UPDATE: SCALING UP LOCAL MANAGEMENT OF COASTAL FISHERIES IN FIJI

WORLD RESOURCES 2005 HIGHLIGHTED THE local management of coastal fisheries in Fiji as an example of successful community-based stewardship of natural resources that improved local livelihoods while enhancing marine biodiversity and productivity. A locally managed marine area (LMMA) is an innovative type of marine protected area that blends traditional village management of ocean resources with modern methods of biological monitoring and assessment.

Through the establishment of LMMAs, communities are empowered to improve management of declining marine resources, leading to gradual restoration of productivity and, ultimately, to increased catches of fish and shellfish. Organizing communities into networks actively engaged in the management of their marine resources also helps villagers gain greater access to decision-makers and have more impact on policies that affect their lives.

Since the creation of Fiji's first LMMA in 1997—covering 24 ha near the small village of Ucunivanua on the eastern coast of Fiji's largest island—the use of LMMAs as a tool to address overfishing has spread rapidly throughout Fiji. In 2001, the Fiji Locally-Managed Marine Area (FLMMA) Network was established as a forum for Fiji's LMMA participants to share their methods and monitoring results. As reported in World Resources 2005, the LMMA Network in Fiji encompassed nearly 60 LMMAs, involving 125 communities and covering about 20 percent of Fiji's inshore fishery. By 2007 the Network had scaled up to include some 213 LMMAs, involving 279 villages and covering almost 8,500 sq km (850,000 ha) of coastal fisheries, or about 25 percent of the inshore area (LMMA Network 2005a; LMMA Network 2007a:3; Tawake 2008:2).

At the same time, the LMMA Network has expanded to other countries in the Asia-Pacific region, including Indonesia, Papua New Guinea, the Philippines, the Solomon Islands, and the islands of Palau and Pohnpei. All told, the international LMMA Network encompasses more than 300 LMMA sites, covering in excess of 10,800 sq km (LMMA Network 2007a:3). The LMMA approach has also inspired local management of marine resources in more distant lands, ranging from the Marshall Islands and Vanuatu to Hawaii (LMMA Network 2007b).

In this update, we look at how the LMMA Network has expanded in Fiji and elsewhere in the Asia-Pacific and examine the key factors in that scaling-up and the impact it has had.

Background: The LMMA Approach in Fiji

The FLMMA Network emerged against a backdrop of long-term depletion of Fiji's inshore fisheries that had accelerated in the 1990s, attributable to increased commercial fishing as well as larger harvests by growing populations of subsistence fishers. The resulting degradation of marine resources impinged sharply on the livelihoods of rural Fijians, most of whom depend on local fish and shellfish catches for some or all of their daily protein intake and income. With fish stocks on the decline, the incidence of national poverty rose from 29 percent in 1991 to about 34 percent in 2003 (Narsey 2007).

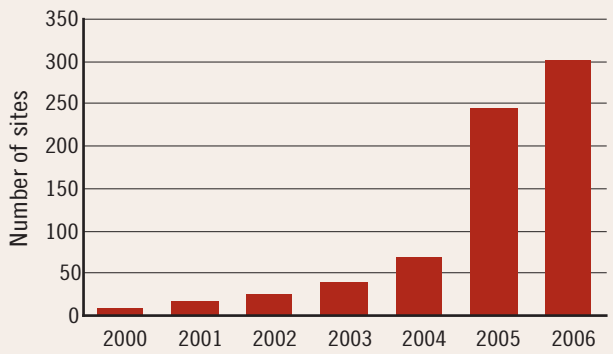
The structure of LMMAs in Fiji is based on customary systems of marine tenure, under which communities control traditional fishing grounds, known as *iqoliqolis,* adjacent to their villages. (Leisher et al. 2007b). Communities establishing LMMAs in Fiji today have used these traditional practices, managing their iqoliqolis at the community level and setting aside a portion of this traditional fishing ground (typically 10–20 percent) as a restricted or *tabu* area to allow marine resources to recover (LMMA 2005a).

