The Locally-Managed Marine Area (LMMA) Network

Improving the practice of marine conservation

2005 Annual Report:
A Focus on Lessons Learned

Diver checking transect. Photo by Hugh Govan

Papua, Indonesia. Elizabeth Holle

Solomon Islands. Hugh Govan

Learning Workshop, Fiji. See Lay Tan

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Bali, Indonesia. Photo by Cliff Marlessy

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I. INTRODUCTION

Depapre Bay, Jayapura, Indonesia. Photo by Cliff Marlessy

The Locally-Managed Marine Area (LMMA) Network is a group of practitioners involved in various community-based marine conservation projects around the globe who have joined together to learn how to improve our management efforts. Although the Network was officially launched in 2000, this is only our second Annual Report. While last year's 2004 Annual Report gave an in-depth introduction and history of the Network, this year's 2005 Annual Report focuses on Results and Lessons Learned over the last five years. The document also reports on progress made toward our objectives and provides brief updates on member status and country activities from last year.

Network members employ a common strategy and evaluation process to learn about the conditions under which using an LMMA approach works, doesn't work, and why. Participating project teams use a common guide to monitor the progress at their sites. This guide, the LMMA Network's "Learning Framework," was jointly created by the members themselves, and outlines specific factors and methods to measure biological, socioeconomic and governance conditions that may influence the success of their work. The Learning Framework contains assumptions about how these factors will affect the success of their project sites.

For several years, project team members have been collecting data on a number of these factors, of which there are a total of 37, to test whether or not these assumptions hold true in reality. Starting in 2004-05, cross-site analyses have been made to begin to determine whether our assumptions are accurate and to gauge progress made so far.

The bulk of this year's Annual Report is a presentation of our progress made to date in analyzing site data collected from 14 key sites in four countries within the Network from 1997[1] to 2005, and to provide preliminary answers to Learning Framework assumptions. It also shares examples, stories and lessons learned accumulated throughout the years from many other sites within the Network.

[1] Although the LMMA Network was formally established in 2000, some sites have been managing their resources and collecting data prior to that, the earliest one since 1997.

Workshop in Marau, Solomon Islands. Hugh Govan

"If what you are doing is right, it'll eventually happen.
It may take five, ten, fifteen years, but you'll get there."

– Professor Bill Aalbersberg, Director of University of the South Pacific Institute of Applied Sciences (USP-IAS), during the opening speech of the Network-wide Learning Workshop in Suva, Fiji, August 2005

"Temporary or rotational closures have very little or no contribution to the overall health and sustainability of fishing grounds. The longer the period of closure, the better; permanent protected areas are best (recommended).

– Veratavou LMMA Project, Fiji

This report is aimed at the people and organizations with whom we currently work, as well as external audiences interested in marine conservation and community-based management. This report is intended for those who are already familiar with our work and the Learning Framework (for more information, please see our 2004 Annual Report and the LMMA Network Learning Framework, both available on our website www.lmmanetwork.org).

II. Progress on Objectives

Overall, the LMMA Network has made good progress towards our four original objectives. After years of active community engagement and data gathering, we are now beginning to analyze and better understand the conditions under which LMMAs work best, and are collectively learning from this information how to improve our work. It has taken us five years to get to this stage, with many success stories and challenges along the way. But every challenge has been a learning opportunity, and we have certainly taken advantage of these to learn and adapt our efforts. Here we present details on the progress made toward each of our objectives.

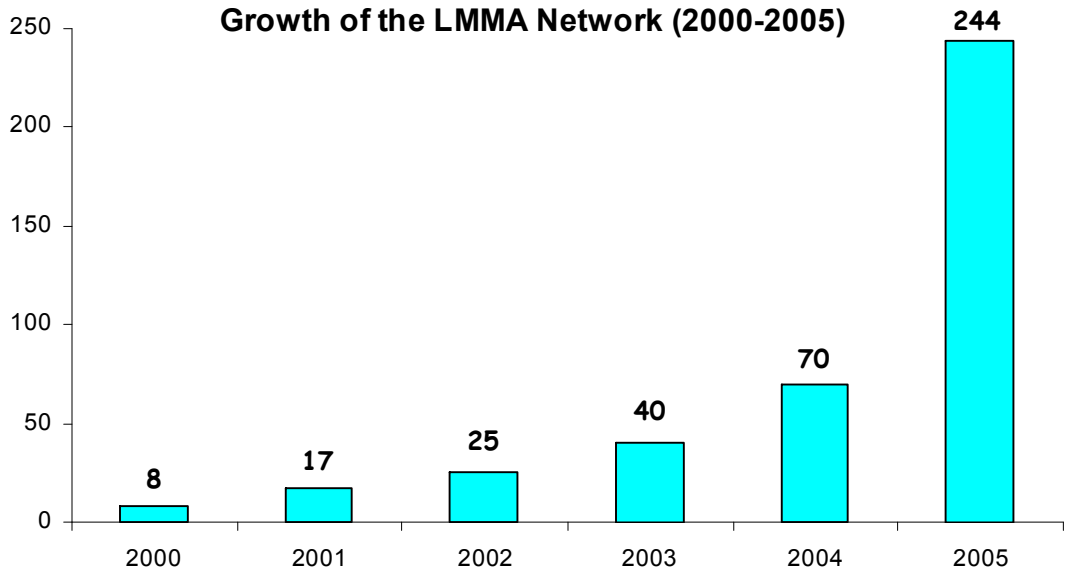
Objective 1: Protect Biodiversity at Specific Sites. *By 2004, to reverse the rapid overexploitation and degradation of coastal and marine resources and ecosystems and to preserve aquatic biodiversity in at least ten sites across the Indo-Pacific region.*

Giant Clam, Fiji. Toni Parras

Tuna, Palau. Wayne Andrew

Surgeonfish, Solomon Islands. Hugh Govan

The Network started out with only a handful of sites in 2000. By 2004, we had 70 sites and 109 protected areas. This year, these numbers have grown to more than 244 LMMA sites covering close to 9,000 sq km, with 276 protected areas covering at least 1,255 sq km. The graph below shows the number and growth in LMMA sites across the Indo-Pacific region since its inception.



The table below gives a breakdown of LMMA Network site statistics as of 2005, including number, size, geographic distribution, and more.

Country	Total No. of LMMAs	LMMA Sites - Full	LMMA Sites - Provisional	LMMA Sites - Associate	No. of Villages	No. of Management Tools/MPAs	LMMA Area (sq km)	Tool/MPA Area (sq km)
Federated States of Micronesia	7	0	1	0	9	1	22	10
Fiji	189	8	25	156	177	200	7,010	440
Indonesia	12	3	9	0	16	12	477	18
Palau	1	0	1	0	3	1	266	263
Papua New Guinea	7	0	7	3	7	28	503	503
Philippines	12	3	3	6	19	22	270	7
Solomon Islands	16	0	4	12	27	16	410	14
Totals	**244**	**14**	**50**	**177**	**258**	**280**	**8,958**	**1,255**

Note: Areas given are minimum estimates only, for various reasons. LMMAs in Fiji continue to increase dramatically; areas given for PNG are for closed reefs only and don't include entire LMMA areas due to community sensitivity of boundaries.

"'Bottom up' approach is more attractive than 'top down'."

– Pohnpei LMMA Team, Federated States of Micronesia

There is a plethora of science-based MPA networks across the region, although some of these have only minimally engaged communities in their planning and management process. In stark contrast, the LMMA Network shows that protected areas based on the socioeconomic and cultural needs of communities rather than for purely scientific purposes can yield significant conservation results. Communities themselves have collected, analyzed and used data to improve their marine areas. Conserving biodiversity at the local level is integral to the Network's vision and this has been partly achieved at some sites. Although we are still working on systematic analyses across all our sites, we can report the following preliminary results:

*Rabbitfish (*Siganid *species). Toni Parras*

- In Meos Mangguandi, Papua, Indonesia, rabbitfish counts increased inside closed areas by 485% over two years.
- In Sinub, Papua New Guinea, fish species diversity increased by 17% in the closed areas over six years.
- In Lobo, Philippines, fish biomass inside the fish sanctuary showed an 80% increase in abundance over two years as compared to the control open harvest areas.
- In Hinatuan Bay, Philippines, catch per unit effort for fish increased by 160% over two years in the LMMA as a result of enforced gear restrictions.

Fisherman using approved size mesh net, Hinatuan Bay, Philippines. Toni Parras

Toni Parras

- In permanent *tabu* areas in Fiji, clam stocks (*Anadara sp*.) in Naloto and mud lobsters (pictured left and right) in Sawa increased five times and seeded the harvest areas as well over two and four years, respectively. In some cases, local incomes in Fiji increased by as much as 35% over three years due to improved local management using LMMA tools.

Toni Parras

In summary, in addition to improving certain fisheries species of commercial and subsistence value to communities, we have also been successful in achieving biodiversity conservation at various sites throughout the Indo-Pacific region through the promotion of our community-based approach to marine conservation. Our members have been able to show that LMMAs based on cultural and/or socioeconomic motivation can reverse the rapid overexploitation and degradation of coastal and marine resources and ecosystems and preserve aquatic biodiversity.

Objective 2: Develop Resource Management Policies in the Places where these Projects are Working. *To innovate and disseminate appropriate practical policies and strategies for management and conservation of coastal and marine resources and ecosystems and to work with appropriate partners to get them adopted and implemented in selected villages, provinces, and countries by 2004.*

Because of the long timeframes needed to effect policy changes, our progress toward this objective has been slow, although we have had some success, as shown in the following examples, both big and small, at the village, national and international levels.

Influencing Government Decision-making

In Fiji, communities have been collecting data on the benefits of traditionally-managed areas and have shared their stories with the appropriate government agencies. As a result of their input, and with guidance from the Fiji LMMA (FLMMA) Network, the Fijian government made a commitment to protect 30% of their country's waters by the year 2020. This pledge was made at the 2005 UN Conference on Small Islands in Mauritius. Because the Ministry of Fisheries is a key member of the FLMMA Network, input from the communities will continue to guide and inform Fijian government policy-making. At the provincial level, Macuata has just joined Kadavu and Cakaudrove in adopting province-wide measures to protect their traditional waters through community-based techniques.

"Community conservation efforts will not be successful without government support and legislation."

– Pohnpei LMMA Team, Federated States of Micronesia

Banking on LMMAs

A harvest of sea cucumber. Photo by SIRaN Foundation, Kei.

At the village level, LMMA work has influenced small villages in eastern Indonesia to expand their *sasisen* or seasonal closure areas and to make them permanent no-take zones, as a result of the increased numbers of sea cucumbers found in adjacent harvest areas. This seasonal closure tool worked so well that the village of Tablasupa in Depapre Bay was able to construct a community hall from the proceeds of sea cucumber sales. They are now banking on the LMMAs to provide future income for community projects, creating a strong incentive for good management.

Strengthening Existing Policies

In the Philippines, LMMA work has not influenced resource management policies as much as helped strengthen already existing but unimplemented ones. The Philippines has long institutionalized local management of resources, but this devolution has not been successful everywhere. In Lobo, Batangas and Hinatuan Bay, Mindanao, the resource monitoring and enforcement work that the communities have been doing has garnered political attention and concrete financial support from the municipal governments. Seeing increases in biological indicators and the depth and level of community commitment and participation in marine resource management, local governments have taken notice and are taking their supporting roles more seriously.

More Adaptive Management to Come

Now that many of our member sites are becoming informed with their collected and analyzed data and sharing with their communities the implication of these results, we expect more adaptive management to take place soon. On a larger scale, there is currently a push by large conservation institutions worldwide to create national networks of marine protected areas (MPAs) by 2012. How the Network's LMMAs will contribute to the biodiversity and ecosystem preservation goals of these networked MPAs will be an increasingly important discussion, but there is little doubt that with our head-start in building national networks of LMMAs and stimulating collaborative learning, the LMMA Network will continue to influence policy change and impact marine conservation work at various levels.

Objective 3: Promote Learning Locally and Globally About the LMMA Tools. *To determine the conditions under which locally-managed marine areas can be most effectively employed to meet both coastal biodiversity conservation and fisheries food security needs in developing countries in the Indo-Pacific region, and once these conditions have been determined, to help practitioners understand and use this knowledge.*

In 2000, when the term 'LMMA' was coined by the initial group of project teams that started the Network at the ***"Fish for the Future?"*** workshops, the prevailing paradigm in marine conservation was the "top-down" marine protected area (MPA). Locally Managed Marine Areas (LMMAs), on the other hand, were fairly new and emphasized the active management of marine resources by local communities or resource-owning groups. Today, the term 'LMMA' has become part of the marine conservation lexicon. It has been written about as an effective conservation strategy in various trade journals, which has indeed increased the visibility of this movement. While the idea of community-based management has been around for millennia, its recent global application is booming. Today, as more communities are taking the reins back from central planners, there is a great demand for the skills on how to do this well across the Pacific, Atlantic, and Indian Oceans. Our progress in promoting information about LMMAs both locally and globally has been substantial.

Formal Learning

One of our main focuses in 2005 was to build upon the momentum from 2004 toward promoting learning through data analysis activities. The LMMA Network's **Learning Framework**, which is a guide that outlines specific factors and methods to measure biological and socioeconomic conditions at project sites, is used to collect data to help determine the conditions under which LMMAs work, do not work, and why. Many guidebooks abound, but the Learning Framework was specifically designed to be useful to community-based conservation practitioners working across the Indo-Pacific region.

