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Small Scale Fisheries Management: Lessons from Cockle Harvesters in Nicaragua and Tanzania

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Introduction

There is increasing recognition that not only men, but women and children make significant contributions to the fisheries sector. However, the role of women and children in gleaning fisheries tends to be underestimated and poorly documented although they make significant contributions to coastal food security and income generation.

Gleaning is the harvesting of marine resources with simple implements or by hand in the intertidal zone, with the bulk of the catch consisting of bivalves and other invertebrates. This activity and its harvest are typically unreported or under-reported in fisheries statistics. Usually, these resources also go unmanaged. Gleaned species are characterized by high yields due to high levels of natural productivity of tropical intertidal zones in estuaries and reef flats. A large portion of these harvests are for household food and income.

Emerging models of successful management of this type of gleaned fishery are found in Fiji, where women gleaners have established small-scale no-take zones on the reef flats to manage an important species of clam locally called kaikoso (Tawake 2001). These no-take zones were recognized by village chiefs and

established with technical support from the Department of Fisheries and The University of the South Pacific. Participatory monitoring of these “Locally Managed Marine Areas” (LMMAs) has shown increased abundance and size of cockles inside the no-take zones and in adjacent fishing areas. Higher harvests also occurred in the downstream side of the no-take zones, providing direct benefits to harvesters.

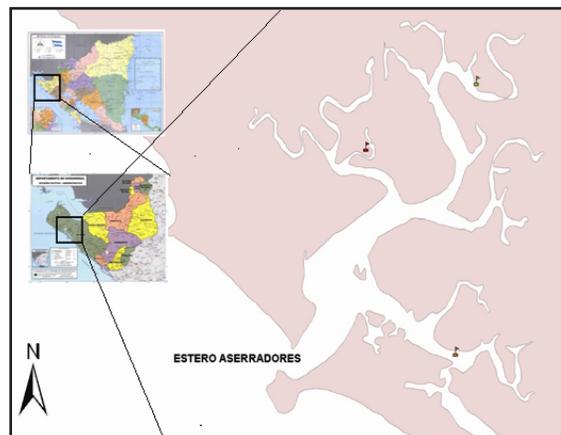


Figure 1. Location of the Estero Aserradores, no-take zones and monitoring sites.

The Sustainable Coastal Communities and Ecosystems (SUCCESS) Program, funded by the United States Agency for International Development (USAID) and implemented by the Coastal Resources Center (CRC) in partnership with the University of Hawaii

Hilo (UHH) and several regional partners set out to test the premise that the

general Fiji-style model for managing women-dominated small scale cockle fisheries using a co-management approach coupled with no-take reserves has high potential for transferability worldwide. This article describes two initiatives for co-management of women-dominated cockle (*Anadara* spp.) fisheries—one implemented on Zanzibar Island of Tanzania and another implemented in Nicaragua—that were based on the Fiji model.

The Aserradores Estuary of Nicaragua

Communities along Nicaragua’s Pacific coast are greatly impoverished with little access to services, markets or other livelihood opportunities. While cockle harvesting plays an important role for approximately two thousand people in the area, there is increasing exploitation of fish and bivalve stocks, removal



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of mangroves, and rapid population growth. These factors combined make livelihood and food security for the people living in this area increasingly tenuous. Cockle gathering is further restricted by the creation of several protected areas where cockle harvesting is banned and by long seasonal closures. While these management regulations—the establishment of protected areas and closures—were central government’s response to declining stocks, they nevertheless created hardships for people dependent on these harvests for their daily livelihood. Many harvesters were forced to violate the regulations and harvest illegally—either to provide an important food protein source or income for their families, many of which are female-headed single parent households. In this context, management authorities were unable to fully enforce these regulations and high non-compliance resulted in ineffective management of the fishery.

The Centro de Investigación de Ecosistemas Acuáticos (CIDEA) at the Universidad Centroamericana (UCA) piloted a co-management cockle management initiative in the Aserradores Estuary (see Figure 1) as an alternative to the centralized top-down approach. Women and children make up the majority of cockle harvesters in this area. When fish catches by the men are low, cockle harvesting becomes a default food and income substitute for them as well. Hence, the cockle fishery plays a critical role in food and economic security and household resilience in this area. CIDEA, through the SUCCESS Program, and working

with the National Fisheries Agency (MARENA), attempted to adapt the Fiji model of cockle management in the Aserradores Estuary. This included working with a female extension agent from CIDEA and the women in the community to establish no-take areas.