The location and size of this tabu area is determined within each community, often with suggestions from technical experts. In this aspect, LMMAs are distinct from the more common marine protected areas (MPAs), in which management decisions are made by central authorities with little or no consultation with local people (LMMA 2005b).

As fish and shellfish species recover in tabu areas, their abundance gradually increases in nearby areas of the LMMA where fishing is allowed. This "spillover effect" has boosted local income by as much as 35 percent over 3 years (LMMA Network 2006a:5).

Over the past 7 years of LMMA work in Fiji, communities have collected data on the impacts and benefits of their management efforts and shared these with appropriate government officials. As a result, the LMMA approach has gained increasing acceptance from government, and the Ministry of Fisheries has become a key FLMMA partner. In 2005 the Ministry publicly committed to protecting 30 percent of Fiji's inshore waters by 2020—a commitment that was subsequently joined by Palau and the Federated States of Micronesia (LMMA Network 2006a:5).

GROWTH OF LMMA NETWORK, 2000-2006



Source: LMMA Network 2007a: 2

LMMA NETWORK PARTICIPATION, 2006

Country	Total Number of LMMAs	Number of Villages	LMMA Area (sq km)
Fiji	213	279	8,497
Indonesia	12	16	700
Palau	1	3	266
Papua New Guinea	16	17	503
Philippines	17	17	270
Pohnpei, FSM	1	4	64
Solomon Islands	42	75	567
Totals	**302**	**411**	**10,867**

Source: LMMA Network 2007a: 3

Creating Local Ownership

Local control of natural resources is the centerpiece of the LMMA Network's approach. The network is a collaborative partnership that aims to demonstrate that marine protected areas can yield impressive conservation results while accommodating a wide range of local needs—economic, cultural, and social—and using modern marine science.

Local Demand

The rapid expansion of the LMMA Network in Fiji and elsewhere in recent years has been driven by demand from communities. When a village creates an LMMA that results in increased fish catches and higher incomes, neighboring communities hear about it and want to learn how these successes occurred and how they can follow a similar path (USP 2007:3–4; Aalbersberg 2008).

Over time, demand for information about the LMMA approach has grown; inquiries now come from as far afield as East Africa (USP 2007:5). As of mid-2007, with more than 200 active LMMA sites in Fiji, 50 to 100 additional villages were at the preliminary consultation stage of the community engagement process (LMMA Network 2007a:3, 23).

Communities engaged in LMMA work tend to retain high levels of commitment to the program, indicative of their sense of ownership and economic stake. For instance, members of the Navakavu community surveyed as part of an extensive international study of the impact of MPAs on poverty reduction indicated that they consider their LMMA to be crucial for themselves and future generations. Ninety-five percent of respondents agreed that dissolving the LMMA now would cause significant problems in the future (Leisher et al. 2007a:9).

Participation and Local Decision-Making

A hallmark of the LMMA Network approach is the use of participatory methods to help communities design simple management plans to address threats to marine resources. Experts from FLMMA partner organizations, such as the University of the South Pacific (USP), the Peace Corps, and the Fijian Fisheries Ministry, provide technical information and advice to support community decision-making but do not dictate it; community members make all final decisions (Tawake et al. 2005:7; Govan et al. 2008:7).

When a community decides to establish an LMMA, participatory planning meetings are held to establish resource rules governing the use of the community's marine resources. Typically an intermediary organization such as USP engages

extensively with the community during this period to provide assistance. Support from a neutral party like USP that is not aligned with any interest group in the community is often very helpful to stakeholders in reaching consensus.

Once rules governing resource use are established, an iqoliqoli committee is formed to coordinate LMMA work as well as to represent the community before relevant institutions on issues involving the LMMA. The iqoliqoli committee has the responsibility, as designated by the *vanua* (traditional community council), for making all management decisions concerning the LMMA, following consultation with residents through village council meetings (van Beukering et al. 2007:11).

In the community of Navakavu, for example, the iqoliqoli committee consists of 21 members, including landowners and the headman from each of the four main villages using the iqloiqoli, as well as the individuals serving in key posts established by the LMMA process: biological monitors, fish wardens (one from each village), and the leader of the youth environmental drama group (van Beukering et al. 2007:11–12).