With monitoring and data collection well under way at various sites, the next step was to manage and analyze all the data to get useful results. Staff at USP-IAS began to tackle this challenge with the help of a US Peace Corps Volunteer, Dr. Jim Reynolds, a retired fisheries professor from the University of Alaska at Fairbanks, who was assigned to work with Alifereti Tawake. Their hard work and intellectual leadership helped produce a database and all the mechanics behind the meta-analysis approach to comparing results from across the Network. The database comes with a user guide complete with instructions and a full set of sample biological and socioeconomic monitoring forms. In 2005, they introduced the **Learning Framework Database** for storing and analyzing data to members. Intensive data management and analysis workshops were held in the Philippines, Indonesia and Fiji, where community members and partner organization staff were trained in analyzing and interpreting their own site data and making cross-site comparisons. Some of these analyses appear in the following section, **Results & Lessons Learned**. A network-wide Data Manager was hired to help ensure that data are properly collected, analyzed and grounded in good science. To further improve the functionality and ease of use of the database, the LMMA Network has teamed up with the World Fish Center to convert it to a more user-friendly interface.

In addition, this year the Network will publish a step-by-step **LMMA Guidebook**, which details specific processes and activities for planning and implementing LMMAs with communities.

Informal Learning

Another way to promote learning about LMMAs is through informal means, such as cross-site visits, where community members are able to see how other sites are being successful or struggling, what their circumstances and methods are, and how they handle certain situations. Cross-site visits were held between many LMMA Network countries and sites. Holding informal sessions during workshops is another way to allow for enriching discussions and sharing of experiencing and observations that expand members' views beyond their own site and give them new ideas.

Cross-site visit, Candelaria, Philippines. Daisy Flores-Salgado

Communications

We have also had progress in promoting learning globally about the LMMA tools through our website, publications, presentations and awards. The LMMA Network continues to garner interest from international news services and others who are interested in covering stories about LMMAs, most notably the highly-regarded **World Resources Report 2005** and **MPA News** (see our website for the actual publications).

The website continues to expand; in 2005, we added **Members Profiles**, a section highlighting individuals' personal accounts of how they got involved with LMMA work. A **Site Profiles** section will be added in 2006, giving details and progress on specific sites.

Didick Casas, Papua New Guniea. Daisy Flores-Salgado

Also in 2005 we began production on a **Lessons Learned** video, in which members from various sites share their experiences, challenges and advice on LMMA work. The video will be released in 2006.

Filming the Lessons Learned video. Manuel Mejia

Various Network members gave presentations about their work at the **First International Marine Protected Areas Congress (IMPAC1)** in Australia. They were:

- "Community-based marine conservation in Fiji" – Alifereti Tawake and Bill Aalbersberg, University of the South Pacific Institute of Applied Science (USP-IAS), Fiji
- Rural Development & Community-Based Resource Management in the Solomon Islands
- "Managing better: a network of community led marine conservation efforts" - Scott Atkinson, Community Conservation Network, Hawaii, US
- "Shared Stewardship; Experiences and Lessons in Partnerships in CRM and MPAs" - Benedict Balderama, Sentro para sa Ikauunlad ng Katutubong Agham at Teknolohiya (SIKAT), Philippines
- "Building Partnership and Strengthening Multi stakeholders Participation in MPA Management" - Jovelyn T. Cleofe, Center for Empowerment and Resource Development (CERD), Philippines
- "Understanding Lessons from a Learning Network: The Local Community Experience" - Daisy Flores-Salgado, Earth Restoration Trust, Philippines
- "Working to improve coastal livelihoods in Solomons, Fiji, Tuvalu" - Hugh Govan, Foundation for the South Pacific International (FSPI) Coastal Programme, Solomon Islands/Fiji
- "Gains & challenges of community management of MPAs in Hinatuan Bay" - Mariter B. Quinonez, Center for Empowerment and Resource Development (CERD), Philippines
- "Locally managed marine areas (LMMAs): a conservation strategy for PNG" - Rebecca Samuel, World Wildlife Fund South Pacific Programme, Papua New Guinea, and Pamela Seeto, Regional Advisor-Western Pacific Program, The David and Lucile Packard Foundation

In addition, Dr. Jim Reynolds presented "Pineapples versus Bananas: Meta-Analysis for Lessons Learned in Locally-Managed Marine Areas, South Pacific" at the 135th Annual Meeting of the American Fisheries Society in Alaska.

Awards

In 2005, the following Network members were recognized for their outstanding achievement:

- Bill Aalbersberg, University of the South Pacific Institute of Applied Science (USP-IAS), Fiji, was awarded the *NOAA Walter B. Jones Award for Diversity in Coastal Management.*

- Francis Wadui and Paul Led of Papua New Guinea were awarded the *WWF Leaders for a Living Planet Award* for their leadership in establishing community-based protected areas in PNG. This award was presented by Jim Leape, Director General for World Wildlife Fund International, at the Pacific Islands Forum meeting in Port Moresby.

Francis Wadui (left) and Paul Led (right) with WWF award.

Objective 4: Enhance Capacity of Institutions in the Region. *To strengthen the capacity of our partners in key skills (project or program design, management, monitoring, analysis, and communications) required to undertake effective adaptive management of marine resources.*

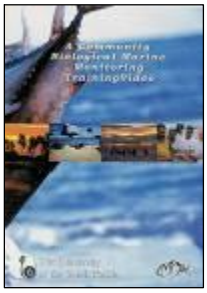
This year, we continued our capacity-building activities for our partners throughout the region. In 2005 alone, we held four international workshops on data management and analysis, which were attended by staff from the Fijian Department of Fisheries, World Wildlife Fund-Papua New Guinea, The Nature Conservancy-Papua New Guinea, Earth Restoration Trust (Philippines), Community Conservation Network (Hawaii), Solomon Islands Development Trust, SekPro (Indonesia). While it is difficult to quantify the number of people practicing what they have learned, an approximation can be made through the number of people trained. Over the past few years, we have reached nearly 2000 people throughout the region as shown in the table on the next page.

Number of people trained in LMMA approaches to marine conservation

Country	Number of people trained
Fiji	~1000
Hawaii	30
Indonesia	486
Palau	20
Papua New Guinea	110
Philippines	136
Pohnpei	140
Solomon Islands	80
TOTAL	**~2002**

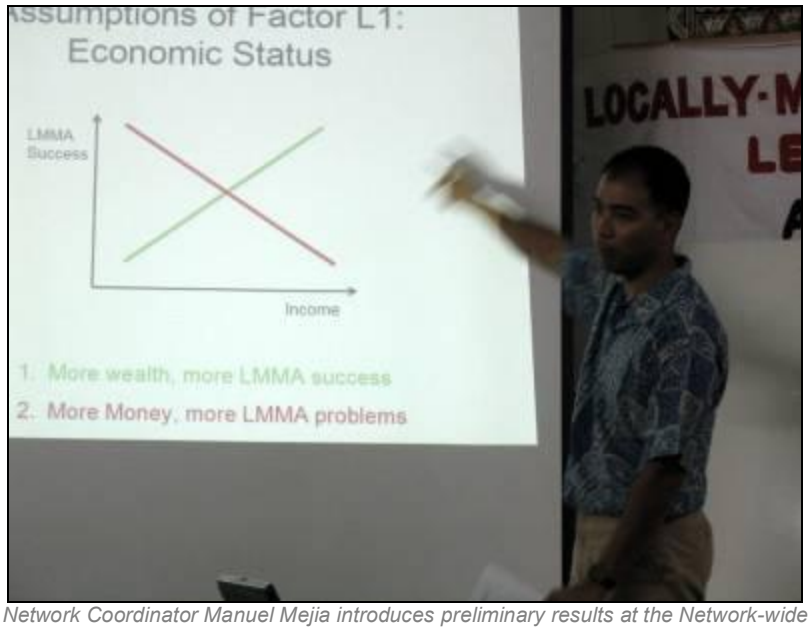
In addition, the Network's close partnership with the Institute of Applies Science at the University of the South Pacific in Fiji has given us a good model of how to meet capacity-building needs through providing leaders and training in country. We are now looking to replicate this type of relationship in other key places. For example, relationships are being cultivated between country networks and universities in Indonesia (with the University of Cenderawasih in Jayapura, Papua), and to a lesser degree in the Philippines (with the University of the Philippines' Marine Science Institute).

In addition, a Participatory Learning and Action training workshop was held by Fiji Network members for practitioners in American Samoa, thus continuing to expand the LMMA Network's reach.



In response to the heavy demand for community training in biological monitoring, the Fiji Network, together with University of the South Pacific, produced a biological monitoring training video specific to LMMA management. The video introduces the concept of monitoring an LMMA site and covers step-by-step instructions for carrying out biological monitoring, including the materials needed and the different methods employed. The video is available on DVD; please contact info@lmmanetwork.org for ordering information.

III. Results & Lessons Learned



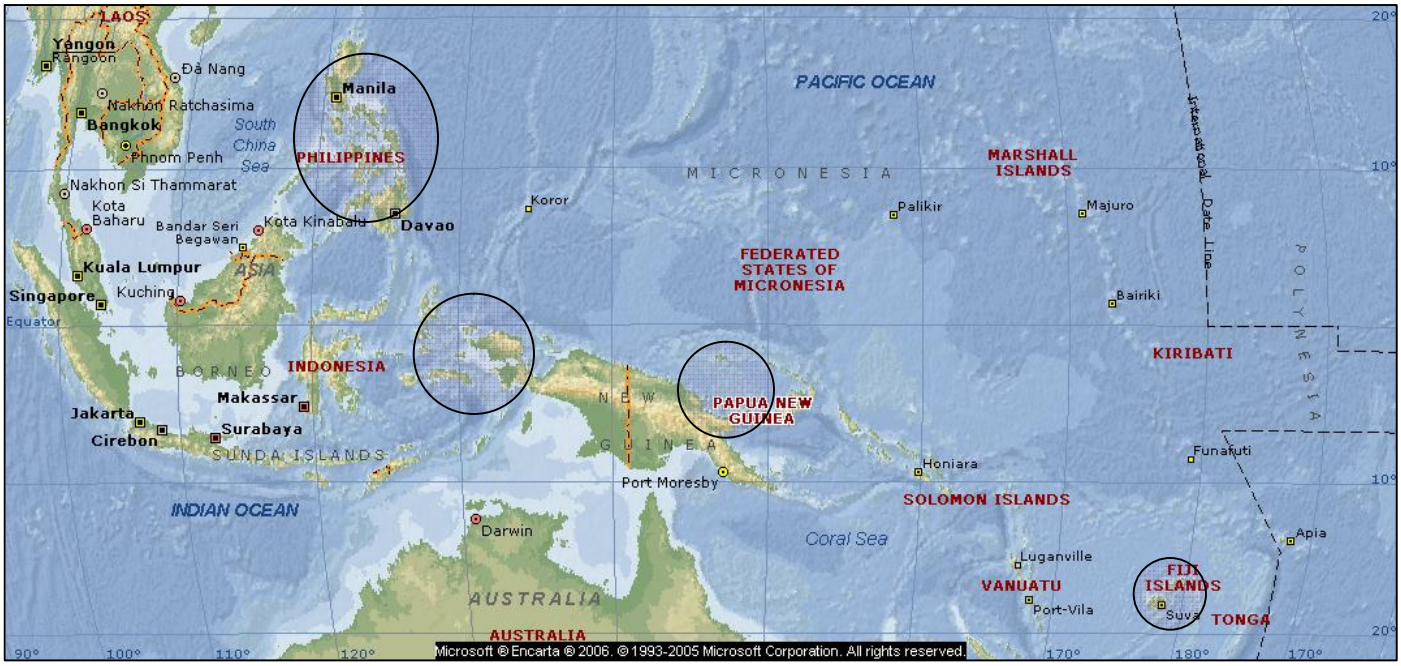
Network Coordinator Manuel Mejia introduces preliminary results at the Network-wide Learning Workshop in Suva, Fiji, August 2005. Photo by Daisy Flores-Salgado

In August 2005, representative from the 14 core sites, along with other Network members and invited guests from various countries, got together for a week-long Learning Workshop in Suva, Fiji. The purpose of the workshop was to pool site data and conduct a Network-wide analysis of select Learning Framework factors, discuss results and how they support or contradict the Learning Framework assumptions, and share experiences and lessons from the field.

The 14 sites were chosen for the analysis in this report because they have collected time-series data – that is, baseline and serial datasets – of biological data from their full reserve and open harvest areas, *and* they have at least one set of socioeconomic data. This was necessary so that the measure of LMMA success could be correlated against the socioeconomic factors. For example, to be able to determine if a high LMMA success (based on the abundance of an indicator species or coral cover) positively or negatively relates to a specific socioeconomic factor, such as the level of education of those in the community. The 14 sites are:

1. Ucunivanua, Verata, Fiji
2. Kumi, Verata, Fiji
3. Navakavu, Verata, Fiji
4. Vanuaso, Gau, Fiji
5. Lamiti-Malawai, Gau, Fiji
6. Tagaqe, Korolevuwai, Fiji
7. Daku, Kadavu, Fiji
8. Saba, Papua, Indonesia
9. Auki, Papua, Indonesia
10. Meos Manguandi, Papua, Indonesia
11. Sinub, Madang Lagoon, Papua New Guinea
12. Hinatuan Bay, Mindanao, Philippines
13. Candelaria, Bohol, Phillipines
14. Tawala, Bohol Marine Triangle Project, Phillipines

See map on following page for general location of sites. For more details on each individual site, visit our website www.lmmanetwork.org/Site_WhereWeWork.cfm



For detailed locations of each site, see our website
www.lmmanetwork.org/Site_WhereWeWork.cfm

Ten of the 37 Learning Framework factors[2] were tested with data collected from the 14 core sites. These factors were chosen based on having the most data points available to produce reliable comparisons across sites. Comparisons were made by correlating selected socioeconomic factors against overall LMMA Success. LMMA success was determined by measuring the growth or decline in biological indicators, expressed as either Habitat Health or Species Health. Typically, Habitat Health is determined by measuring live hard coral cover, whereas Species Health is determined by counting a specific indicator species. Common indicator species include sea cucumbers, groupers, snappers and surgeonfish.

