Title: Enhancing Mangrove Wetland Conservation through Silvofisheries Opportunities in two Coastal Communities of Kenya

Final Report

By

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Introduction

Mangrove forests are vital economically, ecologically and in protection to the coastal environment. The ecological role of mangroves is changing and range from nursery and feeding habitat to complex ecosystem services like water quality maintenance and carbon export. Mangrove tree formations contribute to the marine food web through their production of detritus. Various life forms including birds, commercially important species of marine animals (crabs, fish and prawns) and other wildlife spend part or their whole life in the mangrove ecosystem.

Mangroves are being converted to fish and prawn ponds for large scale aquaculture e.g. the Ngomeni prawn culture in Kenya and the Rufiji prawn culture project. This practice has led to the destruction of an enormous amount of the world's mangrove forests in nations such as India, Thailand, Costa Rica and Ecuador. When mangroves are destroyed for aquaculture, the benefits and services provided by this ecosystem are traded for a single service. Besides destroying the mangroves, unsustainable industrial aquaculture can create many more problems for the surrounding environment, including; polluted water, accidental introduction of exotic species, vulnerability to diseases outbreaks and occurrence and high intensity Tsunami among others. Based on all these and the fact that communities in the coast of Kenya feel that mangroves are a government property; there was a need to get them involved directly in mangrove management together with the Kenya Forest service through livelihood options in the mangroves (silvofisheries).

The silvofisheries initiative funded by the Rufford grant is spearheading "Freedom for Mangroves" campaign through community training and awareness on sustainable methods of mud crab silvofisheries toped with mangrove management and restoration. The silvofishery training initiatives in this project were aimed at conserving and managing mangrove wetlands through improving livelihoods as a way of community empowerment to sustainably become custodians of mangroves in their areas.

The Rufford Grant for silvofisheries project in Kenya was provided for 2007-2008. The project that was executed in two coastal communities (Majaoni and Dabaso) had five main components or activities to be achieved: Mud crab culture using drive-in cages; mangrove planting and nursery establishment, community awareness campaigns, Bamboo planting and Bard walk construction to access the cages.

The silvofisheries leading activities that were to be directly addressed during the project included but not limited to:

- Training on mud crab silvofisheries using drive-in cages
- Setting up of culture with the communities on mud crab culture in drive-in cages to assess profitability and viability.
- Training of mangrove nursery development and mangrove planting
- Empowering the communities to manage mangrove forests
- Planting of bamboos as future cage construction materials
- Constructing timber walk boards to access mud crab cages.
- Creating community awareness campaigns on mangrove conservation and networking with other stakeholders.

During the one year silvofisheries project period a lot of the project activities were achieved in both communities though some could not be implemented as planned due to limitations to be addressed latter in the project report. It was also realized that there existed some potential for using other mud crab and fish culture methods to make use of the pools in the mangrove forests where there is permanent water residence at both low neap and spring tides. With such diversification, it will be able to streamline silvofisheries as one of the back bone revenue earner for the coastal poor in the national economy.

Profile of the participating groups

1. Dabaso Conservation Group (Mida Creek)

Is one of the groups within the bigger Mida creek conservation community that has focused on mud crab silvofisheries. The group that was formed in 2004 and has 26 members was triggered by unplanned mangrove cutting in the area by close friends, uncles, cousins, grandparents and the effect of El nino which caused a lot of siltation that destroyed mangroves calling for strategies of conserving the mangroves. They started mud crab farming with the assistance of Kenya Marine and Fisheries Research Institute (KMFRI), Moi University, and Coast Development Authority (CDA) through funding from Ramsar under supervision by Kenya wildlife Service (KWS) which did not pick up well due to lack of technical know-how leaving them very frustrated. They therefore needed further technical and financial assistance to realize their dreams in mud crab silvofisheries which Rufford grant was able to provide. It's also worth to note that the area is rich with excellent mangrove pools and channels which can be used for multi-species fish culture using net enclosures without any additional feeding since they are served by every high tide.

2. Majaoni Youth Development Group (Mtwapa creek)

The only active group in Mtwapa creek was formed in 2003 and is made up of 14 members all of whom originates from Majaoni village. It was latter registered in 2005 under the social services department and has been actively involved in the day to day affairs of the youth and the community of Majaoni Village. The group has been involved in a number of project/ activities together with partner CBOs and NGOS. They are involved in a community mariculture and mangrove conservation project on Mtwapa Creek being supported technically by Kwetu Training Centre since 2005-2006 which has seen them understand the links between mangrove and livelihoods well. The group has a high potential to utilize their mangroves for mud crab culture since it's served by tidal water daily, in addition to innovations of using down ponds as pens to culture mud crabs.