People in the villages of Navakavu are confident about the committee's competence and its responsiveness to community demands. As one villager noted, "The establishment of the [iqoliqoli] committee has helped each member recognize their assigned duties and has encouraged them to perform well in their area" (Leisher et al. 2007a:8).

The relatively small size of LMMAs (compared with large MPAs administered by central authorities) tends to foster a stronger sense of ownership and engagement by the locals. The limited scale of the resource ensures that the impact of conservation measures can be detected sooner. In the case of Navakavu, the LMMA is even within sight of the managing villages, adding to their sense of control (Leisher et al. 2007a:32).

Compliance and Enforcement

When a community establishes an LMMA, the improvement in the condition of marine resources attracts poachers from both inside and outside the community. Thus monitoring compliance with established resource rules and minimizing poaching is

central to a community's LMMA management (Leisher et al. 2007a:10). For instance, in Kadavu alone (Fiji's third largest island), some 52 fish wardens provide enforcement for 26 LMMAs and their protected zones (LMMA 2006a:15).

In many communities, poaching can undermine the levels of cooperation and social cohesion that are needed for successful management. That is especially true when poachers are internal. Rata Aca Vitukawalu, a tribal chief in Daku village in Kadavu province, observes: "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" (LMMA Network 2007b).

In order to ensure tabu compliance, communities select a voluntary fish warden, who patrols local waters, reports illegal entries and collects evidence. Fish wardens are given special training by the fisheries ministry to enable them to arrest violators (LMMA Network 2006a:15).

Developing Capacity

Monitoring and Analysis

When the first LMMAs were established, scientists from USP taught villagers to use simple techniques of sampling and statistical analysis in order to determine a baseline of species abundance in the tabu area and in adjacent, down-current sites. The resulting baseline was then combined with results of annual biological monitoring surveys in order to determine the impact of the LMMA on species numbers (LMMA Network 2006a:6–7).

By 2006, almost 3,000 people—more than 1,000 people each in Fiji and Indonesia, and another 800 or so in other countries, including Papua New Guinea, the Philippines, and Micronesia—had received training in LMMA Network methodologies (LMMA Network 2007a:8). The network has also produced a biological monitoring training DVD for communities.

As community-based management has grown, the methodologies used for monitoring and analysis of results have also evolved. Over the past 2 years, the LMMA Network has devoted particular effort to refining, clarifying, and streamlining data collection and analysis techniques taught to LMMA communities. This has helped to scale up the effort by making it easier to roll out the LMMA approach in new areas (LMMA Network 2006a:7).

One example of this refinement is USP's Learning Framework (LF), which serves as a common language across the LMMA Network. The LF contains methods to measure biological and socioeconomic conditions at LMMA sites, allowing communities to help identify the factors that correlate most strongly with poverty reduction and successful marine resource conservation. Recently, this tool has been translated into local languages, enhancing its accessibility for current and potential LMMA participants (LMMA Network 2006a:7, 35).

The overarching goal of the training provided to LMMA communities is to build their capacity for "adaptive management"—the ability to adjust management practices and rules over time, based on monitoring results (LMMA 2006a:6). Now that communities have been collecting and analyzing monitoring data for several years, many sites are "at the stage where we expect to see more adaptive management happening soon," says Professor Bill Aalbersberg of USP (Aalbersberg 2008).

Enterprise Development

Some LMMA communities are experiencing new economic opportunities, now that villagers spend less time fishing and often have fish surpluses. In communities with good infrastructure and access to urban centers, the men have found jobs in cities or towns and commute daily from the village. In Navakavu, a recently established public bus service has given women access to markets in the capital city of Suva where they can sell their surplus fish and shellfish catch at higher prices, increasing their ability to earn significant amounts of cash (Van Beukering et al. 2007:9–10).

In general, training provided to communities by the LMMA Network and its partners have focused so far on biological monitoring and analysis, with the aim of empowering communities to manage their marine resources better. Yet only a small subsection of the population learns these skills, namely fish wardens, those involved in biological monitoring, and members

of the iqoliqoli committee (Van Beukering et al. 2007:16). Unfortunately, even less emphasis is placed on development of alternative livelihoods for families currently dependent on fisheries or on the acquisition of skills needed to run successful enterprises: accounting, bookkeeping, and management (Van Beukering et al. 2007:16).