The women harvesters were initially reluctant about the idea of no-take reserves. After a

great deal of social engagement and networking to build their trust, the women offered their support for the reserves. The community eventually set up three no-take zones and established a management committee. They also established a community-based monitoring scheme to assess the effectiveness of the no-take areas.

Figure 2 shows statistically significant changes over time in the mean density

of cockles inside the three no-take zones and in the adjacent areas, which also showed increased densities over time.

Although the cockle harvesters became enthusiastic about this new approach, they experienced challenges along the way. MARENA and INPESCA (Instituto Nicaraguense de Pesca y Acuicultura,) unilaterally decided that harvests from Aserradores could not be sold and would not issue permits for this purpose. Since MARENA and INPESCA could not discern between cockles taken illegally from the nearby Padre Ramos Reserve and cockles taken legally from the Aserradores Estuary, they banned all cockle harvests in the vicinity. This top-down decision making included no consultation with the local

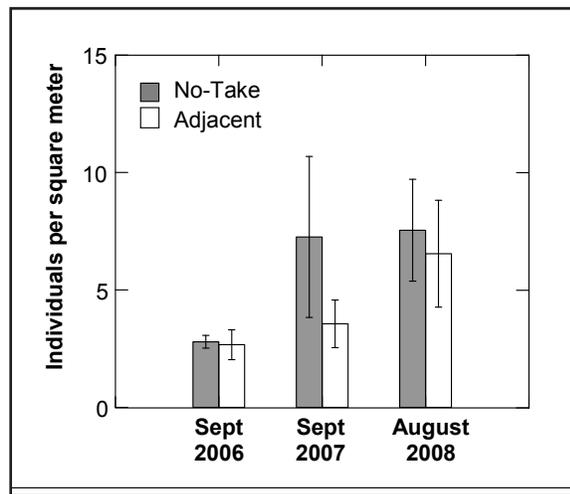


Figure 2. Changes in mean density of cockles inside and outside the no-take zones in the Aserradores Estuary



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communities and so discouraged the Aserradores harvesters that they considered placing roadblocks on the highway as a show of protest. However, CIDEA extension staff persuaded the harvesters to enter negotiations with the national agencies and helped get the local government involved. The latter supported the community and lifted the ban on the sale of cockles. This led to an important decision wherein MARENA and INPESCA agreed to allow the Mayor's office to control the harvests from the Aserradores Estuary and issue commercial permits to the Aserradores cockle group as long as they maintained the alternative management regime for the cockles. This agreement provides a degree of formal delegation of responsibility from the central government to the local municipality and the cockle harvesters to manage the harvest and sales from the estuary. Through the commercial sales permits, it also provides the community with a degree of exclusive use rights.

Lessons from Aserradores

The need to manage gleaning activities along the coasts of Nicaragua and Central America is great as they play an important role in sustaining coastal household incomes and providing food security. The experience in Aserradores suggests that in this region the cockle resource, harvested predominantly by women, can be effectively managed at the local level. It is also demonstrating that when the resources are managed properly, it is possible to allow for year-round harvests. This allows for uninterrupted provision of food and income at

the same time it promotes conservation goals.

The results in Aserradores also suggest that a small amount of continuing outside technical support helps sustain such initiatives. While the Aserradores cockle harvesters are today more empowered, the role that CIDEA played cannot be underestimated—e.g., their critical role in facilitating negotiations with powerful central government agencies. External institutions such as universities can be important partners with communities in facilitating the social process of organization, mobilization, participatory monitoring, and advocacy.

Important challenges still lie ahead at the national level.

Aserradores is an exception and no new national policy has been proposed or established based on this model to allow the approach to be adopted

more widely in Nicaragua. However, other donors and non-governmental institutions are starting to replicate the approach, including for coastal fin fisheries. National policy change can be a slow process, but, as an increasing number of communities start experimenting and building a constituency for this approach, there will be increased pressure on national agencies to consider change.

Cockle Harvesting in Menai Bay on Zanzibar Island Tanzania

In the Menai Bay Conservation Area (MBCA) located on Unjuga Island of Zanzibar (see Figure 3), most people make their living as fishermen, seaweed farmers or by gleaning molluscs from the intertidal reef flats. Mollusc harvesting, especially of cockles (*Anadara*



Figure 3. Location of the Menai Bay Conservation Area (MBCA) on Unjuga Island, Zanzibar and the project village sites.



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antiquata), provides an important source of food and income. This is particularly true for women who can earn approximately \$20-\$30 per month from gleaning. However, collection of molluscs and bivalves is open access with no restriction on size, numbers, gear or areas collected and there has been a drastic reduction of stocks in the nearshore areas.