The difficulty in comparing results across sites lay in the fact that biological datasets from different sites are collected using different monitoring methods and indicator species. For example, some of the biological data are collected by academics and others by local community members, resulting in different levels of organism identification (i.e., species level or common names). In addition, selecting the biological indicator for comparing against the socioeconomic factors proved difficult due to the lack of a common indicator, and more so due to the different life history processes (growth rate, reproductive rate, etc.) of each. As such, comparison of data between one dataset to the next is near impossible, prohibiting lessons learning across different project conditions. The novel approach that we decided to use is Meta Analysis of project site data. Meta analysis allows for comparing datasets that have been collected using different methods and on different indicator organisms. In laymen terms, it allows for comparing 'oranges' to 'bananas.' To adjust for these incongruities across datasets, an average Standardized Mean Difference (SMD) was first determined for each of the common indicators. Then, the mean of these SMDs for all indicator species was calculated for each site and then used in correlation against the aggregated data for each socioeconomic factor, listed on the following page.

[2] To see a complete listing and description of factors, please see the LMMA Network Learning Framework, available on our website www.lmmanetwork.org.

Governance Factors

1) G4: Compliance and Enforcement:
2) G7: Leadership
3) G8: Resource Conflict

Human Population Factors

4) H4: Degree of Consensus

Livelihood Factors

5) L1: Economic Status
6) L2: Dependence on Marine Resources
7) L5: Formal Education
8) L6: Environmental Knowledge and Attitudes

Practitioner Factors

9) P1: Local Participation
10) P2: Project Team

The meta analyses on each factor are presented using the following outline:

- Factor Name
- Assumption
- Results (graph)
- Discussion
- Recommendations

Each factor is first introduced with their corresponding assumption(s) from the Learning Framework, followed by a graph of the actual plotted data. The Y-axis for each graph represents LMMA Success measured using the Standardized Mean Difference of biological data (either Habitat or Species Health). The X-axis represents the socioeconomic data for each of the sites for that particular factor. Only those core sites with sufficient data are included in each graph; therefore some graphs may have less than 14 data points.

The presentation of each factor's graph is followed by a discussion of the results, including possible reasons for why they may differ from the assumption, anecdotes and examples from different sites to illustrate the discussion, and recommendations from members on how to overcome difficulties. While the data presented in the graphs is drawn from the 14 key sites, the comments under the discussion portion of each factor is compiled from statements made during the workshop as well as from previous reports, presentations, or statements by various Network members, including those outside the 14 key sites.

We want to emphasize that this section represents more a test of our abilities to analyze data rather than a vigorous and conclusive presentation of results. We are still learning, and look forward to sharing our accomplishments, challenges, lessons and experiences in the future.

"By learning together, we can all improve."

– Alifereti Tawake, University of the South Pacific Institute of Applied Sciences (USP-IAS), Fiji

GOVERNANCE FACTORS

Governance factors are those that are related to the governance of local marine resources and the LMMA. Governance refers to the particular set of institutions, rights, and rules operating within and guiding a society. For the purposes of the LMMA Network, we are particularly interested in the governance of marine resources. Resource governance takes place at four related levels: local, provincial, national, and international. Governance factors presented here include compliance and enforcement, leadership, and resource conflict.

Factor G4: Compliance and Enforcement

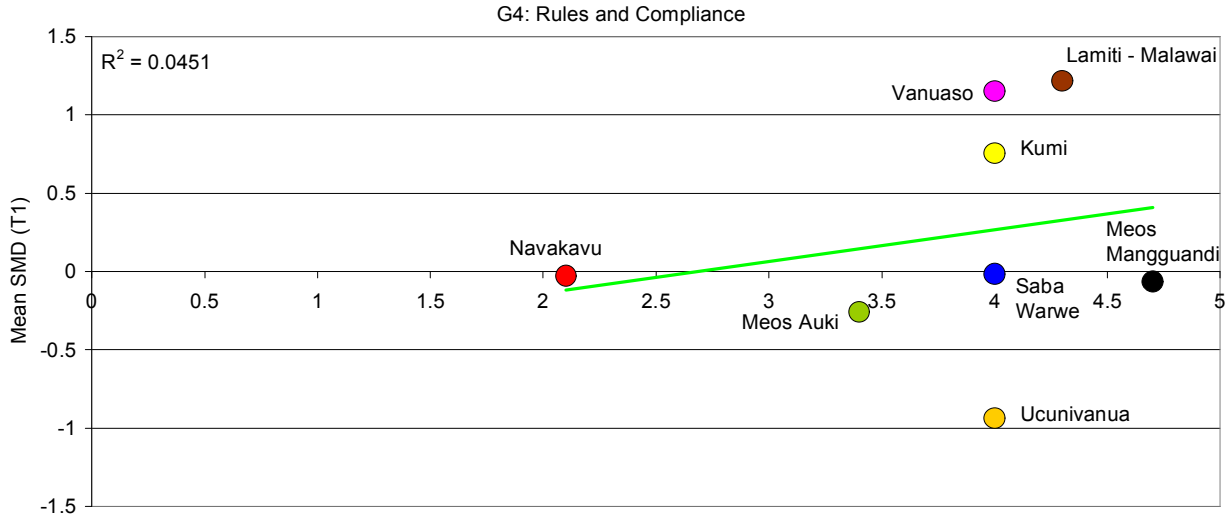
This factor deals with the degree to which resource users follow stated rules and actions taken to influence compliance, and also considers the credibility of the enforcers implementing those rules and actions.

Assumptions

- As compliance increases, it becomes easier to maintain a successful LMMA project. In other words, LMMAs that experience high rates of rule violations are less likely to be successful.
- As enforcement becomes more effective, it also becomes easier to maintain a successful LMMA project. For enforcement efforts to be effective:
  - compliance with rules needs to monitored;
  - resource users must believe that the consequences of violating the rules are not worth the risk of being caught; and
  - the enforcement agency must be recognized by resource users as having the appropriate authority to enforce the rules.

Results

The data indicates that the higher the compliance with the rules, the higher the LMMA success, thus supporting the assumption. Respect within the community of the rules as well as the ones enforcing the rules (e.g. fish wardens, policy makers, fisheries sector, community leaders, and local government system) leads to greater compliance within community users, thus resulting in higher LMMA success.



Discussion

Despite the reassuring results, there are always poachers that take advantage of the resources in protected areas. Does legal gazettal of a protected area make a difference? For the one legally gazetted area in Fiji, it does not; people still poach even though the area is legal now; there are penalties but they are not enforced. Some sites have been able to improve compliance and enforcement, while others are still having difficulties.

Ratu Aca Vitukawalu in Daku Village, Fiji. Photo by Toni Parras

"I think the biggest obstacle we are facing right now is people are still fishing illegally in our marine protected area… people have been stealing not only fish but also the buoys which have been left as marks for our MPA boundaries."
– Ratu Aca Vitukawalu, Namoce tribe Chief, Daku Village, Kadavu, Fiji

"People are still poaching in the protected reefs. There was no awareness in the beginning about what LMMAs were all about. Not the whole community was behind the decision to close the areas for protection. And they were closed for the wrong reasons; people thought it was a way of generating fast money. So there were misconceptions about the LMMA idea itself. So people did not respect the closures. Also, the majority of the communities did not know that these areas were protected and gazetted under the Fisheries Management Act. There was no public document to inform the public or the communities of this."
– Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager, Papua New Guinea

"Basically just the rules by themselves do not help unless people comply. Although we have many rules and regulations like the fisheries code of 1998, and we have the delineation of the marine areas, and we have the local fish wardens – there are still poachers, like commercial fishers. They still go inside the sanctuary. There are still many violations, but this is being overcome by the people coming together and forming the Bantay Dagat, fish wardens… It's a big challenge for them to face the commercial fishers because they are in small boats, they are local fishers, and to be faced with these big commercial fishers trying to threaten them to get their resources and them trying to protect is really a continuing challenge." – Daisy Flores-Salgado, Philippines LMMA Network Country Coordinator

Daisy Flores-Salgado

"In Fiji, it is not so much the rules that are being put into place that lead to compliance, but ***who*** *is giving the rules. Traditional respect for the chief who is giving the rules matters more than the rules themselves."* – Loraini Sivo, World Conservation Society, Fiji

"Our situation before – frankly speaking, the fish were scarce. Why? Because of illegal methods. We used small-mesh nets. We used tubli [poison]. We used cyanide. And especially dynamite. We wanted to catch fish as much as possible. Today is different. There is an abundance of fish today. The illegal fishing has been stopped. This is because of the guarding done by the People's Organizations." – William Perolina, President, Danggit People's Organization, Hinatuan Bay, Philippines

"At the start, we had a difficulty explaining to the violators. But today, all the people in the community understand what we are doing…Our experience in guarding the fish sanctuary – it is not only the husband and wife, but also their children that are involved; the parents bring the children to the guard house and they sleep there. Their sacrifice is really great… to protect and guard the fish sanctuary. And the number of fish has really increased, so some people are tempted to go into the sanctuary. But by not entering is their way of supporting us. They won't

attempt to enter when they see someone is guarding. Especially since the ones guarding are the whole family. Exploiting them is just too pitiful to think of." – Gemma Gades, Chairperson of NAMAHIN Federation, (United Fishermen of Hinatuan), Philippines

"The challenge is neighboring people come and take the [marine] products. If someone comes to steal, that man can be caught and brought into meeting among the chiefs of the tradition to be punished, which is settled by a meeting drinking coconut water. If the stealing is repeated, we keep talking, but there is no punishment." – Henry Passaray, Tribe Chief, Tablanusu Village, Depapre Bay, Papua, Indonesia

"Nobody is excused. The moment they violate, then we have to bring these people to justice. They are apprehended by the Philippine National Police and they are brought here. And for first offenses, based on the ordinance, we just penalize them. For second offenses, we go to court and by that alone, these are deterrents to them." – Alicia Momongan, Mayor, Hinatuan, Philippines

Which works better – legal or more traditional methods of compliance? It depends. If a site is close to urban areas, it is easier to get the police. However, in general when in rural areas, it is hard to get police or legal enforcement.

"Traditional method works better, but the legal system should compliment this as in the case in Kimbe Bay LMMA. In Kimbe Bay LMMA, the Talasea Marine Environment Law compliments the village court system in the communities. So penalties which are not dealt with at the Local Level government can be dealt with at the village court level. Regulations and penalties from the village court systems have been incorporated into the legal system. So the Law just gives power to the traditional methods that are already in place." – Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager, Papua New Guinea

"In Meos Manguanddi, which is far from urban areas, it is not effective using a legal approach. We must go to other islands and go to the church and explain that we have a protected area. We try to ask for compliance because the legal system doesn't work out in the rural areas. In the traditional system, there is more trust. Social sanctions are more effective, for example – being shamed at the church when one clan or family uses a bomb."
– Cliff Marlessy, Indonesia LMMA Network Country Coordinator

Similarly, at some sites in Fiji, a violation of the rules is brought up in a town meeting, and the person is shamed. In Fiji, only sanctioned fish wardens have the right to take violators to the police. Fisheries wardens (including some women) have been trained by the ministry of fisheries so they are legally able to arrest violators; they are fully endorsed by the government. In Kadavu alone (the third largest island in Fiji), there are 52 fisheries wardens covering law enforcement for 26 protected areas.

In the Philippines, fish wardens – both men and women – are deputized by the government. In Hinatuan, the fishery law enforcement team consists of the Philippine National Police, People's Organizations, and municipal level officials, not just the LMMA site. Patrolling is conducted by group.

In Indonesia, enforcement takes place at the local level and district level, and is also government-empowered.

Candelaria Fish Warden Modesto "Estong" Montejo. Photo by Toni Parras

In Papua New Guinea, there is a village-appointed committee usually made up of clan leaders who are resource owners of the reefs that are being managed. If there is an enforcement issue, it is taken up with these clan leaders and then is taken to the village court level and they are able to deal with it there.

Recommendations

- Community rules should be developed through a participatory process and endorsed by the whole community.
- Rules should be clear and transparent to the community itself and to the neighborhood.
- Rules should be in the local language to increase community awareness.
- Good systems for enforcement are necessary, such as patrolling and court trial for appropriate penalties. These should be carried out by the proper authorities, fish wardens, policy makers, fisheries sector and local community.
- Use an 'enforcement through education' approach.
- Religion and traditional ethics should be sustained and integrated during the development of community rules.
- There should be community support regarding resources used for enforcement, e.g. fuel costs, etc.
- There should be government support for enforcement such as a boat and engine.
- Enforcement partnership between the community and government should be encouraged.
- Make the communities aware of the LMMA, what it is about, the benefits etc, BEFORE they set up their tambu areas. So that all of the members are on the same page and in the long run you don't face problems among community members and partners.

Let the community know about the rules: the poster above right about the protected area in Vueti Navakavu in Fiji is produced in the local language and given to every household to increase awareness.

