		◆				◆	◆	◆	◆	◆
Honduras (Helene)				◆				◆	◆	◆
Mexico (Sian Ka'an)								◆	◆	◆
FREQUENCY	0	2	1	1	0	2	2	6	6	6

baseline for marine and coastal resource managers to improve the interaction with the communities that are the beneficiaries of the natural resources. This information sheds light on the conditions that either inhibit or facilitate the community participation in the management and conservation of coastal resources. Although most SocMon Central America studies were conducted relatively recently and little time has passed to implement management recommendations, ideally SocMon data are used to focus resource management on sustainable livelihoods and management policies that permit the availability of the coastal resources in the long term. This information should be used to involve the interested actors to create proposals that serve as alternative solutions to the problems encountered in the management of the management of marine and coastal resources.

Regional Summary

Although resource availability has been diminishing and the majority of the population recognizes that destruction of coastal and marine resources has endangered their quality of life, most respondents indicated that there exist too many restrictions on use of coastal resources. Additional issues include the lack of sustainable alternative livelihoods.

Some local populations are concerned that conservation activities and tourism should be received benefit only specific community members; that is to say, those people that have the necessary assets to provide tourist services or those that are most involved in the institutions in charge of the protection of the natural resources. For this reason the successful development of management plans for the marine and coastal zones of the region must include monitoring and evaluation processes over the actions or activities that are developed.

To ensure sustainability, a well defined management plan should include important aspects such as the conservation of marine species and their habitat, management of tourism activities, restoration of aquatic reserves, and the reduction of conflicts between the resource users in the coastal zone. It is fundamental to generate alternatives that aid in poverty alleviation and reduce household dependence on marine resources. This can be done through aligning action strategies that achieve better living conditions for the coastal population.

Given that the coastal communities of Central America are particularly vulnerable to extreme weather events due to their geographic location, it is important build local capacity in disaster prevention. However, funding and sources of technical assistance for such programs limit their development.

Children from Sawasawaga Village, Papua New Guinea. Photo credit: Christy Loper

Pacific Islands

The Pacific Islands region, home just over 10 million people, is the least populated of the SocMon regions. Over half of the region's population is concentrated in Papua New Guinea (4 million residents) and Hawaii (2 million residents). The most commonly spoken languages of the region are English and French. While both standards of living and coral reef conditions tend to be higher in the Pacific region than other tropical regions, the Pacific is arguably the most vulnerable of the regions due to remote locations, high transportation costs and susceptibility to climate change. The region is characterized by rich cultural practices and strong traditions of local tenure to govern marine resources.

Where has socioeconomic monitoring occurred?

To date, no SocMon assessments have been completed in the Pacific region as the *SEM-Pasifika Socioeconomic Monitoring Guidelines for Coastal Managers in Pacific Island Countries* were recently published in October 2008. The SEM-Pasifika program (Socioeconomic Monitoring in the Pacific Region) is led by the Secretariat of the Pacific Regional Environment Programme (SPREP) with support from NOAA, the U.S. State Department and numerous regional partners, including the PIMPAC network and TNC-Micronesia. Two regional training workshops were held- first, a workshop was held in Papua New Guinea in October-November 2007 to field test the draft guidelines.

The second training workshop was held as part of the SEM-Pasifika Training Program. This workshop targeted the Marshall Islands, Palau, Yap, Chuuk, Kosrae, Pohnpei, Guam, the Northern Marianas, American Samoa, and Hawaii. Through the SEM-Pasifika Training Program, assessments are now underway at eight sites.

In the Pacific region, the vast majority of socioeconomic monitoring has been carried out by the Locally Managed Marine Areas Network, which is very active in Fiji and also active in Papua New Guinea, Solomon Islands, Pohnpei and Vanuatu. The Fiji Locally Managed Marine Area (FLMMA) is working in around 230 villages covering all provinces in Fiji. The results of socioeconomic surveys presented below is the averages from 29 Institute of Applied Science LMMA sites. Based on 29 sites, the average number of houses in a village is 54 (SD of 73), with an average household size of five and an average village size of 312 people. Village composition by gender showed that around 64% of the village population are females.

In-migration into a village is low (5.2%) and is usually through marriage. Out-migration by village members is also low (7%) and can also be attributed to marriage and/or in search of better education and standard of living.

What issues have commonly motivated socioeconomic monitoring?

The purpose of socioeconomic monitoring in the LMMA is to assess the changes that occur in the social, cultural and economic well-being of the community as a result of management actions. Socioeconomic monitoring, along with biological monitoring, will determine the success of the LMMA will give necessary information to adapt the management actions if required to improve the effectiveness of the LMMA.

For the SEM-Pasifika Program for US States and Territories and Freely Associated States, three main over-arching information needs were identified as key components of their socio-economic assessments. These are:

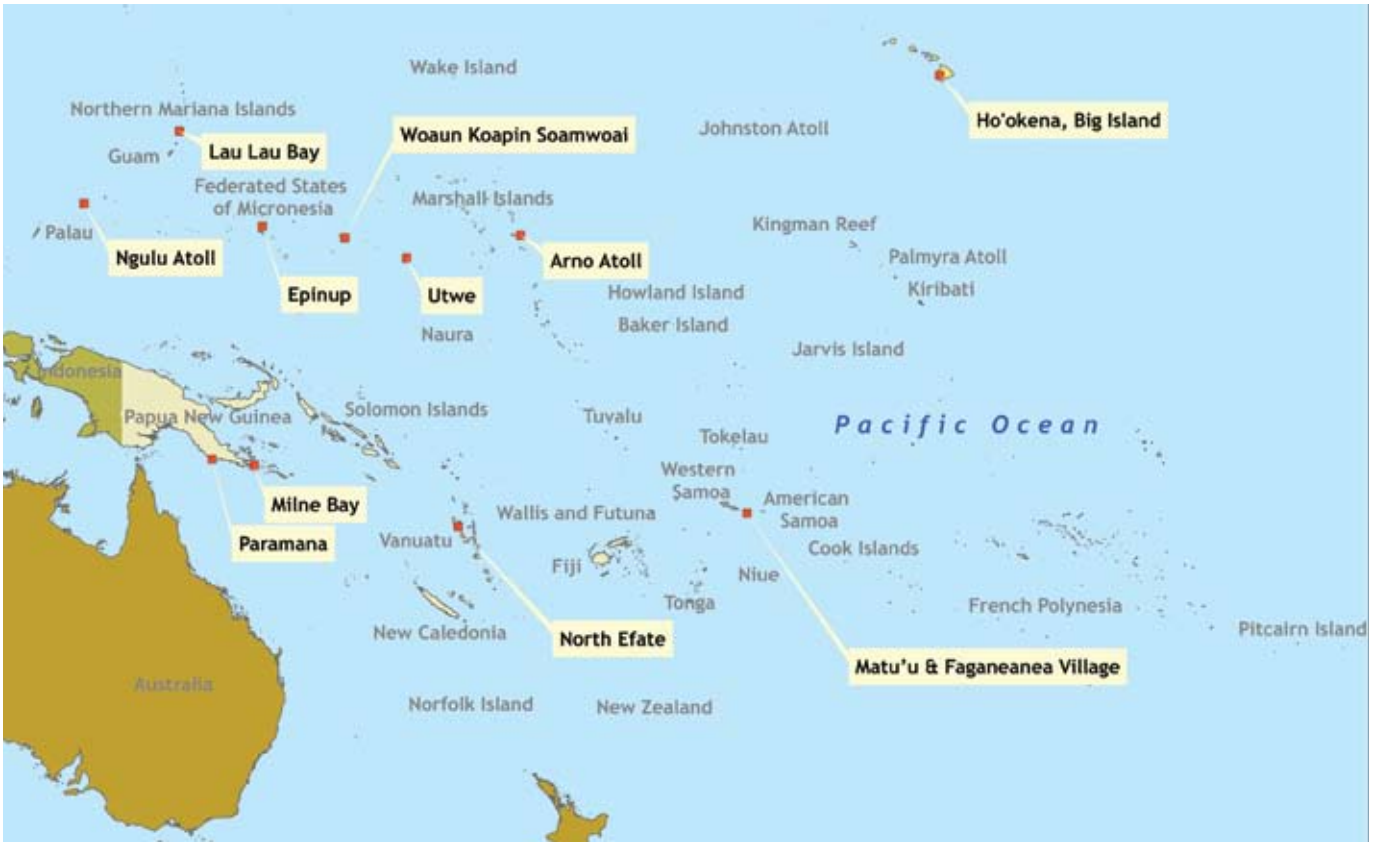


Figure 3: Pacific Islands Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

Village elder interview in American Samoa. Photo credit: Arielle Levine

1. perception of resource condition and threats- provides a baseline understanding by which managers could monitor if trends in resource health were perceived to be improving or declining. This could be compared to biological assessments and provide information to managers on how closely perceptions compare with biological data and what further activities may be needed (e.g. outreach on biological studies, increased participation in monitoring)
2. impacts of management activities- could be used to assess why there may or may not be support for management, reduce or mitigate unintended negative consequences of management activities and help to strengthen or duplicate efforts where impacts are positive.
3. stakeholder participation and support for management activities- helps determine if stakeholders know if and why the management is in place. Has management been successful and do stakeholders support existing management?