The communities experienced several challenges during implementation of the no-take areas. There were problems of poaching—largely by persons from neighboring villages or outsiders. Poaching also accelerated in the period before the month of Ramadan, when people are looking to earn extra cash for the Idd celebration.

Since the Zanzibar Resources Management and Conservation Act provides a legal basis for community management, The Western Indian Ocean Marine Science Association (WIOMSA) in cooperation with the Institute of Marine Sciences (IMS) of the University of Dar es Salaam initiated a community-based planning and management process similar to that undertaken in Nicaragua and also based on the Fiji model. After a series of meetings, the communities decided to establish four no-take areas near the villages of Bweleo, Nyamanzi, and Fumba (Figure 3). Communities drafted bylaws to manage the no-take zones. The bylaws were then signed by all three village heads, and next by the District Fisheries Commissioner. The bylaws establish a management committee in each village, outline the punishments for poaching, and require the sites to be demarcated. The communities, with assistance from the WIOMSA/IMS extension team, also drafted a management plan. Throughout this process, representatives of the MBCA were actively involved in supporting the community-based no-take initiative.

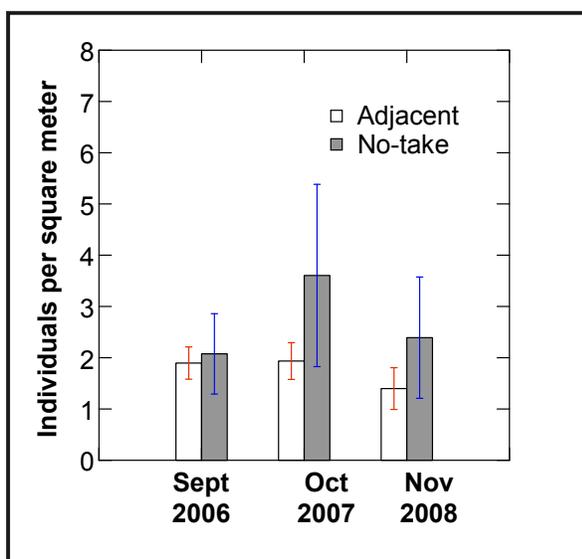


Figure 4. Changes in mean density of cockles inside and outside the no-take zones in Menai Bay, Zanzibar.

Community-based monitoring was conducted at each of the no-take areas. This included preparing simple bar charts of length frequency distribution and cockle density and comparing the results with those from previous monitoring. The monitoring group discussed the trends and shared this information with the village committee and other community members.

Figure 4 provides the community-based monitoring data, which shows the changes over time in the mean density of cockles inside the four no-take zones and in respective adjacent areas. The results show that other than the Bweleo site—which had statistically significant positive changes (Figure 5) in mean density—overall, there was no statistically significant change for all sites combined.

Lessons from Menai Bay

The expectation was there would be increased cockle abundance inside the no-take zones and adjacent areas. Results of the monitoring data, however, show that this was true in the Bweleo site only. One likely reason was poor site



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selection. For example, one of the no-take sites in Nyamanzi is periodically covered with sand during the southeast monsoon season, which leads to high seasonal mortality of cockles. The Project has discussed this issue with the

consistent with other research findings that a key factor in sustainability is the perception by the community that they are receiving tangible benefits (Pollnac and Pomeroy, 2005).

Conclusions

The project premise that the community-based management approach to small scale management of gleaned shellfish (*Anadara* spp.) using small-scale no-take marine reserves has widespread applicability was demonstrated by the two cases presented above. The Western Pacific experience was transferred to Tanzania and Nicaragua. In both instances, however, some trial and error adjustments and adaptation to local context were necessary to make the approach effective. In addition, the role of the enabling environment proved important. In Nicaragua, there is not yet full buy-in by central government to scale-up a community-based approach. In Zanzibar, the legal basis for community-based management was present, but there was no framework for the cockle fishery specifically. In both cases, the pilot project made inroads on influencing policy—although formal policy changes at the national scale have not yet happened. In general, while experience from pilot projects can help foster change at the larger scale, this usually happens only over a long period of time.