Factor G7: Leadership

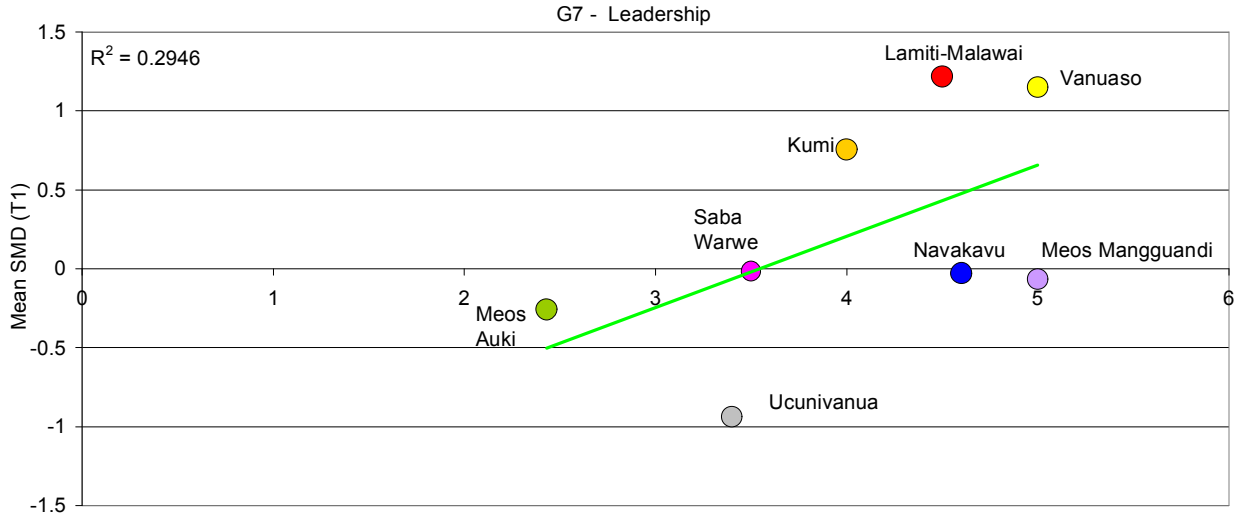
This factor deals with the relative strength of key leaders involved in the implementation and management of the LMMA. Leaders are defined as individuals (such as a local chief) or groups (such as a council of chiefs) who take responsibility and action and who have influence over other people's behavior. Leaders can be either formal (part of the governance structure) or informal (outside the governance structure).

Assumption

- If traditional and local leaders are involved in the governance of the LMMA, then it becomes easier to maintain a successful LMMA project. Furthermore, if there is strong leadership that supports the project, then the project is more likely to be successful.

Results

The data strongly supports our assumption that strong leadership and more local leaders involved leads to higher LMMA success.



Discussion

"*The Ministry of Fisheries wants leaders to be spiritually enlightened. Not just economically and intellectually. They want them to be people-centered. If you want to change society, you have to change men*." – Fiji LMMA member

"Lead people from the communities have to be dedicated and respected and influential in the community. Need good leadership, otherwise it will never work." – Papua New Guinea LMMA

Pio Radikedike.
Photo by Toni Parras

"I think the most important factor that leads to the success of LMMA is leadership. We have good leadership in our communities, which work together with the communities... [But] when there is disagreement/ disharmony among leaders, when people see leaders not getting along, people don't respect the tabu. The obstacle that we are facing in Verata is when the communities at the grassroot level look up to the decision makers and the decision makers are not helping each other – the people will not follow the rules never mind what the chief says because they see that the decision makers are not loving each other, not getting along."
– Pio Radikedike, Village Headman, Ucunivanua Village, Verata, Fiji

"I think the most important thing that leads to the success is that we respect the advice from various organization and groups, and also, we respect the elders in the decisions they make." – Lemeki Nabua, Naivakarauniniu Village Spokesman, Kadavu, Fiji

Naivakarauniniu Village Chief.
Photo by Toni Parras

"To me the greatest thing I have learned is about leadership. What I have been observing in every site is the support from the community because they listen to the decision of their headman. The biggest obstacle in our

area right now is whenever somebody asks the headmen to discontinue the tabu, he allows it and never informs the villagers." – Sikeli Seruvatu, Village Headman, Kumi Village, Fiji

"When you have a leader with no background in fisheries, it is difficult to convince people on the purpose of having a protected area. Leadership in LMMA depends on whoever is elected during election. If the elected leader has their heart in fisheries, there is an assurance that all conservation projects will be successful with his political will in implementing all the policy concerning marine resources." – Tawala LMMA site, Bohol, Philippines

The following are traits of a "good" or "strong" leader as defined by members at the Network-wide Learning Workshop.

A good/strong leader:

- Takes into consideration the people's view when making decisions
- Is not result-oriented but aware of and concerned with what benefits are gained for the people
- Is transparent and equitable
- Possesses environmental ethics
- Is responsible for all of their people
- Shows no favoritism
- Is accountable
- Puts people first
- Practices "green" leadership. Is aware of and responsible for the well-being of their people and their environment (local environment issues).

Recommendations

- Strong and good leadership is important for LMMA success, but consensus on decisions/policies is necessary, complemented with mutual respect between leaders and community members.
- Ensure continuity of LMMA and environment programs with changes in leadership.
- LMMA coordinators must have the full support and understanding from their home organizations' supervisors to undertake their roles and responsibilities for the Network.

Factor G8: Resources Conflict

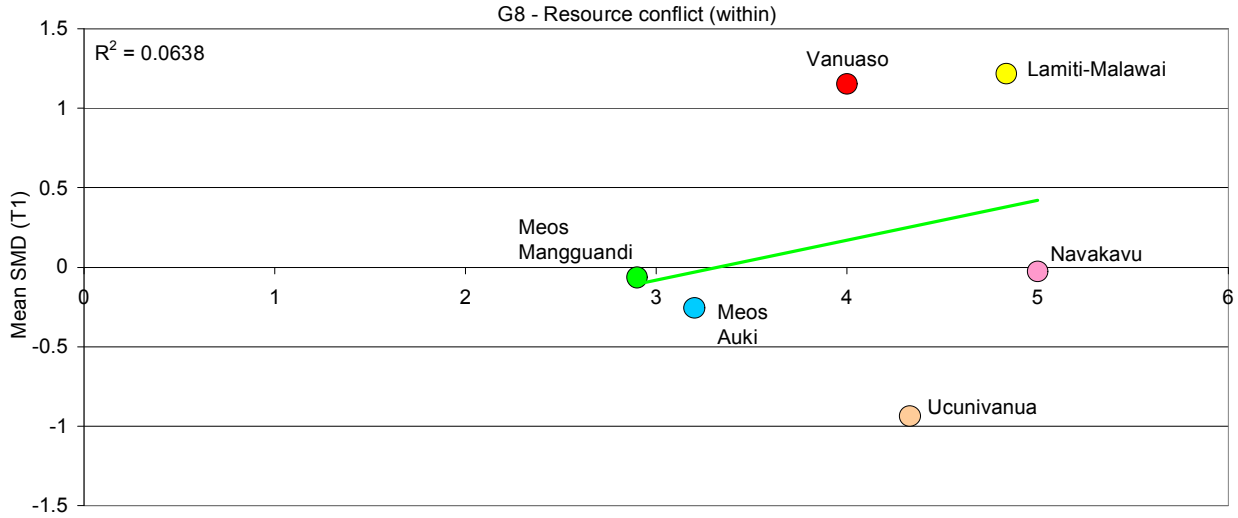
This factor deals with the types and nature of conflicts over marine resources that exist within the site, the relative intensity of such conflicts, and how conflicts are resolved.

Assumptions

- As the degree of conflict increases, it becomes more difficult to maintain a successful LMMA project.
- Communities that are able to resolve resource conflicts are more likely to have successful LMMAs.

Results

The data indicates that as the degree of conflict increases, the success of the LMMA also increases, which is contrary to our assumption.



Discussion

Some possible reasons for this incongruity between assumption and result include:

- In Lamiti-Malawai and Vanuaso, Fiji, the conflict is outside the protected area, but the local governance is strong
- Even though there is conflict, the community supports the LMMA site
- The conflicts are from outside the village
- There is more effort to solve the conflict, because the community enjoys the benefits of the LMMA

Types of resources conflict include:

- Disputes over the boundaries of the protected area
- Preferential rights given to resource owners
- Use of traditional versus commercial types of fishing gears
- Transparency of financial transactions
- Equitable distribution of wealth
- Conflict between development and conservation

"Regarding the data in the graph: maybe some sites are reporting conflicts while others are ashamed so they don't admit their conflicts." – Bill Aalbersberg, Director, University of the South Pacific Institute of Applied Sciences

"Conflict over marine resources use is external…some divers destroy the fishing gears used by fishermen, especially fish traps. Divers don't think that dive sites should also be used as fishing ground, but the community doesn't agree. Another factor is encroachment of large-scale commercial fishers from other towns within municipal waters." – Tawala LMMA site, Bohol, Philippines

Boy with fish trap, Bohol. Photo by Daisy Flores-Salgado

"It is important that people can see the physical boundaries of the protected area. If there are none, people need to ask around and get local knowledge of the area. All in all, conflict is part and parcel of management. Conflict is something you should expect. Everyone's interpretation is different. Advice to new LMMA sites: You should choose to address this conflict." – Alifereti Bogiva, Leader of the Village Governance Program, University of the South Pacific Institute of Applied Sciences, Fiji

Recommendations

- Resource conflict should always be expected.
- Initiative to start LMMAs should come from the resource owners.
- There should be strong to absolute consensus in order to solve resource conflict for better LMMA success.
- There should be strategies to solve the resource conflict, like consultation with community and outside parties.
- Conflict can be minimized by ensuring distribution of benefits to non-resource owners as well as owners, and increasing women's role in the LMMA management.
- There should be clear resource use guidelines.
- There should be community advocacy to government dialogue.
- Leaders must work with the local community entities such as:
  - Church, local government, local NGO's
  - Traditional youth and women groups
  - Fishermen groups, fisheries management committees

HUMAN POPULATION FACTORS

Human population factors includes the number of people at the site, human migration population diversity degree of consensus. Based on the data available, we are only presenting the results for the Degree of Consensus factor.

Factor H4: Degree of Consensus

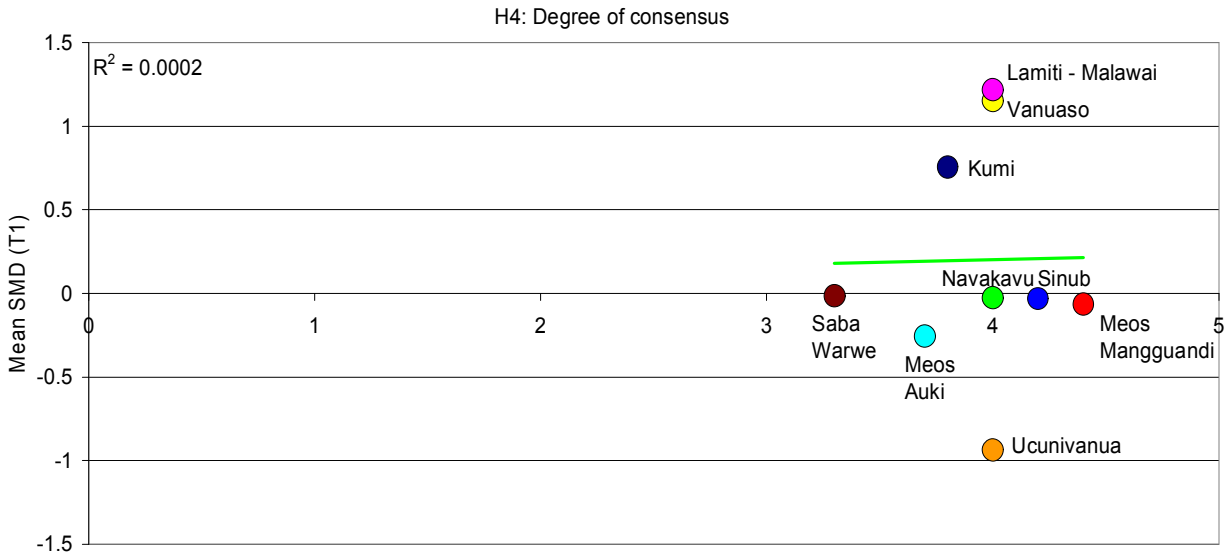
This factor deals with the degree of agreement among the members of the population at the project site about natural resource use policy and practice that impact the health of their marine environment. This may include decisions about the location and duration of species no-take areas, the size and type of fishing gear that is permitted, and the number of hotels and homes that are built along the coastline.

Assumptions:

- As degree of consensus increases, it becomes easier to maintain a successful LMMA.
- If there is high consensus, then governance becomes much simpler and more effective.

Results

The data indicates that there is a moderate to high degree of consensus, yet there is a very weak positive relationship between the degree of consensus and the measure of success.



Discussion

Strong consensus is still believed to be necessary, but apparently it is not sufficient for LMMA success. Despite community agreement on the LMMA, other factors can break it down – for example, poor leadership, poor site selection, weak implementation, choice of protection/LMMA tool (total no-take area versus partly protected or species-specific) and definition of protected (that is, some people interpret it differently), and lack of information.

In some areas, where there are strong traditional beliefs, there is more consensus among villagers not to go inside the protected area. There also tends to be more consensus if the community agrees to put the marine reserve in a lesser-fished or unused area altogether. Having the majority of the community decide and agree to the protected area is more effective than when it is mandated solely by a chief or leader.