What common trends are we seeing in socioeconomic factors?

% of residents involved in fishing

According to LMMA data, which does not provide specific information on dependence on fishing, monthly income for all 29 villages is FJD$636, which are mostly from selling root crops (yaqona, taro etc) and marine resources (fish, sea cucumbers), and other paid employment. Most households in the village harvest marine resources for consumption at home and partially for selling, whilst a small proportion in a community are solely commercial fishers. Main gears used by men include spear and nets. Meanwhile, women mainly use nets, fishing line and glean the reef.

% of residents involved in tourism industry

Neither SocMon nor LMMA have provided data on tourism dependence by local communities for the Pacific region. However, there are national-level statistics available to show the percentage of GDP derived from tourism at the national level and these data are presented here in Table 7. Of the Pacific Island Countries (and possibly the world), Palau is the most heavily dependent on tourism, with over 67% of GDP coming from tourism. Cook Islands, Vanuatu, Samoa, and Fiji are also highly dependent on tourism at 50%, 23%, 18%, and 15%, respectively.

Perceptions of threats to marine and coastal resources

Major threats to fishing grounds as noted from village management plans include overfishing (resulting in the rare to no sighting of certain

Table 7: Pacific Island dependence on tourism

Country	International tourist arrivals, thousands/year			Tourism as percentage of GDP			
	1990	1995	2000	1990	1995	2000	2005
American Samoa	26	34	44				
Cook Islands	34	48	73	27.34	30.05	44.56	50.23
Fiji	279	318	294	15.11	14.62	10.79	14.51
French Polynesia	132	172	252	5.84			
Guam	780	1,362	1,287				
Kiribati	3	4	5	3.52	4.36	5.89	
Marshall Islands	5	6	5		2.85	4.05	
Micronesia (F.S.)			21			6.91	7.17
New Caledonia	87	86	110	3.72	2.98	3.51	
Niue	1	2	2				
Northern Mariana Is.		426	669	517			
Palau	33	53	58			45.21	67.05
Papua New Guinea		41	42	58	1.25	0.52	0.54
Samoa	48	68	88	17.85	17.47	17.76	18.48
Solomon Islands	9	12		3.36	4.39	1.18	0.53
Tonga	21	29	35	7.27	6.42	4.72	5.13
Tuvalu	1	1	1				
Vanuatu	35	44	58	25.50	18.51	22.90	
	115	174	171	11	10	14	23

UNESCAP, 2007

No data are available for Nauru

fish species and invertebrates), rubbish or pollution into the sea or along the coast, sedimentation as a result of logging and forest clearing, and poor farming practices. Poaching within marine protected areas is also a problem. Other threats include liquid pollution from piggery waste and washing effluents.

How has socioeconomic information been used for management?

What are the common management recommendations?

According to LMMA data, villages are working with partner organizations to implement solutions to identified threats and problems. These include putting sawdust into piggeries to prevent liquid waste loaded with excess nutrients and digging holes near houses for biodegradable solid wastes such as food refuse.

Low tide in Arno Village, Marshall Islands.
Photo credit: Christy Loper

Bala adiyal shore seining in Lakshadweep, India. Photo credit: Vineeta Hoon

South Asia

The coastal South Asia region consists of India, Pakistan, Maldives, Bangladesh, and Sri Lanka. Home to over 1.5 billion people, the region is characterized by overwhelming poverty and is second only to Eastern Africa for percentage of residents living on less than US$1 per day. Average GDP per capita is US$2,653. This region is second to Southeast Asia in terms of number of inhabitants employed in fisheries and agriculture. Of the five countries, Maldives has highest coral cover while Bangladesh and Pakistan each have limited coral reefs (Whittingham, et. al., 2003).

Where has socioeconomic monitoring occurred?

In 2002, socioeconomic monitoring was conducted at five sites in the region (shown in Figure 4) in order to collect baseline data against which to measure future changes. The main objective was to establish a demonstration system of long-term socioeconomic monitoring, to obtain data relating to the status of local communities dependent on the reefs for their livelihood, and to promote the use of this data in reef resource management. These assessments were made using the GCRMN Socioeconomic Manual for Coral Reef Management and supported by GCRMN South Asia. The IUCN Coral Reefs and Livelihoods Initiative (CORALI) project supported the development of regional *SocMon South Asia Guidelines*, which were published in October 2008. The *SocMon South Asia Guidelines* addresses the prevailing issues of poverty and resource dependence in South Asian countries and is yet to be used at the site levels. Thus far NGOs have been leading the SocMon initiative in South Asia and it has yet to be institutionalized at the government level.

What issues have commonly motivated socioeconomic monitoring?

In South Asia, the sites that have conducted socioeconomic monitoring through SocMon have done so primarily to (1) establish a demonstration system of long-term monitoring (2) assess resource use patterns, (3) assess poverty and reef resource dependence (4) compliment biophysical monitoring and (5) support reef resource management decision making in future. Of the six SocMon regions, South Asia is the most focused on integrating socioeconomic and biophysical data.

What common trends are we seeing in socioeconomic factors?

In South Asia, there have not been enough sites to do a comparative analysis of trends in socioeconomic factors; however, some trends are apparent from the data.

% of residents involved in fishing

Data from the five South Asian sites indicate that:

- Reef resource dependence for livelihoods and subsistence level is high. In the Gulf of Mannar, India, 90% of households on average are dependent on coral reefs and marine resources, working as fishermen, boat laborers, or seaweed collectors. Over half of these households have no secondary livelihood activities. In Vaavu Atoll, Maldives, approximately 20% of local households are involved in commercial exploitation of fish but a significant proportion of the population carries out subsistence fishing for their own consumption.
- Poverty continues to play an important factor in coral reef resource dependence.
- Fish supplies most of the protein coastal dwellers' diets, including 90% in of protein for Lakshwadeep residents. Data from the Gulf of Mannar indicate that fish is consumed daily throughout the year and is viewed as a freely available food source. For widows and female-headed households, crabs and smaller fish discards provide a major source of protein.
- Reef gleaning and fishing continues to be the main source of subsistence income for poor households.

Figure 4: South Asia Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

% of residents involved in tourism industry

Reef related tourism is well developed in Maldives and Sri Lanka but is slowly catching on in India. Too few SocMon assessments have been completed in the region to estimate coastal community dependence on tourism; however, national level statistics are available. As shown in Table 8, tourism arrivals have steadily increased in all of the South Asian countries since 1990; however, tourism as a percentage of GDP has increased only for Bangladesh and India. Of the five South Asian countries, only Maldives is significantly dependent on tourism at the national level, with over 38% of GDP coming from tourism. This is a decline since 1995, when tourism accounted for close to 54% of GDP in the Maldives. Over 60% of tourists traveling to the Maldives do so to scuba dive, underscoring the importance of healthy coral reefs to the tourism industry.

Perceptions of resource conditions

SocMon data from the five South Asia sites indicate that coastal populations are aware of the non-market and non-use values of the coral reefs. Community members are concerned that net fishing in the lagoons and near shore area is leading to a decline and changes in fish catch, size and composition. Assessments conducted in atoll sites indicated a need for secure solid waste management.