In both cases, universities played a more active role and government a more passive role in field activities. Moving forward, there is a need to engage government authorities more fully in the field efforts, including involvement in monitoring and management planning. This is especially important if the initiatives are to be considered truly co-management. This would help foster sustainability and greater commitment to changes in enabling conditions that are needed to support and scale-up the co-management approach. While the initiative may be viewed as an example of community-based

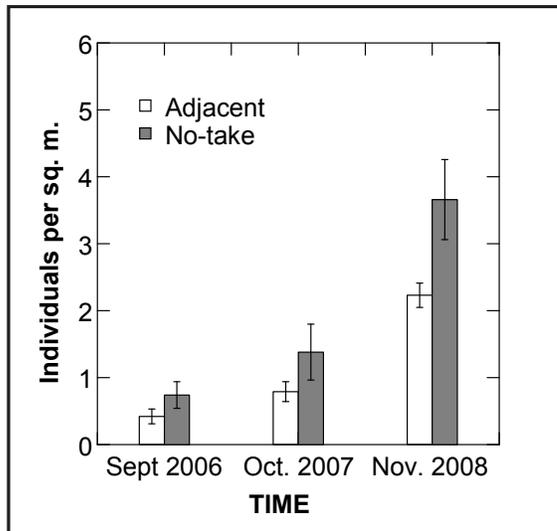


Figure 5. Changes in the mean density of cockles in the Bweleo no-take zone and adjacent area.

community and recommended that they select an alternative site—one that is not subject to shifting sands. In two other sites there were reported high levels of poaching just prior to the religious festivities in October 2008—just before monitoring took place. In response to this last issue, the communities may want to consider adopting traditional management practices such as those used in Eastern Indonesia, where closed areas are temporarily opened for a few days once a year during traditional celebrations, then closed again. These traditionally managed sites, with short periodic openings, showed higher conservation performance compared to co-managed and centrally managed closures (McClanahan et al. 2006). If Fumba residents are given the opportunity to partially harvest closed areas for special celebrations, then compliance during the rest of the year may improve and provide more motivation to enforce during the closed period. This is



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management, in each case local and national governments played important roles in providing legitimacy and endorsement of community management responsibilities. In reality, these examples are better characterized as a form of co-management with the caveat that more active involvement of government is needed to make them sustainable.

Community monitoring played an important role in each case. In Nicaragua, communities were able to see how their own data demonstrated the link between the closures and increasing abundance of harvestable stocks. In the case of Tanzania, monitoring helped to expose problems with poor initial site selection and possible poaching, requiring adjustments to management strategies.

Universities can play an important role in promoting innovation and in catalyzing policy change as decision-makers are likely to pay more attention if credible local scientists are behind these initiatives. However, university researchers need to learn how to blend applied research with practical community extension skills. As shown in these cases, learning-by-doing is an effective capacity building approach for local universities as well as the communities.

Another key to sustaining innovations at the community scale is involving external local institutions—other than government—that have a long term interest in the communities. For example, in both the Nicaragua and Tanzania cases, the local university had previous community service initiatives within the project areas. While there is one school of thought that posits that all outside support to community-based initiatives should be terminated at some point, others have determined that continued interventions from external organizations is a key factor in the long term success of community-based initiatives (Pollnac et al. 2001). The Nicaragua and Tanzania cases

also illustrate that local universities can play a unique role in promoting new ideas and influencing policy makers at a national level. This is especially true in situations where the government may view nongovernmental organizations with suspicion.

In Zanzibar and Nicaragua, interest and acceptance of co-management approaches is growing. This has a high likelihood of influencing policy in the future—i.e., beyond the life of the project. When the capacities of supporting institutions such as CIDEA, WIOMSA and IMS are strengthened as part of the overall process, chances are increased that the benefits and impacts will continue well beyond the life of the project. Unfortunately, too often it is only the number of hectares of resources protected or the number of people benefiting at the pilot site scale that are considered as indicators of a project's success. Yet a project's most valuable legacy, and the one that may offer the most significant long term impacts, is the strengthening of local institutions to implement applied research and extension systems.

References

McClanahan, T.R., M.J. Marnane, J.E. Cinner and W.E. Kiene. 2006. Comparison of marine protected areas and alternative approaches to coral-reef management. *Current Biology* 16: 1408–1413.

Pollnac, R. B., B.R. Crawford and M. Gorospe. 2001. Discovering factors influencing the success of community-based marine protected areas in the Visayas, Philippines. *Ocean & Coastal Management* 44: 683-710.

Pollnac, R.B. and R. Pomeroy. 2005. Factors influencing the sustainability of integrated coastal management projects in the Philippines and Indonesia. *Ocean & Coastal Management*



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48: 233–251.

Tawake, A., J. Parks, P. Radikedike, B. Albersberg, V. Vuki and N. Salafsky. 2001. Harvesting clams and data. Conservation Biology in Practice 2(4): 32-25.

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