"In Papua New Guinea, if an area is believed to have spirits, people respect it and don't go in there." – Aaron Jenkins, Wetlands International – Oceania

"Traditional beliefs have a significant influence when establishing/enforcing LMMAs."
– Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager,Papua New Guinea

"In the Philippines, one community agreed to put their marine reserve in a less-used area – not in the main fishing ground, so it would be protected but not affect their fishing." – Daisy Flores-Salgado, Philippines LMMA Network Country Coordinator

"Lamiti village agreed on one site for the no-take area, and Malawai another site which overlaps. Conflict arose for about one year. Intervention lead to agreement on the current site to be shared." – Josese Radrodro, Lamiti/Malawai project site, Fiji

"LMMAs have improved community cohesiveness with a high degree of LMMA benefit distribution after 3 years. Through our engagement with LMMA work in partnership with University of South Pacific Institute of Applied Science and the provincial office, our three chiefs are now talking to each other after decades of disputes and they have installed a paramount chief." – Bai Kei Votua, Fiji

"About one-quarter of people in the village don't agree with the protected area, so they poach at night… Also, the Fish Wardens have their duties but do not do them. They have no boat for patrolling and no gear that they need." – Alena Laqai, Secretary, Korolevu-I-Wai District Administration Office, Tagaqe, Fiji

Recommendations

- Always aim for moderate to absolute consensus when setting up the specifics of your LMMA
- The communities' criteria of what constitutes a successful LMMA may be different to that perceived by western science. Make sure the LMMA addresses community needs.
- Help the communities help themselves, mediate community expectations – clarify roles of all stakeholders, change community incentives for only material gain, ensure NGO transparency, etc.
- Strong community support, commitment, participation and leadership is needed for success of LMMAs. Frequent community engagement and consultation…follow up, follow up, follow up.
- Seek help to control outside forces (commercial fishing boats, public waste, etc.)
- Build partnerships with NGOs and businesses (for example, hotels and tourist shops)

LIVELIHOOD FACTORS

'Livelihood' refers to the human activities undertaken to maintain life, standards of living, and lifestyle, and includes both subsistence and income-generating activities. Subsistence activities involve directly providing food, shelter, clothing and other basic household needs, while income-generating activities involve raising money; oftentimes, the two overlap. The livelihood factors presented here are economic status, dependence on marine resources, formal education, and environmental knowledge and awareness.

Factor L1: Economic Status

This factor deals with the relative wealth of local stakeholder households and their society Economic Status generally describes community wealth, including both the overall level of wealth and the distribution of wealth among households in the community. Economic Status includes the combination cash income, savings, assets, and the outputs of subsistence activities.

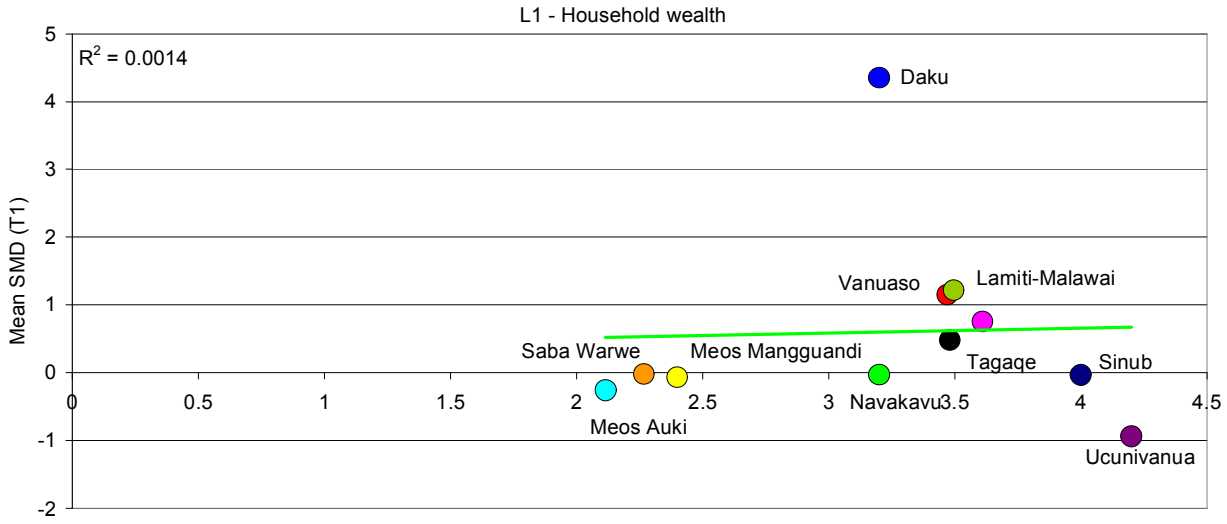
Assumptions:

- As the economic status of a community increases, it becomes more difficult to maintain a successful LMMA (this occurs because higher status leads to greater material expectations, which leads to greater pressure on marine resources).
- Another opposite assumption holds that as the wealth of a community increases, they have more alternative income sources and thus are less dependent on marine resources, making it easier to maintain a successful LMMA.

- If local economic status levels exceed the national average, then we might expect migration to the site and thus difficulties in maintaining a successful LMMA over the long-term. If local economic status levels are less than the national average, then we might expect migration away from the site.

Results

The data shows some correlation between higher household wealth and higher LMMA success, although the correlation is weak. Whether this is due to decreased dependence on marine resource is unknown at this point.



Overall, in the two years since the establishment of LMMAs at these sites, household wealth seems to be a weak influential factor in regulating LMMA success. The presence and successful management and involvement of local people in alternative sources of income within the community *could* result in increased LMMA success by shifting focus from extraction of marine resources, thus allowing for resource recovery. However, it is likely that more time (> 5 years) needs to elapse before people become more dependent on alternative sources of income and thus reduce harvesting effort of marine resources. Only then would there be enough data to see strong correlations between household wealth and LMMA success, if any.

Interestingly, the site with the highest wealth has the lowest LMMA success in terms of habitat health (Ucinuvanua).

Discussion

Participants discussed various scenarios for how wealth could be a positive or negative factor for LMMA success, including:

Positive

- If there is more money, people can buy food in stores rather than fishing, or they can pay others to go fishing for them (less people out fishing).

Negative

- The more wealth, the more money people have to buy more efficient fishing gear (including destructive ones such as dynamite and cyanide) and boats, thus leading to more efficient and/or illegal harvesting of marine resources.

"If people have more money, there is less pressure on marine resources – people just get fish for consumption; they are not dependent on it economically. On the other hand, the more money you have, you can buy dynamite to throw it." – Ratu Timoci, Tagaqe Village Chief and Chairman of the District Environmental Committee, Tagaqe, Korolevu-i-wai, Fiji

"If you have more money you can buy a bigger boat, bigger nets, more fishing gears. It might cause more problems." – Daisy Flores-Salgado, Philippines LMMA Network Country Coordinator

"The more wealth, the more LMMA success because people are getting more from the LMMA; there is more incentive to protect it. It is like saving their money in a bank." – Cliff Marlessy, Indonesia LMMA Network Country Coordinator

"In my community, the more wealth, the more LMMA success because there are other things apart from MPAs. When we ban fishing licenses, there is LMMA success and there are plenty of fish. Second thing, there is money to collect from activities using the land; we have land so there is money to be made from it." – Pio Radikedike, Village Headman, Ucunivanua Village, Verata, Fiji

Recommendations

- For communities with below-average wealth, LMMA strategy should incorporate income-generating projects.
- Material expectations should be clarified at the very beginning of the LMMA establishment process.

Factor L2: Dependence on Marine Resources

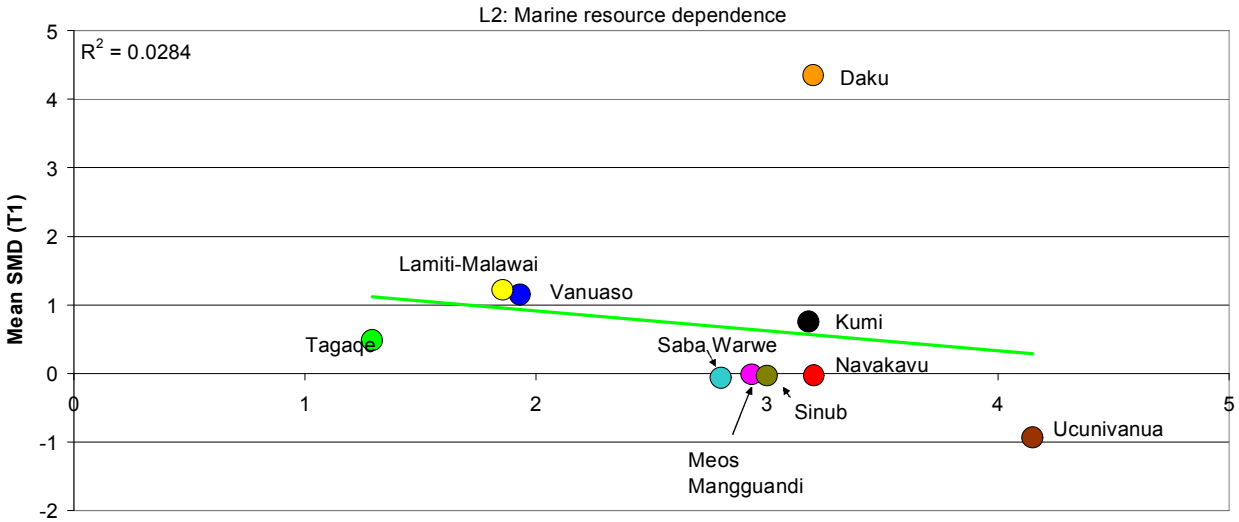
The degree to which the local stakeholders gain their income and subsistence from marine resources associated with the availability of alternative sources of livelihood.

Assumptions

- As dependence on marine resources increases, it becomes easier to maintain a successful LMMA. (This would occur because an understanding of greater dependence on marine resources leads to better resource management and greater interest and support for LMMAs.)
- An alternative assumption holds that a high degree of dependence on marine resources makes it more difficult to maintain a successful LMMA. (This would occur because if people are highly dependent on marine resources and have no alternative sources of livelihood, it may be hard for them to forego resources in set aside no-take areas of resources that they are currently using in the short-term, even if it may lead to increased resources over the long-term.)

Results

The data supports the second assumption, showing that more dependence on marine resources leads to lower LMMA success. The most obvious reasons for this are that higher dependence leads to increased fishing pressure, poaching, and extraction due to migration.



Discussion

While the data shows an overall inclination to higher dependence leading to less success, it varies from site to site; indeed, there are some sites with anecdotes to the contrary, while others support these results.

"In Meos, higher dependence leads to more LMMA success. In Meos, for sea cucumber, first there was only one protected area (photo below left), and it was doing well. Then they increased it to three protected areas (center photo below). Finally the church decided to make the whole island protected (photo below right) because the people depend so much on the marine resources." – Cliff Marlessy, Indonesia LMMA Network Country Coordinator

Meos Mangguandi Island, Padaidos, Biak, Indonesia. Photos by Cliff Marlessy

"Less dependence leads to more success because if we spend most of our days harvesting marine resources, we are not making success. The less you depend, the more you can go to other alternatives. If you can go to the land to make a living, you depend less on marine resources and the success of the LMMA will go up." – Pio Radikedike, Village Headman, Ucunivanua Village, Verata, Fiji

"In Sinub, it is the same situation – as people go into cash-earning jobs in town, their dependence on marine resources lessens, so the pressure on marine resources goes down and the success of the LMMA goes up because there are less people out there fishing." – Aaron Jenkins, Wetlands International – Oceania

"In Navakavu it is the same – the village is near an urban area, so when the protected area was set up, some people went to other livelihoods in town. That will decrease dependence on marine resources." – Jolame Sikolia, Navakavu Village, Fiji

"LMMAs have improved our livelihood and make us proud to have done something that will greatly benefit our children and grandchildren to come." – Veratavou, Fiji

When you look at the results for dependence against habitat health (coral reef, seagrass, mudflat, etc.), there actually *is* more LMMA success. However, the results in the graph above are based on measuring dependence against *species* health (fish, shellfish, sea cucumbers, etc.), thus indicating less success. A reasonable explanation offered for this divergence could be that corals are not edible, thus they are not being harvested for subsistence.

Recommendations

- Resource management efforts should be complimented by livelihood intervention at the household level.
- Explore alternate sources of livelihood including farming, agriculture, aquaculture/mariculture, eco-tourism, others (copra, palm oil, kava, mat weaving, etc.).
- Respect and adapt traditional knowledge and practices.
- Employment in other areas.
- Temporary or rotational closures have very little or no contribution to the overall health and sustainability of fishing grounds. The longer the period of closure, the better; permanent protected areas are best (recommended).

Factor L5: Formal Education

This factor describes the education that local stakeholders have received in terms of the years of attendance in schools.