How has socioeconomic information been used for management?

Socioeconomic assessments have mainly been carried out by NGOs, while management in South Asia is the purview of the local government and national Departments of Wildlife and Environment. Reports of socioeconomic monitoring findings have been submitted to the concerned departments. The management action in terms of MPA establishment have been encouraging. A new MPA, the Rani Jhansi Marine National Park, was established in the Andaman and Nicobar Islands in January 2008. The Department of Environment is seriously considering the petition made by the Agatti islanders to establish a community reserve at Agatti Island, Lakshadweep.

Regional Summary

In South Asia, SocMon Guidelines were recently published in October 2008; therefore, limited SocMon data is available and is based on demonstration sites. Data from these sites indicate a strong dependence on fishery resources, particularly as a source of protein for coastal households living below the national poverty line. SocMon data has been used most often to support development of new community-based MPAs and to make recommendations to reduce tourist impacts on fragile coastal areas. Results indicate that support for MPAs is growing- both by residents and the authorities- with increasing awareness of the fragility of coral reef and mangrove areas. To date, SocMon assessments have been undertaken by local NGOs; a stronger partnership between government and NGOs is recommended to ensure use of SocMon data for future sites.

Table 8: South Asia dependence on tourism

Country	International tourist arrivals, thousands/year			Tourism as percentage of GDP			
	1990	1995	2000	1990	1995	2000	2005
Bangladesh	115	156	199	0.03	0.06	0.10	0.11
India	1,707	2,124	2,649	0.46	0.70	0.74	0.91
Maldives	195	315	467	41.39	52.88	51.42	38.24
Pakistan	424	378	557	0.27	0.14	0.10	0.14
Sri Lanka	298	403	400	1.61	1.69	1.48	
Average	*548*	*675*	*854*	*8.75*	*11.09*	*10.77*	*8.75*

Source: UNESCAP, 2007

Case study: Mahatma Gandhi Marine National Park bans use of plastic inside of Park

by Manish Chandi, Anadman and Nicobar Environmental Team

Idyllic scene from Mahatma Gandhi National Park.
Photo credit: Manish Chandi.

The Mahatma Gandhi Marine National Park (Park), located in Wandoor, Andaman Islands, India, is made up of 15 islands in the South Andaman Sea. Tourists travel to the park for its coral reef areas, diving, and to explore Jolly Bouy Island. In 2002, the Andaman and Nicobar Environmental Team, a local non-governmental organization, recognized a need to assess local stakeholders of the Park and understand perceptions and concerns to better manage the Park. These included identifying stakeholder groups, developing socio-economic profiles of the these groups, and document impacts of these groups on the Park. Hence, this group conducted a SocMon survey of the Park based partially on the GCRMN Socioeconomic Manual for Coral Reefs. SocMon Guidelines were not yet published.

The assessment made the following recommendations:

- Increase awareness generation for tour operators and guides
- Minimize garbage generation
- Install mooring buoys for boat operators at field sites
- Install drinking water facility at site to reduce tourist needs to bring water in plastic bottles
- Increase entrance fee to increase revenue
- Shift some tourist embarkations into the Park to reduce tourist load at Wandoor
- Initiate a cooperative venture between Forest Dept & fishermen's cooperatives
- Slowly introduce agro forestry methods to reduce run off into the park from rice fields and yearly tilling of the soil

These results and management recommendations were presented to local and regional decision makers, local community members, other participants of the GCRMN, and during seminars and workshops on coral reefs and livelihoods. As a result, the Park has:

1. Increased the entry fee charged to tourists, which has increased revenue going to the Park.
2. Management authorities and the local community members have been interacting more positively. NGOs and local decision makers are enjoying a strengthened relationship, though there is a long way to go to reconcile development and conservation.
3. Finally, plastic water bottles and other disposable articles have been banned within the Park. Since the creation of a drinking water facility on the tourist islands could not be achieved, tourists are required to pay a deposit, which is only returned upon proof that they have taken these same items back out with them when they leave.

Case study: Community reserve established at Agatti Island, Lakshadweep, India

by Vineeta Hoon, Managing Trustee, CARESS and SocMon South Asia consultant for IUCN

Located in the Northern Indian Ocean, Agatti Island is the westernmost island in the Union Territory of Lakshadweep, India. Consisting of coral formations, the island covers a total area of 2.7 sq km, and supports a local population of 7,202 individuals. The past decade has witnessed a rapid change in the economy and social dynamics shifting from a traditional subsistence economy to a commercially-oriented one. Formal management and gathering of catch data have focused on commercially significant activities such as tuna landings and has paid little attention to subsistence fishing. This has left a gap in the environmental and resource management of Agatti and also a divide between local people and management authorities.

The Centre for Action Research on Environment Science and Society (CARESS) conducted a socioeconomic training workshop and assessment to the local community in monitoring and research for the management of coral reef resources. The focus was on understanding community livelihoods based on locally available bio-resources, fishing effort, gear used, resource governance patterns, indigenous knowledge, site use, resource perceptions and people's perceptions of change and its cause and effect. The socioeconomic assessment showed that:

- The matrilineal system known as marumukkatayam is breaking down and the Sharia law (which favors male over female inheritance) is gaining popularity for asset and property division.
- The reliance on the reef fishery and gleaning for protein and income is high. Somce 20% of the households on Agatti report reef fishery and gleaning as their main occupation, 90% of the protein intake of poor households comes from reef fishing and gleaning.
- Growth in the fishery seems likely in view of the demographic structure of the island as well as a developing reef fishery targeting Napoleon wrasse, parrot fish, groupers and snappers for export markets.
- Sand, rubble and coral boulders remain important construction materials. Perceptions that collecting rubble is not harmful to the coral reefs contrasts with regulations against rubble collection
- Tourism is a growing industry, with resorts catering for both domestic and international tourists established on Agatti and Bangaram. A second air carrier started daily flights to Agatti in April 2007

Monitoring of fish catch in Lakshadweep, India.
Photo credit: Vineeta Hoon.

- Attitudes towards dive tourism have changed and currently islanders think of tourism as a lucrative profession and are taking up dive certification to enable them to set up dive centers or work in one.

NGOs have used the information from the socioeconomic assessment to plan livelihood strategies and communication strategies to build consensus for management action. Recommendations for management included:

1. Awareness programs for stakeholders at site level.
2. Environment orientation to school education in coastal areas to emphasize coral reefs and associated coastal ecosystems, such as mangroves and sea grass meadows.
3. The Department of Fisheries should introduce registration and licensing of fishing boats.
4. Biophysical monitoring should be carried out in tandem with socio-economic monitoring at sites identified as important during the SocMon and vice versa.
5. Develop and pilot sustainable livelihood enhancement and diversification strategies at the sites.
6. Promote MPAs including community managed no-take fishing areas.
7. Install mooring buoys to reduce anchor damage at dive sites.

Since implementation of SocMon, the community has enjoyed a strengthened relationship between NGO & local decision makers, and also between members of the local community and management authorities. Since the SocMon assessment was carried out by the islanders themselves it has created awareness and interest at the site.

Community celebration in Indonesia. Photo courtesy of Stuart Campbell.

Southeast Asia

The coastal Southeast Asia region includes countries on the Asian mainland: Cambodia, Myanmar, Thailand, and Vietnam, as well the countries of the Malay Archipelago: Brunei, East Timor, Indonesia, Malaysia, Philippines, and Singapore. The region, home to over 500 million people, is linguistically and religiously diverse. At least 12 official languages are spoken along with dozens if not hundreds of local languages. Most countries on the Asian mainland practice Buddhism while Islam dominates the Malay Archipelago. Christianity, however, is predominantly practiced in the Philippines and East Timor.

Southeast Asia is home to the Coral Triangle Region, a geographical area that is known as the center of the world's coral biodiversity. Efforts are currently underway by the governments of the region, international NGOs, and the US Government to conserve the resources of the Coral Triangle, potentially through a system of MPAs.

Where has socioeconomic monitoring occurred?