Networks

At its core, the LMMA Network is a peer learning system in which members share a strong commitment to supporting each other's activities, including the exchange of information. Community partners who have been trained in LMMA techniques are eager to pass on what they have learned to others. In addition to hosting formal workshops, the LMMA Network also promotes opportunities for informal learning and village-to-village exchanges. Cross-site visits between Network communities enable those involved to learn from each other's experiences, methods, and practices (LMMA Network 2006a:7).

Extending the LMMA Approach

One especially promising development has been FLMMA's creation of subnetworks to extend LMMA work to more remote areas of Fiji. This is being carried out by province-wide teams, which provide systematic support to remote communities. These Iqoliqoli Management Support Teams (QMSTs) are made up of community members, fisheries officers, overseas volunteers, USP students, and provincial government officials. They hold management planning workshops and link LMMA groups province-wide (Tawake et al. 2005:5–6).

This approach has worked well in Kadavu, Fiji's fifth largest island, located to the south of Fiji's main island of Viti Levu. The people of Kadavu rely heavily on fishing and farming for their livelihoods, although a growing tourist industry has begun to provide a few alternative sources of income (Tawake 2008:4). Kadavu faces significant overfishing problems and destructive fishing practices, which have degraded some marine areas.

But due to the Kadavu QMST's efforts to extend the LMMA approach throughout the province, the number of communities that have established tabu areas has increased rapidly in recent years—from 5 in 2002 to 30 in 2005 and 52 in 2008, which represents nearly the entire island (Tawake et al. 2005:5; Aalbersberg 2008). The provincial council has endorsed the team's work and has passed a resolution calling on every community to set up both terrestrial and marine protected areas (Tawake et al. 2005:5).

Similar province-wide approaches are also being pursued in Cakaudrove and Macuata, two of three provinces based on Vanua Levu, Fiji's second largest island, located to the north of Viti Levu (LMMA Network 2006a:5). As of March 2008, some 40 villages (about half of those encompassed by the initiative) had established resource management plans. Of these villages, 24 had established tabu areas of varying sizes (with a maximum of slightly more than 1 sq km) and varying durations (from 3 months to 10 years) (Aalbersberg 2008).

Policy Influence and Political Engagement

Organizing communities into networks enables them to have greater access to decision-makers and greater impact on policy. The efforts of the LMMA Network have helped to secure national governments' recognition of the value of traditional resource management approaches. Indeed, Fiji's government has formally adopted the LMMA approach and has devoted a division of the Fisheries Department to coordinate with FLMMA to promote inshore conservation. The FLMMA Secretariat is now even housed in the Fisheries Department. And as a result of community pressures on the Fisheries Ministry, Fiji has recently set a 12-nautical-mile limit to keep foreign fishing vessels from iqoliqolis (Tamake 2008:2, 8; Aalbersberg 2008).

Impacts

The economic impacts of the LMMA program seem to be significant, although the data so far are not comprehensive. About 20 LMMA Network sites in Fiji have collected detailed survey data on household incomes. However, only 3 of these sites have time-series data to correlate economic benefits from increased fish catch. In Ucunivanua, average household income rose from just over F$430 (US$258) per month in 2002 to about F$990 (US$594) in 2006, an increase of 130 percent. The community of Daku in Kadavu province experienced a gain in average income of just over 30 percent in one year, from about F$235 (US$141) per month in 2005 to F$307 (US$184) in 2006 (Aalbersberg 2007).

The most comprehensive examination of the economic impacts of LMMA work has been a recent study by an international team examining the role of marine protected areas in poverty reduction. The team did extensive interviews with households in the Navakavu community, an LMMA site since 2000. A survey of 300 households found that monthly income in Navakavu averaged F$418 (US$251), while income in control sites with similar demographic and geographic characteristics averaged only F$197 (US$118) per month (van Beukering et al. 2007:20).