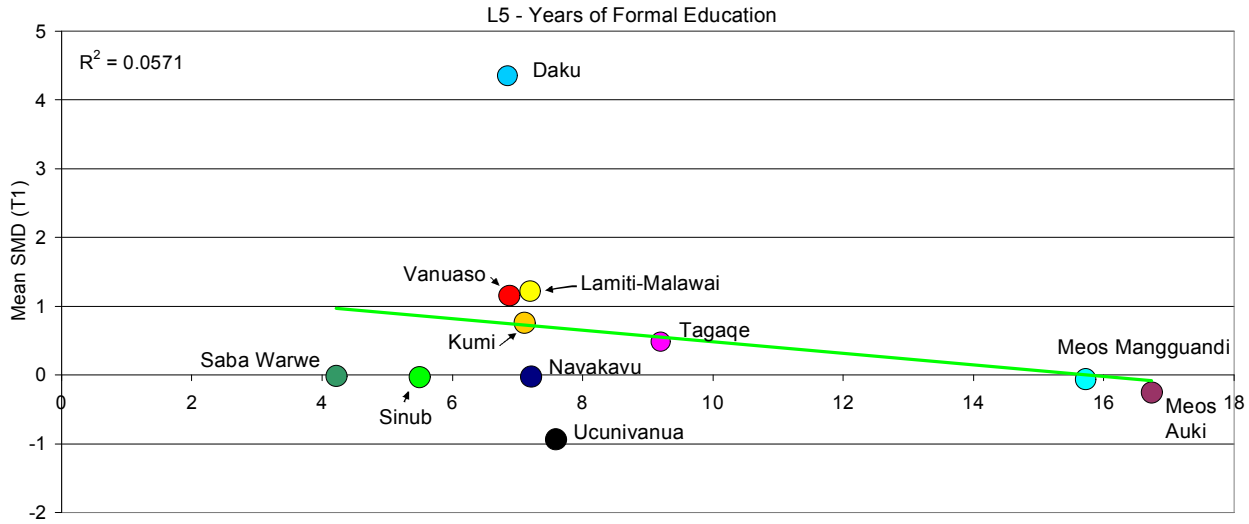
Assumptions

- More education, greater LMMA success. Greater average schooling will result in greater LMMA success because people with more formal education have a greater awareness of environmental issues and tend to have jobs that are not dependent on marine resources.
- More education, reduced LMMA success. Alternatively, greater average schooling will result in reduced LMMA success because people with more formal education are less connected with marine ecosystems, have less knowledge of marine issues, and show less support of LMMAs.

It is expected that as the years of formal education increases (more people attaining secondary and tertiary schooling), people are likely to become more environmentally aware and as a result would lead to high LMMA success.

Results

Unlike what was expected, LMMA success was negatively correlated with years of formal education. That is, an increase in education is resulting in reduced LMMA success. This could be attributed to those that are formally educated learning new, innovative, and more effective (and/or destructive) ways of fishing rather than learning the importance of conserving and managing the use of marine resources.



Discussion

Many participants had anecdotes to share.

"Two years ago, the line in the graph was flat. Again, it seems that the two things fight against each other – some get educated to help protect, others to exploit better." – Bill Aalbersberg, Director, University of the South Pacific Institute of Applied Sciences

"In Sinub, the people who are educated come back with all these newer and better ways and ideas on how to extract; so it seems that less education would lead to more LMMA success." – Aaron Jenkins, Wetlands International - Oceania

"Most of our fisherfolks have never attended high school, but because of their willingness to protect their resources, they are committed to the success of the LMMA. There are also people in Hinatuan that are highly educated, but instead, they are using their education to destroy – they are doing things the other way around. They are building bigger and unsustainable gears and they are teaching people how to use unsustainable gears." – Arnold M. Tiro, Community Development and Advocacy Officer, Center for Empowerment & Resource Development, Hinatuan Bay, Philippines

"Even if it's a college graduate, sometimes they eat junk food in the boat and they just throw the wrappers overboard. So even if they are educated, it does not mean they are aware of the

effect that the trash will have on the waters. Your level of education might be low but you could still be aware of the environment and care and understand that this rubbish will have a bad effect on the water – it's not a trash can." – Daisy Flores-Salgado, Philippines LMMA Network Country Coordinator

"When people from the village go to the city for work or to the university, they come back and think they are smarter than the people who stay in the village. So it is a challenge dealing with them." – Pio Radikedike, Village Headman, Ucunivanua Village, Verata, Fiji

Recommendations

- As education and tradition sometimes disagree, chiefs need sound information and advice from educated community members for decision making.
- Do environmental education program in primary and Sunday school (start young) to build environmental ethic into school curriculum.
- Follow Papua and Kimbe model – that is, include environmental education in formal education primary school.

Environmental Education Program, Indonesia. Photo by Elizabeth Holle

Traditional Welcoming Ceremony, Papua New Guinea. Photo by Cliff Marlessy

- Revive and continue traditional stories about totems, spirits and nature.
- Involve teachers and traditional leaders to build capacity in environment knowledge.
- As formal education often takes people away from the village and to the city, include environmental education in formal education.

Factor L6: Environmental Knowledge and Attitudes

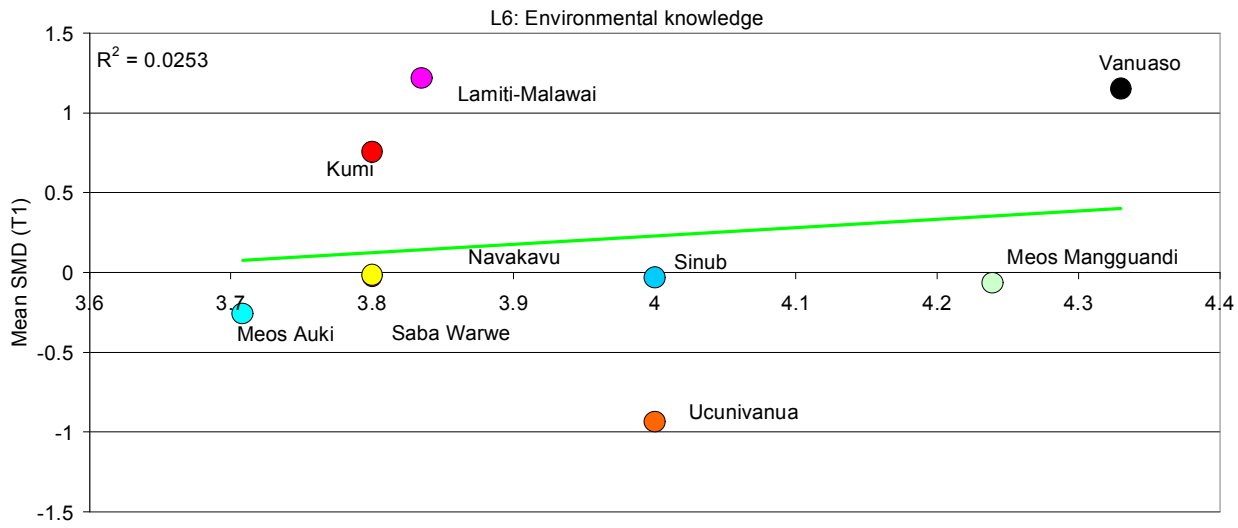
The degree to which local stakeholders understand basic ecological relationships and the effects that human activities can have on the natural environment, as well as local stakeholders attitudes towards the natural environment.

Assumption

- Increased environmental knowledge and positive attitudes will lead to increased LMMA success. (In order for people to take action to protect and manage the environment, they need to understand how the natural ecosystem works. We also assume that they have to have positive attitudes towards the environment and believe that their actions can make a difference.)

Results

The data shows that there is a decent amount of good environmental knowledge among community members at these sites, and concurs with the expectation that the more knowledgeable people are about their environment, the higher the LMMA success.



Discussion

Two Fiji sites (Kumi and Lamiti-Malawai) showed high LMMA success even with only moderate environmental knowledge, and thus are somewhat of an exception to our assumption. This could be explained by outside factors leading to LMMA success. For example, Kumi is located in Verata district, where LMMA work started in Fiji and which has been receiving lots of attention in terms of workshops, awareness programs and cross-site visits. So despite the low formal education level in Kumi, community members are nevertheless receiving environmental knowledge continually from these sources, which reinforces their efforts leading to LMMA success.

"The biggest success is the change of values in people, for example, from being a violator or a resource destroyer into a resource protector, so they are now protecting the environment because they realize that the environment is biggest livelihood that they have…Once they know the importance of the environment, even the children tell their parents that someone is fishing inside the sanctuary. That's one way of helping manage the community resources. Now, if they catch small fish, because of their environmental knowledge, they throw it back to the sea instead of keeping it." – Arnold M. Tiro, Community Development and Advocacy Officer, Center for Empowerment & Resource Development, Hinatuan Bay, Philippines

"By making people aware of what surrounds them and emphasizing its importance, they tend to appreciate their surroundings more. For example, we tell community members of the uniqueness of the marine systems in Kimbe Bay itself by informing them of research results. They say 'Wow, we didn't know that.' And by adding that piece of knowledge to their information system, you arouse their interest about the environment and the idea of conservation itself." – Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager,Papua New Guinea

PNG Network National Meeting, Kimbe Bay. Photo by Cliff Marlessy

Recommendations

- Education and awareness is instrumental to gaining community and other stakeholder support for LMMAs and conservation initiatives.
- Increase adaptive management training and seek technical advice to address new threats.
- Mainstream environmental education – combine formal and informal education.
- Both traditional and scientific knowledge are useful.
- Emphasize land-sea connection – look at land-based issues and how they affect marine habitat and resources.
- Link environmental attitudes and knowledge to environmental degradation and health issues, such as water quality, sanitation, HIV, etc.
- Need to improve recognition of overpopulation and the need for family planning.
- Water catchment level issues need to be addressed and given priority early in the planning process.
- Educate new leaders and decision-makers.
- Ensure proper documentation at all levels.
- Adjacent communities can learn the LMMA establishment process from each other.

PRACTITIONER FACTORS

Practitioners are the individuals and organizations who take action to counter threats at the site. Their ability to implement a successful conservation project depends on their levels of motivation, skills and experience. Factors related to practitioners can influence strategies and direct and indirect threats in a variety of ways. There are five practitioner factors of which only two are addressed here; P1 Local participation and P2 Project team members who speak the local language.

Factor P1: Local Participation

Local participation refers to the degree to which local community members are involved in the project activities. Involvement can range from passive awareness to active participation in various aspects of the project work including planning, implementing activities and monitoring results.

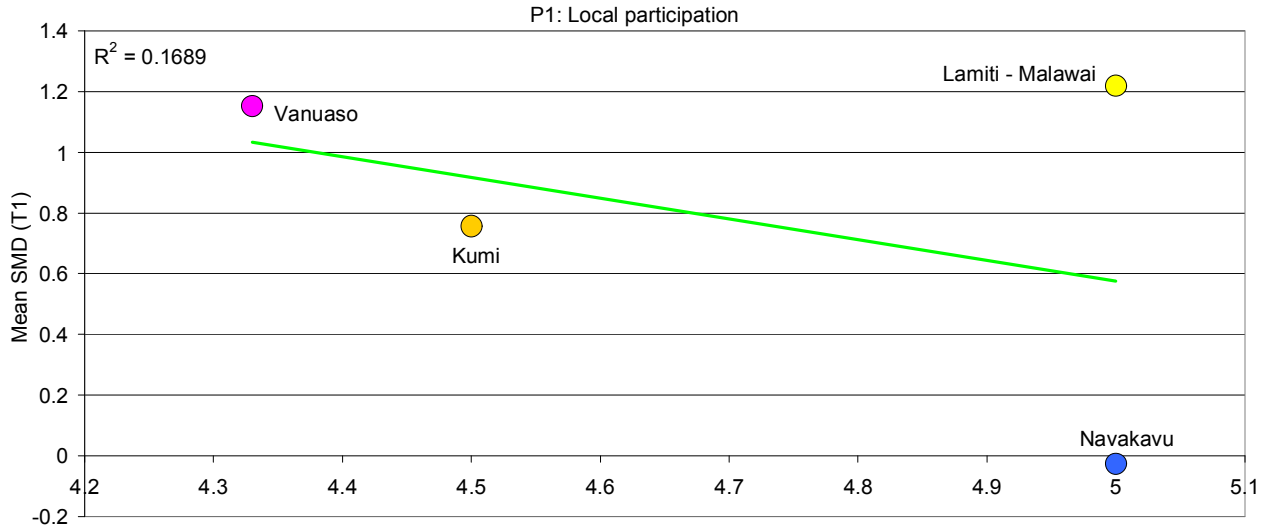
Assumption

- As local participation in the project increases, LMMA success will also increase. (If local people are involved in the project and feel ownership, they are more likely to support the project's work. In addition, if local people are involved in a project and like it, they will be more likely to agree with and act on conservation objectives.)

Results

The data shows a negative correlation between levels of local participation and LMMA success, which goes against our assumption. However, as there are a limited number of sites

represented in the graph (and all from Fiji), there are insufficient data points from which to form a strong conclusion.



Discussion

Even where there may be high local participation, other factors impacting the site can lead to low LMMA success. For example, Navakavu (blue dot on the graph), is located within the Suva lagoon and experiences high levels of pollution and ships coming in and poaching.

At some other sites located in isolated outer islands, there are high levels of local participation and LMMA success. There is also a need to differentiate between more participation and *good* and *useful* participation.

Recommendations

- Get the communities involved from the beginning.
- Community organizing is instrumental and integral to LMMA Network activities and sustainability of conservation efforts, otherwise "all pieces of the puzzle" will not be addressed. LMMAs cannot be considered separately to other community environmental issues such as pollution, land-based threats, health issues.
- Involve both men and women as well as youth in the planning, decision-making and implementation of the LMMA.
- Continue involving more people in all process of LMMA work and increase participation.
- Ensure good communication between community, local leaders, and other stakeholders to increase community awareness and spur increased participation.
- Involving all stakeholders is very important throughout the whole process. It can be a long and challenging process, but the results are promising.
- Without community blessing and participation, resource management will never be sustainable and/or successful.
- Donors should be more adaptive to the dynamics of community-based projects.

Factor P2: Project Team

The project team generally includes key community members and staff of partner organizations and agencies who are actively carrying out project activities and are responsible for the outcomes of the project. This factor considers the number of staff assigned to the project, their level of involvement, the percent of time they spend at the project site, their interest and overall skills in adaptive management, the number of project staff who speak the local language of the site, and the ability of the project team to work with the community to meet the project objectives.