Since 2004, extensive socioeconomic monitoring has occurred throughout Southeast Asia (SEA), particularly Indonesia and the Philippines. Over 9,000 households and individuals have been surveyed, representing over 40 coastal communities, including 21 in Indonesia, 27 in the Philippines, two in Thailand and three in Vietnam. Refer to Figure 5 for a map of regional sites. SocMon Southeast Asia is coordinated by Conservation International-Philippines with strong partnership support from Palawan State University, Philippines.

What issues have commonly motivated socioeconomic monitoring?

As shown in Table 9, an assessment of the motivating reasons for conducting SocMon assessments in the region indicates that sites conduct monitoring in order to collect baseline data against which to measure future changes and to build the local capacity for management. A number of sites indicated that measuring impacts of MPAs on livelihoods and assessing perceptions of MPAs were also very important. Additionally, a number of sites undertook a socioeconomic assessment to assess perceptions of resource conditions and perceptions of MPAs.

What common trends are we seeing in socioeconomic factors?

% of residents involved in fishing

Data from Southeast Asia from based on 6597 household interviews in 32 communities- mostly in Indonesia and the Philippines, indicate that household dependence on fishing as the main income or occupation. The degree of dependence ranges from three percent to 90 percent, with both a mean and median average of 55%. Fishing as a secondary source of income or sustenance was rarely asked in surveys, of those studies that asked this question, the average secondary dependence was an additional 27%.

When the 16 Philippines sites that asked this question were isolated, the percentage of households dependent on fishing drops to 41.5%. However, according to the census for the entire nation of the Philippines, an average of 4.2% list fishermen as their main occupation, a full order of magnitude lower than the SocMon estimate (Philippines National Statistics Office, 2008). Obviously, the SocMon studies focus on coastal areas which are much more likely to depend on fishing than urban areas such as Metro Manila. Secondly, there can be households that are dependent on fishing for income or sustenance but would not consider themselves "employed" with the occupation of fishermen. Thirdly, there could be some selection bias in SocMon studies to focus on areas that are known to be dependent on fishing, as these communities are most likely to be impacted by degraded resource conditions or by restrictions on fishing.

Figure 5: Southeast Asia Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

Table 9: Common motivating factors for SocMon assessments in Southeast Asia

Study	understand management capacity of stakeholders	inform management plan development or review	assess perceptions of resource	assess use patterns	determine awareness levels/design communication strategy	assess impacts of MPA on livelihoods & resource users	assess perceptions of MPA	baseline study
Indonesia (Komodo)			◆		◆		◆	◆
Indonesia (Bunaken)	◆					◆		
Indonesia (Suluwesi)						◆		
Indonesia (Karimunjawa)								
Indonesia (Seribu)			◆	◆				◆
Philippines (Cebu)								
Philippines (Mactan)	◆		◆				◆	◆
Philippines (Palaui)	◆							
Thailand		◆		◆		◆		◆
Vietnam	◆	◆						◆
FREQUENCY	4	2	3	2	1	3	2	5

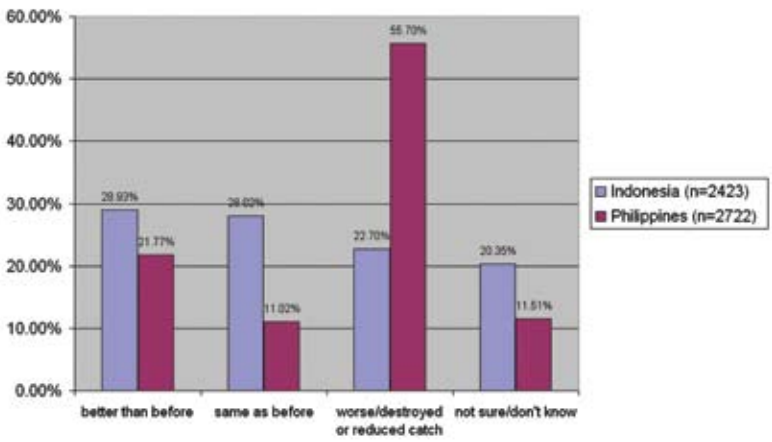
% of residents involved in tourism industry

Unlike in the Caribbean region, tourism did not emerge as an industry significantly affecting socioeconomic conditions in Southeast Asia. Tourism was not shown to affect conditions, either positively as an alternative livelihood option or negatively as causing damages to marine and coastal resources. Tourism is not treated as a separate employment category in virtually any of the socioeconomic studies from Southeast Asia, which makes it difficult to use these studies to quantify community dependence on tourism. Some national-level statistics are available, shown in Table 10. While international tourism arrivals have doubled in each country since 1990, tourism makes up a relatively low percentage of GDP. These percentages—1.61% for Indonesia and 2.17% for the Philippines—have either remained steady or decreased since 1990. This stability indicates that other economic sectors have been growing more quickly than tourism. Only one Southeast Asian country, Cambodia, depends on tourism for over 10% of its GDP. This is in contrast to the Caribbean region, in which 43% of regional GDP comes from tourism.

Perceptions of resource conditions

A majority of respondents surveyed (~52%) indicated that resource conditions such as coral reefs and fisheries are in poor condition and/or have degraded over the past several

Figure 6: Perceptions of coastal and marine environment conditions in Southeast Asia



Source- Indonesia data: Halim and Mous, 2006. Data from Komodo National Park, Wakatobi National Park, Raja Ampat District and Derawan District.

Philippines data: Coastal Dynamics Foundation 2008 and Coastal Dynamics Foundation 2003. Data from Cebu, Bohol, and Leyte Provinces, Philippines.

Table 10: Southeast Asia dependence on tourism

Country	International tourist arrivals, thousands/year				Tourism as percentage of GDP			
			2000	2005	1990	1995	2000	2005
			466	1,422		1.60	8.29	13.56
Indonesia	2,178	4,324	5,064	5,002	1.67	2.35	3.01	1.61
Malaysia	7,446	7,469	10,222	16,431	3.79	4.47	5.55	6.53
Myanmar	21	117	208		0.17	1.95	2.23	
Philippines	1,025	1,760	1,992	2,623	2.95	1.53	2.84	2.17
Singapore	4,842	6,422	6,917	7,080	13.38	9.11	5.55	4.92
Thailand	5,299	6,952	9,579	11,567	5.07	4.78	6.10	5.74
Viet Nam	250	1,351	2,140	3,468	1.31			
Average	2,635	3,577	4,574	6,799	4.05	3.68	4.79	5.75

Source: UNESCAP, 2007. No data are available for Timor-Leste

years. Differences in how this question was asked prevents a true aggregation of response; however, aggregated responses from several large scale studies are shown in Figure 6.

Support for marine protected areas

SocMon studies are often conducted prior to establishment of MPAs to determine support for various marine conservation strategies. SocMon is also undertaken to determine a baseline for perceptions of resource conditions, as well as after MPA establishment to measure impacts on livelihoods and resource conditions.

Of the 28 communities surveyed about support for MPAs, on average, 78% of each community is supportive of MPAs. The main perceived benefits of MPAs are increased fish catch and improved livelihoods. Results for communities who have already implemented MPAs have not been differentiated from communities that have not yet implemented MPAs.

As an example, in Cebu and Leyte Provinces, Philippines, SocMon 172 households were surveyed using SocMon in four villages in which MPAs had previously been established. Results indicated that on average, 64% of respondents were aware of the MPA in their Barangay (village) and 70% of respondents said that coral reef and fish conditions had improved since establishment of the MPAs; however, only 33% indicated that they would support larger or additional MPAs. This finding is consistent with literature from the United States on MPA support; even when a majority of users support existing MPAs, they tend to resist MPA expansion. Some 57% of respondents felt that MPA enforcement should be improved.

Perceptions of threats to marine and coastal resources

Of the seven most common threats mentioned in SocMon studies, five are fishing-related, as shown in Table 11. A number of studies asked for major threats to marine and coastal resources. While it is difficult to compare this information across sites due to the disparate nature of the questions asked and answer choices provided, some trends are evident from the data collection. Namely, in Southeast Asia, most of the identified threats are from in-water threats such as overfishing and use of destructive fishing methods such as cyanide fishing, dynamite fishing, and use of fine mesh nets. Broader scale threats such as climate change and land-based sources of pollution were rarely mentioned as threats; however, this could be because these were not often provided as possible answer choices in questions when asking respondents to identify threats.