The team also investigated whether the tabu had had any significant impacts on fishers. Some 283 fishers were extensively interviewed about their activities, but no significant differences between LMMA and non-LMMA villages could be detected in terms of the types of fish caught, fishing techniques used, fishing frequency, or travel time to fishing grounds (van Beukering et al. 2007:24). Yet LMMA sites generated about three times the income from fishing as non-LMMA sites (van Beukering et al. 2007:28). The ability of fishers from LMMA villages to secure larger fish catches from a smaller harvest zone is testament to the substantial spillover effect from the tabu area into the harvesting zone (van Beukering et al. 2007:28).

The key difference between fishers from LMMA and non-LMMA villages was in their perceptions of changes in fishing conditions over the past 5 years. While some 80 percent of fishers from LMMA villages said that they faced easier conditions, the majority of fishers from non-LMMA villages said that they faced more difficult conditions (van Beukering et al. 2007:26).

Moreover, households in LMMA villages were more likely to rely on income from sources other than fishing, with 28 percent of households in LMMA sites having alternative income sources versus only 17 percent in comparable, non-LMMA villages (van Beukering et al. 2007:28). This increased diversification of income sources boosts resilience in the LMMA villages to threats to future fisheries income from, for instance, the impacts of reef degradation due to coastal pollution, severe storms, or climate change. This resilience comes with other LMMA benefits as well, such as planning skills and closer community cooperation.

Another advantage for LMMA members has been increased consumption of fish. Households in LMMA villages eat more fish because they catch more fish. Some 75 percent of surveyed households in Navakavu reported eating more fish than 5 years ago, while 76 percent of households in the control (that is, non-LMMA) villages reported eating less fish (van Beukering et al. 2007:31).

Despite the challenges of achieving full equity in participation, the ongoing work of the iqoliqoli committees has tended to foster better communication and increased cooperation within LMMA communities, helping to bridge differences between various clans. Typically, local councils in LMMA communities are called on to make many more collective decisions about resource management than was the case before the LMMA's creation. This has revitalized traditional systems of community cooperation and joint decision-making, thus contributing to increased social cohesion (van Beukering et al. 2007:15, 17).

For instance, a survey of villagers in the Navakavu community found that more than 80 percent agreed that since establishment of the LMMA there has been a higher level of participation in community meetings, women have had a stronger voice, and the community has become more united. More than 50 percent agreed that youth have more opportunities to share their opinions and that resource conflicts within the community have declined (van Beukering et al. 2007:30).

In Votua, another LMMA community, social cohesiveness has improved considerably after 3 years of LMMA work. "Through our engagement with LMMA work…our three clan chiefs are now talking to each other after decades of disputes," observed one community member (LMMA Network 2006a:21).

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LMMAs have also enhanced social cohesion by increasing village fundraising for communal purposes, such as to support the local church or schools. Households earning additional income from selling surplus fish and shellfish are better able to meet their traditional social obligation to contribute to village fundraising. For instance, in Waiqanake village in Navakavu, the Community Fundraising Project recently amassed some F$20,000 (about US$12,000), three quarters of which came from the sale of fish and shellfish from the LMMA (van Beukering et al. 2007:9).

Sustainability

The LMMA approach has several distinct characteristics that contribute to its ability to create long-term change. First, it relies on strong commitment and motivation from the communities themselves, which tends to promote enhanced resilience. Experience with the initial LMMAs indicates that communities remain engaged in the collective efforts needed for successful ongoing resource management.

Another favorable aspect is the relatively low cost to establish an LMMA. For instance, the total cost to establish the LMMA in Navakavu is estimated at less than US$12,000 over 5 years—a modest investment that has led to a doubling of average household income for about 600 people (Leisher et al. 2007a:iv). A separate study in Navakavu showed that the increase in fish caught over this period has provided about US$37,800 in benefits to the community (O'Garra 2007:2). The province-wide approaches established in Kadavu and other provinces of Fiji hold considerable promise as a low-cost and highly effective method for extending LMMA work to remote sites and may provide a model for other LMMA Network countries to emulate (LMMA Network 2006a:35).