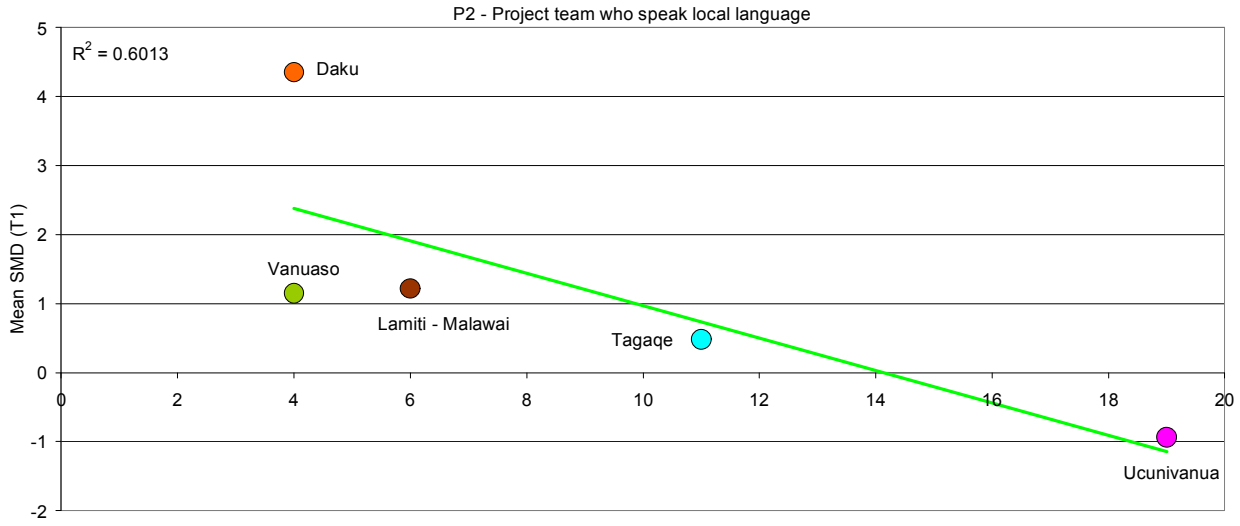
Assumption

- Projects with a more effective team are more likely to have a successful LMMA. In particular, projects that have staff who are on site for greater periods of time, speak the local language, and have skills, commitment, and experience relevant to their work are more likely to succeed.

The data results presented here specifically look at *how many of the project team speak the local language*, thus the assumption is – the higher the number of staff who speak the local language, the higher the LMMA success.

Results

The data negates the assumption, in fact showing a decrease in LMMA success. However, the low number of data points could mean there is not enough data to form conclusive findings.



Discussion

One possible explanation is that where someone in the local community can read and understand English, they have more access to resources that can help in the LMMA efforts. However, it is still felt that knowledge of the local language is helpful.

"It is important that the project team speaks the local language, because it makes communicating messages to each other easier. It also makes everyone feel comfortable with each other and everybody can talk openly and not feel out of place." – Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager, Papua New Guinea

In addition, some sites experience a high level of LMMA success even though the number of staff is small.

"With regard to the number of project staff, the risk of having a big team is that they rely on each other and then nothing gets done." – Alifereti Tawake, Assistant Project Manager, Institute of Applied Science, University of the South Pacific

"When you have a small team, they are very committed." – Alifereti Bogiva, Leader of the Village Governance Program, University of the South Pacific Institute of Applied Sciences, Fiji

Some final words stress the importance of clarifying roles of project staff and partners.

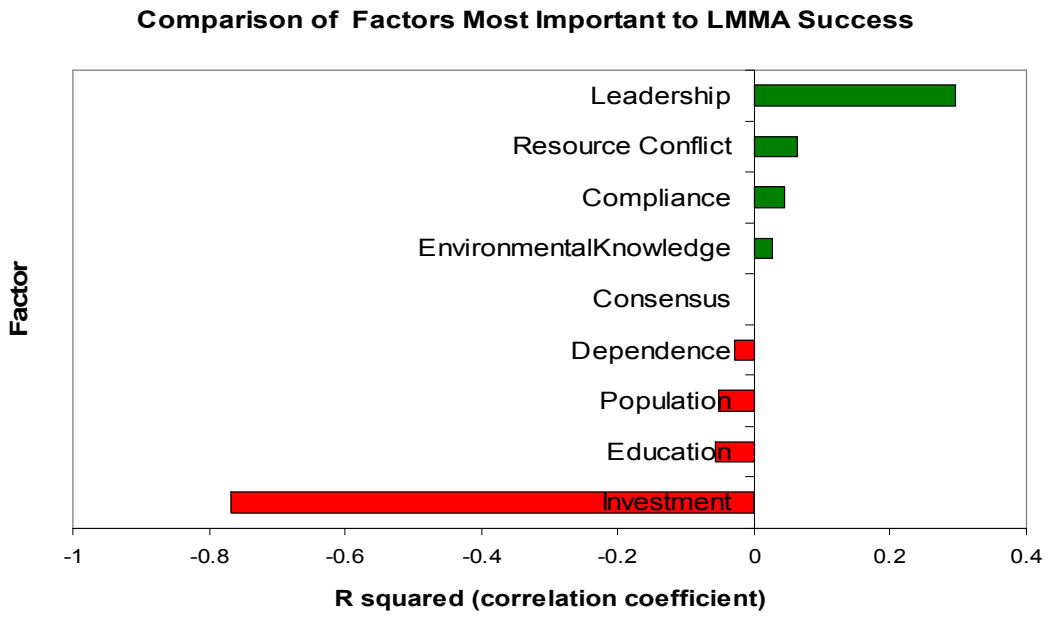
"Don't underestimate the importance of having LMMA coordinators on the ground and at each site to serve as facilitators, trainers, and mediators between different stakeholders and organizations. Follow-up is crucial after every training workshop and without adequate manpower, progress is slow or does not eventuate…However, LMMA coordinators need to be seen as an independent body (more as partners) to other organizations active at the project sites, otherwise politics of the other organizations can hamper LMMA Network efforts. Roles of all partners must be clarified and expectations discussed to avoid confusion and failed expectations." – Papua New Guinea LMMA

Recommendations

- There should be a high number of projects staff can speak the local language for better communication in the community.
- In villages with bigger populations, the number of project staff should be high.
- Project team should have at least one female team member.
- The project staff should have the necessary skills and equipment (computer, GPS, maps, diving, and others).
- Ideally, the project should have an office available in the village where equipment and documents are kept.
- Project staff should stay working in the site over a longer-term for better success.
- The staff should train local people in monitoring, data analysis and interpretation.
- All results and reports regarding project work should be made available in the local language.
- LMMA success could be increased by diversifying the race or ethnic language spoken by project team members.
- Increase cross-site or cross-country visits as different languages/dialects bring with it different stories.

SUMMARY OF RESULTS

So, what does the data mean? Some of the results are glaringly obvious, while others are quite surprising. The graph below illustrates each factors' importance. According to data from our key sites, the factor most important for LMMA success is Leadership, while an increase in Project Investment (beyond a certain basic requirement) is inversely related to project success. In other words – overall, small investments that help the community make decisions and implement activities are better than large spending per site that allows for the bringing in of lots of experts, which often takes decision making out of the hands of the community and/or raises their expectations of project outcomes. Obviously, effective and ongoing LMMA work could not take place without appropriate project investment.



While it must be emphasized that these are preliminary findings based on a very small sample size, we have non-the-less found them to be enlightening and look forward to continued data gathering and analysis. One of the biggest lessons we have learned from the workshop is that we need more data on common indicators collected from all sites at all survey times in order to make useful comparisons. This is what we will strive for during the next years. In the meantime, results from data analysis from individual sites will be presented on our website on the country pages under the Where We Work section in the coming months.

Madang cross-site visit to Kimbe, PNG. Pamela Seeto

Monitoring giant clams, Pohnpei. Brad Phillip

Jayapura, Indonesia. Manuel Mejia

Check our website www.lmmanetwork.org throughout the year for more updates on our findings.

IV. Country Updates

FIJI

Kadavu, Fiji. Toni Parras

Fiji's LMMA (FLMMA) Network continues to trailblaze. FLMMA has streamlined its approach by partnering up with government (Fisheries Ministry) and rolling out focused and effective province-based *qoliqoli* (fishing ground) management support teams. Fiji has also received many awards and recognition in the international press about its pioneering work. One of the biggest highlights for FLMMA in 2005 included the establishment of FLMMA as a registered and independent entity, which is a key step towards sustainability.

Another highlight was the release of the Community Biological Monitoring Training DVD, which is in very high demand throughout the Network and beyond. Funded through FLMMA's Whitley Award money, this training tool will be used in many LMMA villages.

For more information on FLMMA activities, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

INDONESIA

Jayapura, Indonesia. Manuel Mejia

2005 was a very productive year for the Indonesia LMMA Network (ILMMA). The Learning Framework and its accompanying survey forms were translated into the Bahasa Indonesia language for use at the community level, and a strong effort was made by partner organization SekPro PLKL Biak to train communities in biological monitoring. As a result, baseline surveys were conducted at new sites, and second time-series data were collected from existing sites.

Members in Tablasupa Village.

Survey training in Demoikisi Village.

Currently with a total of 12 sites, ILMMA is poised to expand in 2006. The series of Data Management and Analysis trainings in 2005 have helped arm ILMMA members with the knowledge, tools and methodologies on how to do adaptive management. For more detailed information, the ILMMA 2005 Annual Report will be published this year in both English and Indonesian, and will be posted on our website.

For more information on ILMMA activities, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

PALAU

Helen Reef, Palau.

This year, the Palau Conservation Society will take the lead in providing an interim LMMA coordinator for Palau. The proposed coordinator has undergone the community-based conservation course at the University of the South Pacific sponsored by the South Pacific Regional Environment Programme and has been exposed to FLMMA training. 2006 should see the growth of this country network and spread to neighboring Yap and other Micronesian neighbors.

"The presence of people at the site has been essential"
Regarding community support – "seeing is believing"
"Preventing the introduction of invasive species is easier than eradication"
"We achieve all through cooperation"

– Lessons Learned from Helen Reef, an LMMA site located at a remote atoll in Palau

For more information on Palau LMMA, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

PAPUA NEW GUINEA

Madanag Lagoon, Papua New Guinea. Cliff Marlessy

Much has happened in PNG this year. Three local coordinators, from The Nature Conservancy and World Wildlife Fund, are now on-board, and their involvement has helped push the PNG LMMA forward. The new coordination structure has really streamlined LMMA work in PNG. This system provides a good model for other countries – the Solomon Islands LMMA in particular could benefit from this kind of arrangement given its geographic size and cultural diversity.

Trainings in biological monitoring have taken place and data that has been dormant was analyzed. Community involvement and environmental awareness has also increased; threats previously disregarded are now being recognized. A Threat Reduction Assessment in 2005 showed a decrease in threats in all but one site.

Francis Wadui and Paul Led, two active PNG LMMA Network members have been recognized by WWF-International with an award for their outstanding conservation work with communities.

Francis Wadui (center) and Paul Led (second from right) receive award from Jim Leap (WWF)

More 2005 highlights can be found on the next page.

January – Passing of the first marine environmental law in PNG for the Talasea Local Level Government (LLG). With support from The Nature Conservancy, the Talasea LLG in West New Britain Province (Kimbe) has passed a marine environment law that sets out guidelines, regulations and penalties regarding the LLG's marine resources and LMMAs. This law will help empower the Talasea communities to better manage and enforce their LMMAs.

March – The 2nd national LMMA Network meeting in Kimbe Bay brought together Madang and Kimbe Bay LMMAs and partners to do strategic planning, review progress to date, and plan for the future.
– Local Madang Lagoon coordinator Rebecca Samuel, attended the first phase of the Pacific Islands Community Conservation course at the University of the South Pacific in Suva, Fiji.

May – Para-legal training and awareness for Madang Lagoon LMMA communities in collaboration with the Centre for Environmental Law and Community Ownership Rights.

June – Community biological monitoring training for Madang Lagoon (8 youths from 2 communities trained)
– Environmental leadership awards were presented to Madang Lagoon community members Francis Wadui and Paul Led at the Pacific Islands Forum in Port Moresby. The award was given by WWF International in recognition of their outstanding leadership and effort towards conservation and LMMAs in their communities.
– First Para-legal training and awareness workshop for Kimbe LMMA communities in collaboration with the Centre for Environmental Law and Community Ownership Rights.
– The PNG LMMA network coordination team attended the New Guinea Biological Conference in Papua, Indonesia, where Rebecca Samuel made a presentation on PNG LMMA Network Activities, followed by the LMMA Network Data Management Training in down-town Jayapura.

August – PNG LMMA Network Coordination Team retreat at Motupore Island, to orient new coordinators on their roles and responsibilities, and to discuss the remaining year's workplans.
–The Coordination team participated in a SeaWeb radio script-writing workshop.

September – Annisah Sapul, Kimbe Bay LMMA coordinator and country Data Manager, attended the Network-wide META Analysis training at the University of the South Pacific in Suva, Fiji.
– First Community Biological monitoring training in Kimbe Bay on the Reef Check Method and how to monitor their protected areas (10 youths from the 6 LMMA sites).
– Meeting with Kimbe LMMA communities to develop simple management plans.
– Monitoring Plans developed for two LMMA sites in Kimbe Bay.