How has socioeconomic information been used for management?

Efforts by the Coastal Dynamics Foundation in Cebu, Philippines provide perhaps the best illustration of SocMon data feeding directly into management efforts at the municipal level. In the City of Cebu, SocMon has been integrated with Reef Check biophysical reef

Table 11: Major perceived threats to marine resources in SEA region

Threat	# of studies listed (n= 34)	Average % of respondents listing threat
dynamite fishing	24	32%
garbage/solid waste	23	12%
use of fine mesh nets	22	14%
cyanide fishing	15	27%
commercial fishing	8	17%
others (not specified in reports)	6	13%
overfishing	5	75%
use of compressors for fishing	3	14%
water pollution	3	3%
land-based pollution/tree removal	2	18%
large scale fishing boats	1	81%
none/don't know	1	50%
coral mining	1	30%
weather/climate	1	22%
overpopulation	1	1%

surveys and has resulted in the City designating over 100 hectares of critical reef areas with high biodiversity and economic values as MPAs. An additional of 77 hectares of reef are in advanced stages of establishment.

Results from SocMon assessments served to further discussions on reef conditions and local support for MPA establishment at the household and community levels. During conducted public hearings, SocMon results and recommendations played an important role in focusing these discussions, and served to strengthen the political will of key decision makers to establish new MPAs. The assessments served to confirm political will to improve governance of City's coastal resources and waters in partnership with key stakeholders, involving resorts and dive operators. The end result has been development and adoption by the City of standardized procedures for establishing MPA, involving both Reef Check and SocMon.

Regional Summary

What are the common management recommendations?

As shown in Table 12, the most common management recommendation from SocMon South Asia studies is increased outreach and education efforts. The second most common recommendations are to increase alternative livelihood and training programs for fishermen and recommendations regarding the establishment or boundary designations of MPAs.

[3] It is difficult to know how reflective these threats are of local conditions for two reasons. First, some studies asked this as an open ended question (e.g. what are the top three things threatening the health of coral reefs?) and some asked it as a close-ended question where several responses were included. Inclusion of responses, while it makes data analysis easier, can bias respondents towards just those threats provided. Second, it is difficult to know whether the threats of poison and blast fishing are truly two of the top three problems or whether respondents have been exposed to education campaigns focusing on these threats and these threats were therefore in the forefront of respondents' minds. For example, in Karimunjawa National Park, Indonesia, respondents were very aware of poison fishing, likely due to large-scale education projects on impacts of poison fishing conducted by an international donor organization. Residents listed poison fishing last among common fishing methods used; however, they still ranked it as the most impactful factor to the health of reefs and fisheries.

Case study: Assessing the Effectiveness of Tubbataha Reef National Marine Park, Philippines

by Giselle Samonte-Tan, Conservation International, USA and Romeo Trono, Conservation International-Philippines

A diver appreciating the beauty of the diagonal banded sweetlips fish in the Tubbataha Reef National Park, Philippines © Conservation International, photo by: Miledel Christine C. Quibilan

The Tubbataha Reefs lay in the middle of the Central Sulu Sea, southeast of Puerto Princesa City, Palawan, Philippines. Relatively undisturbed for hundreds of years largely due to its remote location and inaccessibility, marine life in these parts have thrived to spectacular abundance. The Tubbataha Reef National Marine Park (TRNMP) harbors a diversity of marine life equal to or greater than any such reef of its size in the world. It is habitat to 417 species of fish, 372 species of corals, 23 species of seabirds, 8 species of marine mammals (TMO 2002). Rays and sharks are common species in the reefs. Pelagics such as tuna, mackerel, jacks and barracudas are observed in schools near the reef crests of this UNESCO World Heritage Site.

As TRNMP pursues its goal of preserving and managing the globally significant biological diversity and ecological processes of Tubbataha and the surrounding areas, it continues to be faced with challenges (TRNMP, 1998). Tubbataha's remote location poses a logistical challenge to its effective management, including securing sufficient resources to effectively enforce park rules. To date, conservation fees paid by dive tourists are the main income of the park and are not sufficient to sustain the relatively high cost of maintaining Tubbataha and undertaking year-round enforcement activities. Finally, the waters surrounding the park will be explored for oil and gas potential, which may pose a threat to the Park.

In terms of stakeholder ownership, management experiences in Tubbataha have proven the importance of an enlightened community stakeholder cognizant of the critical role they play in the welfare of the reefs. Thus, the Park strives to develop an informed constituency by directly engaging them on issues and concerns involving the Park. Participatory planning and analysis of the needs of the TRNMP in terms of evaluation was initiated by WWF-Philippines in 2003. Eight governance and six socio-economic indicators were chosen by the stakeholders of Tubbataha and data were collected on these 14 indicators and compared against a benchmark derived from previously published information. The results indicate that overall, the management of the TRNMP is successful (CI-Philippines, 2006). The socioeonomic indicators which showed positive change were local marine resource use patterns, level of understanding of impacts on resources, household income distribution by source, number and nature of markets, and distribution of formal knowledge to community.

By involving the Tubbataha stakeholders in the development and initial assessment of socioeconomic and governance, several lessons were learned (Samonte-Tan, et al., 2008). First, active involvement of the local government units is crucial for effective MPA management. Secondly, capacity building for the management staff and participating agencies is a major bridge for overcoming technical difficulties in undertaking M&E functions. Linking with local researchers and academic institutions is important. Thirdly, developing partnerships between the local government and the local stakeholders helps in accessing relevant information. Lastly, a multi-disciplinary approach, utilizing relevant mix of indicators, provides a more complete assessment for measuring the success of MPAs.

The initial assessment has been encouraging for the TRNMP management and stakeholders. Several activities continue to be pursued: strengthening of the monitoring team, refining the socioeconomic survey protocol, sharing information with partners, and working towards the institutionalization of management structure for monitoring implementation.

Table 12: Common management recommendations from SocMon South Asia

Study	develop management plans	increase surveillance and enforcement	changes to MPA designation or boundary	establish co-management scheme	form community-based organization	strengthen legal institution, including penalties for illegal fishing	repeat survey in 5-10 years to measure changes	fishermen need alternative livelihood & training programs	involve community more in decision making	more education and awareness
Indonesia (Komodo)		◆								
Indonesia (Bunaken)	◆			◆						
Indonesia (Suluwesi)		◆	◆		◆			◆	◆	
Indonesia (Karimunjawa)										◆
Indonesia (Seribu)			◆			◆		◆		◆
Philippines (Cebu)			◆	◆						◆
Philippines (Mactan)			◆	◆				◆		◆
Philippines (Palaui)							◆			
Thailand	◆						◆	◆	◆	◆
Vietnam			◆			◆		◆		◆
FREQUENCY	2	2	5	3	1	2	2	5	2	6

Regional Summary

Of those surveyed in SEA, over half of the local communities (55%) are dependent upon fishing for their primary source of income, underscoring the need for healthy coral reefs and associated fisheries. Destructive fishing methods such as cyanide and dynamite fishing are perceived as the most prevalent threats to the health of coral reefs and fisheries in the region. Hence efforts to eradicate these destructive fishing methods—while effective in some regions based on anecdotal evidence—should be increased to provide food security and sustainable livelihoods for coral-reef dependent communities. Unfortunately, over half (52%) of those surveyed have indicated a declining trend in resource conditions.

Particularly in light of the Coral Triangle Initiative, which will likely seek to increase the number of MPAs in the region, community based socioeconomic assessments will be vital to the success of the initiative and the well being of the communities dependent upon the resources. Future needs for Southeast Asia include expanding the geographical range of sites that have been studied, including more sites in Thailand, Vietnam, Malaysia, and Cambodia.