It is important to note, however, that successful LMMA work requires a commitment to provide ongoing training for community members who replace people who move away from the village. Likewise, continual training is needed in LMMA Network partner organizations, such as government ministries, since staff move around over the course of their careers and often leave the districts in which they had begun promoting LMMAs.

The role of external funding has also been significant. The cost of the LMMA Network's core operations is about US$500,000 per year, much of which has historically been supplied by U.S.-based charitable organizations, including the MacArthur and Packard Foundations. It has been challenging for the network to secure additional sources of support, especially for core costs (USP 2007:23).

A FLMMA Trust Fund has been established to provide ongoing village assistance costs once donor funding ends. It was originally established with prize money from international awards for FLMMA work. More recently, Conservation International has committed funds in return for FLMMA managing the organization's Fiji Marine Managed Area initiative. A marine bioprospecting venture has also contributed to the fund. Individual communities are being encouraged to establish their own trust funds as well (Aalbersberg 2008).

Challenges to the LMMAs

In addition to the sustainability challenges described above, the LMMA approach faces other tests as it expands throughout Fiji and the South Pacific.

Representation

Traditional Fijian cultural norms tend to emphasize the involvement of older, male community members in decisions on marine resources. Women and youth are often challenged to make their voices heard.

While the FLMMA protocol recommends equal representation of women, men, and youth in all meetings and committees, this is not always achieved. In some villages, women lead iqoliqoli committees (Aalbersberg 2008). In others, however, women are not represented, despite the fact that many are actively involved in gathering shellfish (van Beukering et al. 2007:15,16–17). In interviews, many women of Navakavu voiced serious criticisms concerning the operation of the iqoliqoli committee in their community, especially the lack of any mechanism for women's grievances to be heard and acted on by the committee (van Beukering et al. 2007:15).

Changing such entrenched traditions will take time, yet the long-term future of any community LMMA depends on both the perception and the reality of equitable treatment and participation. Increases in alternative livelihoods, critical when natural resources are the sole source of income, can provide other avenues of empowerment and representation.

Enforcement

Maintaining the integrity of tabu areas is a continuing problem for LMMA communities, despite the efforts discussed earlier to develop enforcement capacity. Uneven support from regional and national officials and inadequate resources both cause problems. Fish wardens often experience difficulties carrying out their assigned jobs due to this lack of resources. Many LMMA villages consider the availability of a specially designated patrol boat (with an engine) to be a prerequisite for successful enforcement, particularly in areas of conflict with commercial fishers (LMMA Network 2006b:2). While some communities have been able to secure the use of such a boat, they may lack the means to purchase fuel for it.

When violations are detected, only sanctioned fish wardens have the right to take violators to the police. Some transgressors may be brought before community meetings for more traditional forms of enforcement, such as shaming (LMMA Network 2006a:15). But a general lack of consistency and an occasional unwillingness of official law enforcement to get involved often undercut the effectiveness of any compliance program (Rarabici 2007). For instance, in the community of Tavualevu, on the north shore of Fiji's largest island, Viti Levu, the iqoliqoli committee has taken on violators who engage in destructive, illegal fishing using dynamite smuggled out from a nearby gold mine. Despite the confiscation of dynamite and offenders' fishing gear by community fish wardens, many violators have evaded significant penalties due to lack of will within the judicial system to convict them (LMMA Network 2007a:14-15).

A related challenge for communities engaged in LMMA work is addressing the suspicion of favoritism in enforcement. There is a perception that some people, such as extended family members of fish wardens, are more able to "get away with" illegal entry into tabu areas or the use of prohibited gear (van Beukering et al. 2007:12–13). Community support for the LMMA program will be eroded if the appearance of preferential access to marine resources is not addressed.

Other Livelihoods

The long-term success of the LMMA strategy also will depend on LMMA members' capacities for enterprise development and alternative livelihoods. Even with new opportunities for tourism employment, most poor families in Fiji's coastal communities remain heavily dependent on marine resources for their income. Yet as populations grow, if additional livelihood options are not available there is always the danger that poaching will become more common and that communities will revert to overharvesting.

Scaling up environmental enterprise for the poor involves creating the conditions for nature-based enterprises to thrive.