October – First community biological monitoring surveys in Pasiloke, Gharile, Patanga and Kilu-Tamare LMMA sites (Kimbe Bay).
– Setting up of permanent transects at Pasiloke reefs (Kimbe Bay).
– Rebecca attended the last phase of the Pacific Islands Community Conservation course at USP – Suva.

November – A presentation on the PNG LMMA Network was presented at the International Marine Protected Area Congress in Geelong, by Pam Seeto, PNG LMMA Network Advisor, and Rebecca Samuel.
– Madang LMMA community monitors conducted baseline biological monitoring surveys of all four LMMAs.
– 3rd PNG National LMMA Network meeting in Madang.

PNG LMMA Network National Meeting in Madang, 2005

For more information on PNG LMMA, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

PHILIPPINES

Hinatuan, Philippines. Toni Parras

In 2005, the Philippine LMMA (PLMMA) Network has focused its efforts and services on its core sites. PLMMA's two full member sites submitted their data and lessons learned and participated at the Network-wide events. PLMMA also hosted the annual Networ `k Coordination Team meeting (the annual network wide planning meeting) in Manila, followed by the Data Management and Analysis Learning Framework Database Workshop, attended by members from all network countries.

2005 Highlights

February – Philippine Country Network National Meeting, attended by representatives from partner organizations CERD, SIKAT, PROCESS Bohol, ERT and People's Organizations NAMAHIN, Sinabacan Fishers Association, and Bingag Fish Wardens.

March – Hosted the NOAA-sponsored ***How is your MPA doing?*** workshop, attended by Philippine and Indonesian LMMA members together with Vietnam participants and representatives from Conservation International, Coastal Conservation and Education Foundation, and World Wildlife Fund Philippines.

April – Site Visits to three keys project sites: Hinatuan in Surigao, Tawala and Bingag in Bohol, and Candelaria, Zambales to glean stories, lessons and member interviews.

May – First-ever PLMMA Data Management and Analysis training in Davao. Workplan validated and revised based on learnings.

June – Partners working to consolidate existing data into the Learning Framework Database and test the new monitoring and site report forms.

July – Hired Melchor Deocadez of University of the Philippines Marine Science Institute as Country Data Manager after careful selection process.

August – Biological Monitoring in Lobo Batangas, a provisional site gearing up to complete their time series data.

September – filming for Network-wide Lessons Learned video.

Oct – Participated in Technical Tour of Great Barrier Reef Marine Park. PLMMA members made both oral and poster presentations at the first International Marine Protected Area Congress in Australia.

Nov – Participated in the second ***How is your MPA doing?*** Workshop held at Hanoi, Vietnam.

For more information on PLMMA, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

POHNPEI
(Federated States of Micronesia)

Ros Island, Pohnpei. Bradley Phillip

In Pohnpei, all of the marine protected areas are state-owned and co-managed between the communities, state government, local government, traditional leaders and NGO's.
The number of LMMA sites in Ponhpei grew from two to 10 in 2005. Trainings conducted during cross-site visits to these new villages were conducted by the Conservation Society of Ponhpei. More training is needed for these communities to be able to contribute to the overall Network learning process.

"People value and are genuinely concerned about their natural heritage, but have lost management skills. When assisted and have the feeling of ownership, they are willing to manage resources."

– Lessons Learned from Pohnpei

For more information on Pohnpei LMMA, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

SOLOMON ISLANDS

Solomon Islands. Hugh Govan

There has been steady growth in the Solomon Islands. The SILMMA Network has conducted Leadership Training workshops and organized themselves nationally. However, much more training needs to be done - in particular, to meet the heavy demand for hands-on data collection and community based adaptive management processes.

There are immense challenges to working in the Solomon Islands due in great part to the spread of the members across the island country. While SILMMA had a good workplan for 2005, proper programming of activities and good organization to manage and carry out the work was lacking. Other challenges were capacity building among members to understand the work and approach of LMMA.

The Fiji LMMA country Network (FLMMA), Foundation of the Peoples of the South Pacific International (FSPI) and the Solomon Island Development Trust (SIDT) have been very supportive to SILMMA through sharing of information and skills and training of members in monitoring and storing of data. Money for these trainings was provided by LMMA through the University of the South Pacific (USP) and the European Union through FSPI. SILMMA coordination is currently housed under the FSPI-SI Communities and Coasts Programme.

Solomon Islands Leadership Workshop, Honiara.

2006 should see more of a focus on getting the sites in the Solomons to learn and share more with the rest of the Network. SILMMA seeks to improve networking and communication among members and partner organizations, build capacity and skills, foster community empowerment, and increase sharing of information. Additional training and fieldwork need to be conducted to facilitate sites' involvement in data collection and LMMA approaches to marine conservation.

2005 Highlights

February – SILMMA annual general meeting at Maravagi Resort, Central Province. The purpose of the meeting was: to train members in the LMMA Learning Framework and its process in Solomon Islands; to gain skills and learn experiences from other sites in the pacific, like Fiji and Papua New Guinea; for SILMMA members to share lessons from Solomon Islands projects in coastal resource management; and to improve SILMMA's resource management and monitoring plans and data management skills. The training was conducted by Alifereti Tawake from the Institute of Applied Sciences at the University of South Pacific, Fiji. Members also evaluated SILMMA programs in 2004 and elected Silverio Wale as the new coordinator and Hugo Tafea as assistant for 2005. Logistics for the meeting were provided by Foundation of the Peoples of the South Pacific International (FSPI), Solomon Islands office.

May – Catherine Siota from The Nature Conservancy-Solomon Islands attended a one-week training in Suva, Fiji to gain skills to bring back and train other SILMMA members in collecting monitoring information on their sites.

July – Hugo Tafea and Joe Keba, staff from FSPI/SIDT, attended a one-week workshop on community-based conservation and family-owned marine protected areas in Vanuatu. The purpose of the workshop was to bring together stakeholders and organizations involved in conservation to share information on the type of work each is practicing, and to discuss the possibility of collaborating and setting up a network that would allow for sharing of information. The workshop was organized by Foundation of the Peoples of the South Pacific – Vanuatu (FSPV) and Vanuatu Fisheries Department with funds from USP. In addition, SILMMA members Allan Tippet Bero and Hugo Tafea attended the Pacific Island Community Conservation Course (PICCC) at USP in July, funded by FSPI and others.

August – SILMMA in partnership with the church of Melanesia under AUSAID conducted a leadership training for the SILMMA steering committee members to build skills for utilizing in their respective community-based programs.

November – Dr. Hugh Govan and Wana Sivoi from FSPI Suva, Fiji conducted a one-week training on "Participatory processes for Community Based Coastal Resource Management in Solomon Islands" at Maravagi Resort for SILMMA members and FSPI/SIDT staff. The purpose of the training was for members to gain skills to apply in their respective communities, particularly PLA tools and how to facilitate community development of management plans.

December- January – SILMMA organized a 'look and learn' (cross-site) visit to Roviana, Vonavona and Tetepare Descendants Association sites for members to learn from these communities and to share their experiences with them, funded by LMMA and FSPI. A documentary of the field trip was made by the International Waters Project (IWP) and should ready sometime in 2006..

For more information on SILMMA, visit www.lmmanetwork.org/Site_WhereWeWork.cfm

HAWAII

Hawaiian Islands. Toni Parras

There is a great diversity of communities in Hawaii, from predominantly native Hawaiian communities that still rely on the ocean for subsistence to non-native affluent communities with a heavy tourist base. Coastal communities from both ends of this continuum have joined together to form a learning network, realizing there are valuable lessons to be learned from each other. The Community Conservation Network (CCN) has been working with Hawaiian communities since 2003, and has integrated the LMMA approach into the framework of their community development projects. While Hawaii has no formal members in the LMMA Network, CCN has been working with several communities, including Miloli'i and Pupukea, using the LMMA approach.

Miloli'i, on the big island of Hawaii, is considered one of the last native Hawaiian fishing villages. Traditional fishing practices – such as harvesting *opelu* (mackerel) by feeding them with vegetable meal and using native canoes – are still practiced. Despite the community's attempt to maintain their culture, their close association with the land and ocean – including the traditional system of managing the marine resources – has severely eroded. Miloli'i's strength is that there is a highly committed core team of respected elders and energetic youth dedicated to making Miloli'i's resources plentiful again. They have been monitoring their marine resource for almost two years now and the high level of youth participation is encouraging.

Pupukea, on the other hand, is a culturally mixed and modernized community. Located on the famous North Shore of Oahu, it has many influential and affluent residents as well as traditional Hawaiian families that are highly educated, impassioned and committed to protecting their area's natural endowments. Already, the community is involved with biophysical monitoring and human use surveys. One of their challenges is to control overfishing and improve tourism management and education in their area.

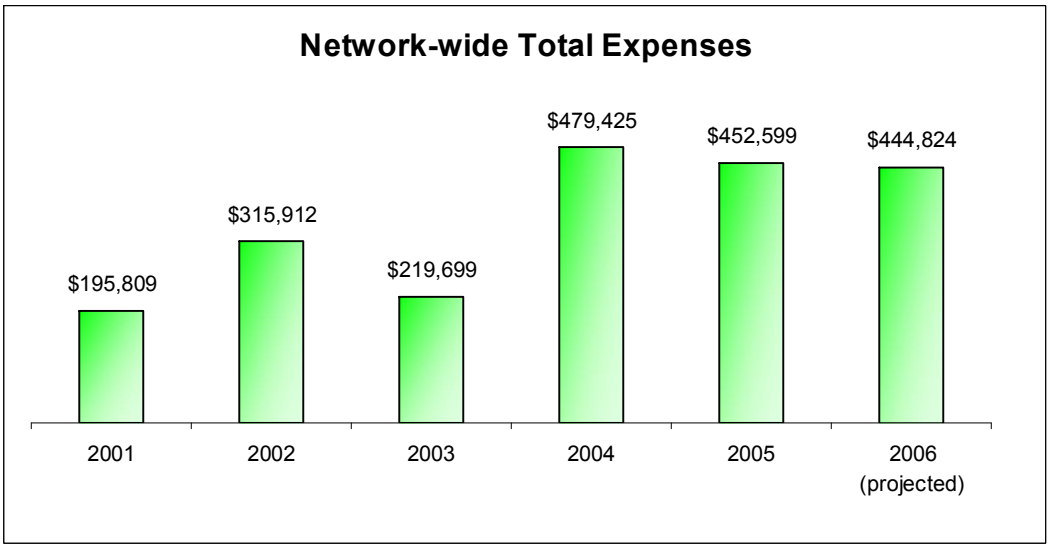
Both areas are linked by common threats – such as overfishing and development, as well as a commitment to properly manage their marine resources. The Hawaiian equivalent of the LMMA Network, the "Kaihi'a O Kanaloa," was formed on an exploratory basis in 2005. During this time, and as a result of having a Hawaiian LMMA coordinator, both communities were introduced to the LMMA concept. Ongoing activities are planned to help these two communities with their biological and socioeconomic monitoring and cross-site visits in the future. Although additional funding for the Hawaii network was not secured, the development of community-based projects in Hawaii will be based on the LMMA framework. By using the LMMA framework as part of their underlying foundation while they grow into fully functioning projects, Hawaiian communities will be better able to participate in LMMA activities, share lessons learned, exchange skills, and contribute monitoring data.

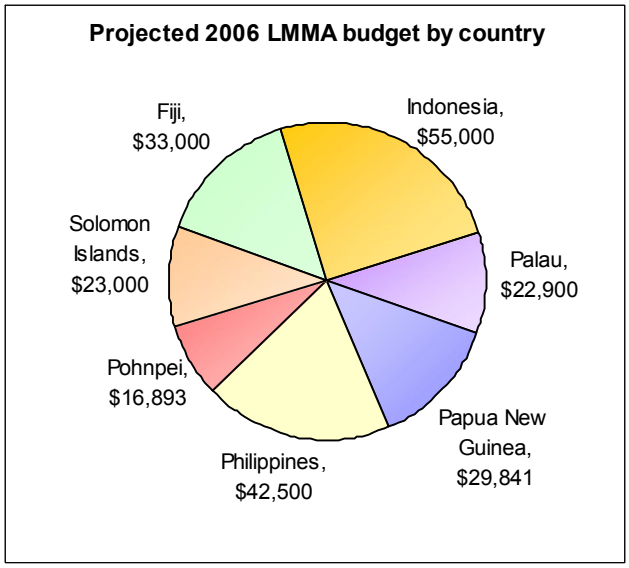
Hawaiian Islands. Photos Toni Parras

V. Financials

The work of the overall LMMA Network is generously supported by the David and Lucile Packard and the John D. and Catherine T. MacArthur foundations. Country-level networks and individual projects are also funded through other sources (for instance, most of Fiji's LMMA work in 2005 was co-funded by the Whitley Award Foundation).

The following graph illustrates funds expended annually by the overall Network since its inception (although the Network was launched in 2000, it did not have an operating budget until 2001). Types of expenses include salaries (including field staff and consultants), travel, conferences and workshops, equipment, resource materials, field supplies, and tele-communications. Figures presented here represent only costs pertaining to overall Network activities. All figures are expressed in $US dollars.





The pie chart at left gives a breakdown of projected 2006 LMMA Network funding per country (final amounts subject to change). Some countries' total budgets are more than the figures presented here; this chart indicates only the amount being supplied by the Network directly. [Note: some salary expenses from Fiji were shifted to core Network expenses this year, which explains the large reduction in Fiji's budget from last year].

As a step to becoming more self-reliant and sustainable, individual country networks are actively seeking their own funding for in-country work.

Acknowledgements

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