Octopus fishing in Andavadoaka, Madagascar. Photo credit: Blue Ventures Conservation

Western Indian Ocean

The Western Indian Ocean (WIO) region includes the countries of East Africa, including Somalia, Kenya, Tanzania, Mozambique, and South Africa, as well as the island nations of the Western Indian Ocean, including Seychelles, Comoros, Mauritius, and Madagascar. The dependent territories of La Reunion and Rodrigues are also included this region. The WIO region, home to over 100 million people, is linguistically diverse. SocMon and other regional trainings are carried out in English, but French, Portuguese, Creole, and Kiswahili are commonly spoken in the WIO countries in addition to local and tribal dialects. Of the SocMon regions, the WIO region has the highest proportion of its population living on less than US$1.00 per day and the highest proportion living below national poverty lines. Approximately one-third of the coast of Eastern Africa is bordered by coral reefs, while reefs surround much of the island nations (Whittingham et. al 2003).

Where has socioeconomic monitoring occurred?

SocMon WIO, coordinated by CORDIO East Africa, is an ongoing monitoring program that was initiated with the aim of expanding socio-economic monitoring throughout the WIO and to establish a regional network. The approach of the project has been to build on existing local-level monitoring systems at sites and emphasize participation by community members. SocMon is implemented by local partners, including local MPAs, local area management authorities, fisheries officers or community groups. Methods were developed from existing socio-economic programs and integrated with the Global SocMon initiative. SocMon WIO is active in 12 sites in 7 countries; refer to Figure 7 for a complete listing and map.

SocMon assessments have been carried out at very diverse sites in the region, from small islands developing states to more developed island countries to sites on mainland East Africa. Sites chosen are often in remote areas that are facing resource degradation issues.

What issues have commonly motivated socioeconomic monitoring?

Habitat destruction, overexploitation of resources, and establishment or evaluation of MPAs have been common issues motivating the set of socioeconomic monitoring, especially in instances where it was recognized that current management is not effective, such as in Comoros, Madagascar, and Kenya. Goals of SocMon studies have included gaining an understanding of the resource users to better grasp needs and potential management interventions. Additionally, improving understanding and thus communication between different stakeholders has been one of the main motivation for the Kenya Fisheries Department which has used SocMon to establish a platform to improve communication with marine resource users.

In other areas, such as Mozambique, Madagascar, Rodrigues, and Tanzania, assessments have been conducted to establish a baseline to investigate impacts of management actions such as MPA development and awareness programs.

In the WIO, SocMon was set up to be used both by local NGO partners as well as by local and national governments. In Kenya, CORDIO works hand in hand with the National Fisheries Department, which has now institutionalized the SocMon process. Projects headed by external organizations have integrated the process, such as WWF in Mozambique, Blue Ventures in Madagascar, Shoals in Rodrigues, which have also institutionalized the SocMon process. However, strong input and collaboration with CORDIO is needed.

In other areas, basic assessments have often been done by external consultants and the

Figure 7: Western Indian Ocean Regional Map of SocMon Sites. Map created by ReefBase, The WorldFish Center. Completed sites are represented in pink; sites where monitoring is still underway are represented by orange squares.

Trap fisher on dhow boat in Pemba, Tanzania. Photo courtesy of Innocent Wanyonyi.

recipient organizations struggle to integrate a socioeconomic monitoring process. Although SocMon has been active since 2005, capacity building and the development of tailored adapted monitoring programs for the different kinds of organizations has been slow. Sites have articulated the importance of increasing managers' ability to use socioeconomic monitoring information to make decisions.

What common trends are we seeing in socioeconomic factors?

Most assessments have focused on coastal activities, occupations, variables related to the use of marine resources (from gear to markets), perceptions of resource conditions, problems and solutions, perceived level of impacts of activities, compliance, enforcement, awareness of rules and regulations. A few sites have also investigated material style of life. The focus has strongly been on fishers, some sites have expressed the need for them to extend monitoring to other stakeholders, especially those who influence fishers' activities such as fish buyers and exporters.

% of residents involved in fishing

There are marked differences in the dependence of SocMon WIO sites on fishing. The highest dependence is found in Quirimbas, Mozambique and Adavadoaka, Madagascar, where over 80% of households in each community depend on fishing. These are also the two most remote sites, with limited infrastructure and tourism activities, and few opportunities for other resource based activities to be carried out, such as farming.

For other WIO sites where main source of income and main occupation have been asked through household surveys), about of a third of households depend on fishing (fully or partly for their livelihood). If fish trading and other fisheries related activities are included this increases to 35% (for the sites where this was investigated) and if all marine dependant activities are considered (this was done in 3 sites) then the percentage increases to 40%. Most commonly, households depend on a variety of activities for income.

% of residents involved in tourism industry

For most of the SocMon WIO sites, tourism is not yet a significant economic contributor; however tourism is considered as a potential alternative livelihood option. Although tourism has been developed at a number of the WIO sites, community employment in tourism has not always been clearly investigated. One exception

Case study: Alternative livelihood development at Riviere Banane, Rodrigues, Mauritius

By Sydney Perrine, Shoals Rodrigues

Focus group conducted in Riviere Banane Community, Rodrigues..
Photo courtesy of Sydney Perrine.

In response to the recent decline in fish stocks in Rodrigues, four marine reserves will be created in the northern lagoon, the first of which is at Riviere Banane (see map). Shoals Rodriques, a local NGO, recognized an urgent need for socioeconomic monitoring to complement biological monitoring, which was ongoing since 2002. In 2006, Shoals Rodriques, with technical assistance from CORDIO East Africa, completed a socioeconomic assessment using the SocMon methodology in Riviere Banane. The main objectives of this study were to formalize and add to existing knowledge on fishers' attitudes and to establish baselines for future monitoring activities.

Recommendations for management

The results confirmed that fishing is very important within the Riviere Banane community and the establishment of a no-take marine reserve in the region will have an important financial impact on a number of households. The need for alternative livelihoods was identified as a priority. The community is concerned that tourists spend little time in their village. The recommendations were as follows:

- Develop an alternative employment scheme for fishers displaced from the marine reserve, including new training opportunities
- Develop tourism in the area to provide greater benefits to the local community
- Better enforce fisheries regulations to prevent illegal fishing activities
- These recommendations were presented to local decision makers, regional/national decision makers, local community members, and the media.

Management results

Shoals Rodrigues together with the fishing community of Riviere Banane have worked together to develop two alternative livelihoods projects for fishers. These are: (1) an eco-tourism project taking tourists out on a glass bottom boat and (2) a small-scale animal husbandry project. In response to concerns over enforcement identified in the SocMon assessment, local government has decided to post a 24-hour patrol over at Riviere Banane Marine Reserve.

The local government is being very supportive in helping the fisher community in land leasing and giving them support in term of providing the animals. As such, it was easy for Shoals Rodrigues and the fisher community to successfully secure funds for the project. Informing people about the results of the surveys helped the decision-making process by the local assembly. Future plans include conducting a follow-up SocMon study to evaluate the impacts of these projects on the fishing community.

Tandilo fishing in Mnazi Bay, Tanzania. Photo courtesy of Innocent Wanyonyi

is Diani, Kenya, where 23% of households are involved in tourism related activities, such as working as beach operators or boat operators.

Perceptions of resource conditions
Perception of resource conditions has been investigated by sites at the household or community level. Of the four sites that have investigated perception of coral conditions, results are available only for two. Respondents in Rodrigues have indicated that their coral reefs are medium to good while Comoros respondents feel their coral reefs are in medium to low condition.

Others have investigated the change in fisheries resources in general terms. These are perceived as being in a poor or average state (in some instances having declined despite the establishment of an MPA). Two sites have investigated perception of conditions in relation before and after MPA establishment. In both cases, fishers' perceptions are that resources are either the same or have worsened since implementation of the MPA. Only in very specific villages within each site has there been a feeling that resources have improved in conditions. This may be due to fishers having had to shift fishing efforts to a location that is less productive.

In both sites, people have modified their behavior and gear use to comply with regulations but have not seen yet the benefits in terms of catch. In Mohéli, Comoros, for example, women have stopped fishing. But in most of these communities there is a lack of alternatives to fishing as sources of income.

Perceived threats to marine and coastal resources

Threats to coastal resources have been investigated through surveys and focus groups and the most commonly mentioned threats are illegal fishing, including poor enforcement of fishing regulations and poaching. Pollution and poor waste management are also major threats, especially for islands. Additionally, certain species such as turtles and dugong are perceived as threatened.

Support for marine protected areas

Community support for MPAs was investigated in three sites where MPAs are in varying stages of management and development, so regional conclusions cannot be drawn. In Comoros, despite resentment against the park and its lack of enforcement there is recognition that some positive aspects emerged from its establishment, especially in terms of empowering local communities to

Case study: Creation of Velondriake Community Protected Area, Madagascar

By Gildas Andriamalala, Blue Ventures Conservation, *http://www.livewiththesea.org*

Coastal communities in the remote region of Andavadoaka, southwest Madagascar, are entirely dependent on marine resources for subsistence and income, and have close cultural ties to the region's coral reefs, mangroves and related ecosystems. Following the success of a series of trial fisheries no take zones developed in the region since 2004, 23 villages in the area are now working together to create Velondriake, a locally-managed marine and coastal protected area covering over 800 square kilometers of marine and coastal habitats. Baseline socioeconomic data are critical to the process of creating, zoning, monitoring and managing Velondriake, and a SocMon program has been developed to support the creation of the protected area. This program was initially carried out in nine Velondriake villages.

The SocMon study has made the following recommendations and conclusions, which were presented to decision makers at local, regional, and national levels, as well as to local community members, scientific and NGO partners, and the media:

- Management should focus first on high-value resources, such as octopus, sharks, sea cucumbers
- Alternative livelihoods need to be explored through partnerships with NGOs
- Management efforts should be focused at the village level, as environmental and socioeconomic conditions vary among villages
- The government should engage the community more to increase understanding of and compliance with fishing regulations
- Local and regional communication and information dissemination will be crucial to Velondriake's success

Management impacts from SocMon project:

- Communities are more involved in the monitoring of their resources, including habitats and fisheries, as a result of introduction of an extensive multi-disciplinary participative monitoring program, developed by partner NGO Blue Ventures.
- In response to the alternative livelihood recommendations, NGO partners and the local mangers successfully obtained funding for a sea cucumber farm which will be managed by local communities, with hatcheries being built in four Velondriake villages.
- Environmental education and awareness has increased; local managers now work closely with NGO partners and newly-created local youth environmental clubs to raise awareness in all villages within the Velondriake area.
- Compliance with legislation governing resource use has increased; local managers and the regional fisheries controllers are working together to raise awareness about local and national fisheries laws and regulations.
- Baseline SocMon data have been used for to advise improvement of management effectiveness and compliance with the local laws implemented to govern resource use within Velondriake.
- SocMon results were included in the proposal needed for the government's approval of formal creation of the Velondriake protected area. Velondriake's status as the first community-managed marine protected area of its kind in Madagascar has greatly increased the government's attention to Velondriake, as well as the national and international profile of the project.

Future Plans

Future plans include expansion of socioeconomic assessments to all remaining villages within the Velondriake area in 2009, and continuation of assessments in the long term to measure changes over time. Recommendations have been made for translation of the SocMon WIO Guidelines into Malagasy to facilitate community training in socioeconomic monitoring.

make management decisions in relation to fisheries management. However, since external funding has stopped, the park has regressed to a paper park and is not enforced. There is a feeling that conditions improved when the park was established due to development of alternative livelihoods and training but has declined since its inactivity. In Quirimbas, five years established WWF established an MPA, an average of 45% indicated a medium level of satisfaction with the establishment of MPA establishment, while only 32% of respondents are happy with the MPA.

How has socioeconomic information been used for management?

In the WIO region, SocMon data is commonly used for management due to the design of the local projects, which include participation from the local site authorities. For example, in 2005, in Mkunguni in Msambweni, Kenya, CORDIO East Africa teamed up with the Kenya Fisheries Ministry to conduct a socioeconomic assessment to assess the impacts of various fishing methods on incomes and educate fishermen on need for conservation based resource use. As a result, the recommendations on gear use and organization of artisanal fishermen are now being incorporated in the draft policy and the Fisheries Act which guide the management of the fisheries resource in Kenya. The Fisheries ministry supports the initiative of SocMon as a monitoring tool. Fishermen need to be involved in making policies based on practical issues derived from data on the ground. Additional examples of use of SocMon data can be found in the two case studies in this chapter.

What are the common management recommendations?

Common management recommendations coming from SocMon WIO sites are:

- Increase stakeholder participation in management and empowerment– stakeholders are looking for more effective ways to engage.
- Increase awareness, education and target awareness raising strategies. Despite strong knowledge among fishers about marine ecological processes, connections between users' actions and resource conditions are not always made. Awareness of rules and regulations should be targeted as well.
- Develop alternative livelihoods and strengthen tourism as a viable livelihood opportunity. However, SocMon data indicate key factors to consider when looking at potential livelihoods (infrastructure, culture, existing activities).
- Increase focus on enforcement by working with stakeholders.
- Strengthen and build upon traditional systems for decision-making and management at the community level to be more effective when there are opportunities, such as in Comoros and Madagascar.
- Build capacity at community level to monitor and take action.

What factors facilitate use of information for management?

For effective uptake of the information, it is essential that SocMon results provide information relevant to national research priorities identified by a national body (e.g. Tanzania's National Environment Management Council). In the WIO, access to information at national level is most important because it has relevance beyond the site level. Harmonising the information at the national level will create access to anyone who needs socioeconomic information at national policy making levels (e.g., state of the coast reports).

Seeking partnerships between the different governance levels is also important to ensure that various levels receive information that is directly relevant to them, from local site level (e.g. beach management unit, village environment committee), to project site level (e.g. district, province) to national level.

Engagement in SocMon needs to be at all levels for mainstreaming of SocMon. Socioeconomic data should be available at the sub national level to feed into District Integrated Coastal Zone Management Action Plans. There needs to be more consultation between the site

monitoring team and its relevant District Environmental Officers.

What factors hinder use of information for management?

Socio-economic information is now available in the WIO region; however, issues hindering use of socio-economic information for management and decision making include:

- Sectoral data collection and ownership does not allow access to existing information.
- Decision makers are often biologists rather than social scientists, which creates a lack of awareness on the need for socioeconomic information, especially among top management
- Coverage of the SocMon WIO network does not enable use of SocMon data at the national level (there are too few Socmon sites to make a general statement about the whole coastline in each country.
- Lack of sustainable funding at some sites means monitoring may stop and resumes only when funded through the SocMon WIO coordination
- Institutional frameworks are not set up for adaptive management, so the results and recommendations from socioeconomic monitoring take time to be implemented.
- Lack of capacity in data entry, management, analysis; CORDIO had assumed the each site team had basic computer knowledge, at some sites this was very limited and has resulted in delayed submission of monitoring results and use of these results in management.
- Lack of capacity to produce required reporting and outputs at some sites; sites require consistent facilitation and technical assistance to produce all outputs to target feedback to communities and for project/ institutional reporting and management.

Regional Summary

Of the six SocMon reigons, the WIO region has the strongest coordination at the regional level due to a strong commitment by CORDIO to socioeconomic monitoring. However, limited capacity and expertise using computers at the site level has delayed reporting of results from SocMon data collected since 2005. Results for several of the sites are now available and indicate a strong dependence on fishing by coastal communities. Overall, evidence from the sites indicates that resource conditions are worsening in the WIO region, particularly with respect to fishery resources. The most commonly perceived threat to coastal and fishery resources in the WIO is illegal fishing and lack of enforcement. For sites with MPAs, satisfaction with MPAs is generally much lower than in other regions and MPAs are not perceived to have improved fishery resources, which may be due to a lack of compliance with and enforcement of MPA regulations, limiting the effectiveness of MPAs in increasing fishery resources.

Spear fisherman in Western Indian Ocean region. Photo courtesy of Innocent Wanyonyi.

Traditional canoes in Milne Bay, Papua New Guinea. Photo credit: Supin Wongbusarakum

Global Status and Trends

Overall, the top three recommendations coming out of SocMon studies are familiar in the coastal management literature. Based on an analysis of 26 studies done, representing over 12,000 household surveys in the Insular Caribbean, Central America, and Southeast Asia, increasing education and awareness is the most common management recommendation, with over half (65%) of the studies recommending this strategy for improving management. Almost half of the studies (46%) recommended development of alternative livelihood and training programs for fishermen. The third most popular recommendation (42% of studies) is to involve local community members in decision making process for coastal and marine resource management. None of these are new recommendations in the coastal management literature; site-based studies have been recommending these strategies for decades. However, the fact that they are still emerging as the most important recommendations by dozens of communities indicates that coastal management efforts have not yet been able to effectively implement these recommendations at the site level in many parts of the world.

Table 13: Summary information for each of the SocMon regions

	Fishing dependence	Top three threats (as perceive by household respondents)	Major conclusions
Caribbean	High, but being replaced by tourism as mainstay	■ Illegal fishing ■ Overfishing ■ Tourism	SocMon has been use for Fisheries Managment Planning
Central America	High, but being replaced by tourism as mainstay	■ Illegal fishing ■ Pollution ■ Overfishing	SocMon results have been used to assess socioeconomic impacts of climate change and extreme weather events
Pacific Islands	High, most households in study harvest marine resources for sustenance	■ Land based sources of pollution ■ Solid waste ■ Illegal fishing	LMMA results have resulted in action to reduce impacts of pollution and solid waste
South Asia	High: up to 90% rely on fish for protein, particularly poorer households	■ Overfishing ■ Solid waste ■ Coral and sand mining	SocMon results have been used to help establish community-based MPAs
Southeast Asia	High: average of 55% of each community in studies fish for living	■ Destructive fishing (e.g.cyanide or dynamite fishing) ■ Solid waste ■ Commercial fishing	SocMon results have been used to help establish municipal MPAs
Western Indian Ocean	High: 30-40% of average communities in studies fish for living; up to 80% for remote sites	■ Illegal fishing ■ Lack of enforcement ■ Pollution/poor waste management	SocMon results have been used to establish alternative livelihood programs

While this report has many limitations, it represents an initial effort to analyze data collected from socioeconomic assessments in six regions throughout the world. Some of the major conclusions from each region are provided in Table 13 for comparison.

Socioeconomic data collected emphasizes the importance of healthy coral reefs for communities living along the world's tropical coasts. Reliance on fishing for income and sustenance is very high in all regions, underscoring the importance of healthy coral reefs and marine ecosystems for food security. Perceived threats at the community level tend to focus on local ecosystem stressors, such as illegal fishing (e.g. poaching), lack of enforcement, and land-based sources of pollution. While threats are remarkably similar among all of the regions, Southeast Asia is the only region that has identified destructive fishing methods such as dynamite and cyanide fishing as a major threat, suggesting that this threat may be unique to Southeast Asia. Global stressors such as climate change are not yet perceived as major threats by local communities in any of the six regions studied.

This information provides evidence of the need to conserve global coral reef resources to ensure food security and contribute to poverty alleviation in the face of global-scale crises including climate change and reduced foreign aid resulting from the global financial crisis. These global stressors will undoubtedly exacerbate local stressors and will further threaten coastal livelihoods.

Village elder in Sawasawaga, Papua New Guinea. Photo credit: Christy Loper

Lessons learned and future needs

The first set of regional SocMon Guidelines were completed in 2003. Over the past five years, the SocMon Initiative has achieved a great deal and next decade could achieve even more if we apply what we have learned so far.

Lessons learned on global reporting

1. This report represents in initial attempt to aggregate socioeconomic data at the regional and global levels. It is recommended that this report be updated in two years' time with additional data; hopefully the 2010 report will be a true meta-analysis.
2. Socioeconomic data collected to date is not yet robust or standardized enough to be stored in a centralized database; web-based access to site reports should be provided.
3. Although it is difficult to aggregate data that is collected in different ways, it is not recommended that SocMon require a global core set of variables, as SocMon is focused on the site level and each site should collect the most useful variables for that site.

Lessons learned on successful socioeconomic monitoring

4. Socio-economic monitoring requires a locally adaptive approach. What works in one place does not always apply equally successfully at all sites without being adapted and thus the site training was used. For instance in Seychelles an outsider is likely to collect information better than a local. However, at all other sites in the WIO region, the direct involvement of a local community member/leader in the team contributed to successful monitoring.
5. The SocMon variables described in the guidelines are not meant to be prescriptive; most sites have added additional indicators to meet local needs.
6. To successfully implement participatory monitoring with communities site management should involve stakeholders early in the process.
7. Involving the authority in charge of site management directly in monitoring means they can act immediately on the outcomes of monitoring. At times communities may expect immediate solutions to their problems once the monitoring team has identified them.
8. Support from national policies, institutions and legal frameworks are required for socio-economic monitoring to be effective.
9. Monitoring results should be disseminated locally and to a wider forum and coordination with other participating sites should be improved.
10. Sites should provide their staff involved in SocMon data management with complete training in management of socio-economic data (i.e. using basic computer application packages, such as Excel spreadsheets, Access database, and word processing).
11. Since monitoring is a continuing process, consistent financial support at global level, regional and local levels is required to enable coordination of sites that incorporate socio-economic monitoring in the management activities. SocMon funding comes mostly from NOAA at the global level and from various sources at the regional level. Sustainable funding is key to the continued measurement of socioeconomic variables for MPA planning and other coastal management efforts.

Future needs

A number of needs have been identified by SocMon principal investigators and regional coordinators. These will form the basis for improvements to the program for the next five to ten years:

- Truly integrate socioeconomics and biophysical data collection by designing projects that have both components, rather than trying to integrate after the fact. The example of a SocMon and Reef Check combined protocol, successfully demonstrated by Coastal Dynamics Foundation in the Philippines, should be replicated in other areas.
- Increase coverage of SocMon network within regions. In particular, there are major gaps in mainland Southeast Asia, much of South Asia, and the Pacific region. The Red Sea and Gulf of Aden region may be another area for potential expansion.
- Begin to repeat assessments at existing SocMon sites to facilitate true monitoring—not just assessments—to accurately measure change over time. Most socioeconomic variables are best measured in five year increments. Initial SocMon sites completed in 2004 or earlier are now ready for repeat monitoring.
- Increase publication of socioeconomic data in the peer-reviewed literature. Scientific articles should be authored by regional coordinators and partners.
- Create a standard template for reporting to increase standardization of reporting.
- Integrate other relevant issues and topics, such as climate change, sea level rise, increasing fuel costs, and non-traditional security issues.

Recreational fisherman at Tortuguero, Puerto Rico. Photo credit: Carlos Carrero

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Acronym List

DFMR	Anguilla Department of Fisheries and Marine Resources
CARESS	Centre for Action Research on Environment Science and Society
CONAMP	Mexico National Commission on Protected Areas
CORALI	Coral Reefs and Livelihoods Initiative
CORDIO	Coastal Oceans Research and Development in the Indian Ocean
DFID	United Kingdom Department for International Development
GCRMN	Global Coral Reef Monitoring Network
GDP	Gross domestic product
INVEMAR	Colombia Institute of Marine and Coastal Research
IUCN	International Union for the Conservation of Nature
LMMA	Locally Managed Marine Areas Network
MBRS	Mesoamerican Barrier Reef System
MERF	Marine Environment and Resources Foundation, Inc.
MPA	Marine Protected Area
NEPA	Jamaica National Environment and Planning Agency
NGO	Non-governmental Organization
NMP	Negril Marine Park
NOAA	US National Oceanic and Atmospheric Administration
PIMPAC	Pacific Islands Marine Protected Area Community
SEA	Southeast Asia
SEM-Pasifika	Socioeconomic Monitoring for the Pacific Region
SocMon	Global Socioeconomic Monitoring Initiative for Coastal Management
SPREP	Secretariat of the Pacific Regional Environment Programme
TCZCDP	Tanga Coastal Zone Conservation and Development Programme
TNC	The Nature Conservancy
WIO	Western Indian Ocean
UNESCO	United Nations Educational, Scientific and Cultural Organization
URACCAN	University of the Autonomous Region of the Caribbean Coast of Nicaragua
UWI	University of the West Indies
WWF	World Wildlife Fund