Activities and level of achievement

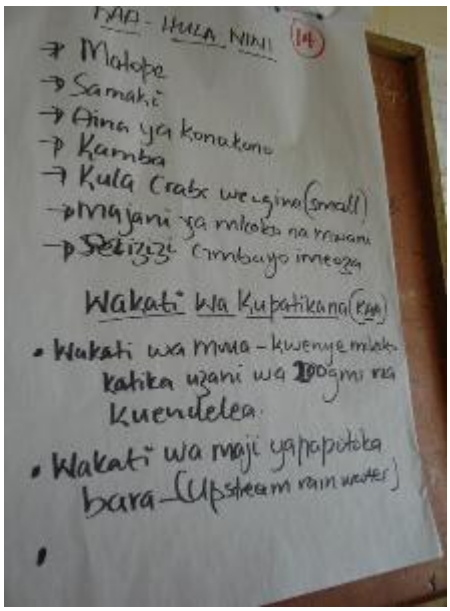
1. Trainings

The trainings were key in the silvofisheries initiatives under the Rufford grant activities. Being a new technology the communities needed a good empowerment as they continued with the activities to ensure sustainability. The four silvofisheries on field (farm) trainings done for each group were aimed at providing skills to the group members on how to construct good crab cages, install silvofisheries net pens in down ponds, crab handing, how to culture mud crabs in drive-in cages, monitoring, cage and pond micromanagement and harvesting.

The 40 community members involved in these trainings were also given further technology on how to make mangrove nurseries using different methods (use of plastics, use of waste pipes and direct planting of some species). Mangrove tree management was also introduced as a concept to the community groups in addition to the importance of ecosystem approach in mangrove management. The communities were also trained on mangrove planting techniques under silvofisheries principles; seed collection by type and season, drive, seed identification, site selection and monitoring techniques, management of planted species and Bamboo planting and management.

Brief aspects of mud crab biology and ecology were mentioned during the trainings though much was learnt during monitoring as the project progressed. To eliminate over dependency on mangrove trees, the communities were introduced to the economic importance of bamboo and the multi-tasking into which it can be put. In addition to the 40 community members trained, five government officers at different levels were also able to learnt and appreciate the impact that silvofisheries can achieve in conservation and livelihood. However, more formal trainings were requested from both the communities and the forest service/fisheries department to provide information on the biology and ecology of culture organisms' inclusive mangroves. This provides the baseline information for silvofisheries since it has been realized that the extension networks in Kenya are poor so information from the scientist does not get down to the managers and other people who need it.

The project brought about a new collaboration between the Kenya forest service in charge of mangrove forest management and the community. This spirit of co-management was a great achievement that took a lot of time to be achieved because of the strict stand by each stakeholder. In the two sites now; the communities know their role in the mangrove management and why, while the forest service understands their role and appreciate the communities responsibility. They both consult one another and solve forest management problems together.



Communities contribute during training on what they think mud crabs eat.

Communities being trained on how to make mud crab cage cover.

A ten mud crab cage compartment completed and ready for stocking.

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Cultured crabs at Dabaso-Mida Creek, Kenya.

Mud crabs monitoring off Dabaso-Mida Creek.

2. Mud crab culture

Dabaso conservation group was able to construct 100 drive-in cages with a capacity to hold 100 crabs at ago with Majaoni having 50 individual drive-in cages and an extra down pond (10m X 16m) with a net enclosure. The mud crab culture process picked up early in Dabaso where they were able to plan for a 20kg mud crab harvest every month with an achievement of 100kg harvest last year (2007) each kg selling at 200kshs. The production was then hindered by post election violence since mostly it targets tourist hotels as outlets, however it's now picking up. The production at Majoni was slowered down due to the smaller crab size (<50g) used in the down pond that needed a 6 months culture cycle, bringing their harvest to coincide with the post election violence when harvesting was done with no proper recorded being documented; with the construction of the drive-in cages, the production process will be harmonized well while bigger grabs (> 150g) will be targeted. The main challenge facing the crab culture is inability to get enough seed stock within the required time and cannibalism during moulting that tend to be addressed by the use of drive-in cages that are now in place in both communities. For the mud crab venture to be more profitable the communities need to be trained on record keeping and development of business plans so that they can monitor their incomes and expenditure.

Improvised down pond for mud crab culture at Majaoni.

The size of cultured mud crabs in a community site.

Majaoni nursery establishment.

3. Mangrove nursery, planting and management

A total of 2000 mangrove seedlings have been planted by the two community groups in the last 12 months. Dabaso was able to initiate mangrove nurseries early by developing a nursery with a capacity of 300 seedlings while Majaoni came later and developed a bigger mangrove nursery with a capacity of 1000 seedlings. The nursery has started its operations and will be having its first planting this year.

Nursery establishment at Dabaso conservation group.

Mangrove identified stickers at Majaoni Silvofisheries site.

Directly planted Rhizophora mucronata mangroves.

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4. Awareness campaigns

The community groups showered a need for fist creating awareness to the communities on the project and relevance of the marine environment through introducing environmental clubs in schools, chief's barazas and other public forums. In the initial stages, these aspects were covered but it was realized the budget could not support it more hence halted. May be this budget could be funded in the next phase to enable effective community transfer of information.

5. Exchange visits

This component was not foreseen in this proposal but was identified to be very important. The communities could be able to get more information and be encouraged once they see what their colleagues are doing in the next villages. Exchange of ideas played a big role between the two groups; Majaoni and Dabaso leading to faster project initiation.

6. Bamboo Planting

A total of 100 bamboos were planted in the two communities (60 pieces being planted along the shore in the silvofisheries sites while 40 were planted at the individual homes). More than half of the shore Bamboos did not survive due to the effect of crabs cutting and dry spell which lead to drying up before effective germination. The farm bamboos grew well but were affected by the long droughts which lead to some drying due to lack of water. Thus a suggestion was made to the communities to make plans of planting them next to boreholes so that irrigation can be done if a dry season comes up again.

Mr Mirera demonstrating mangrove planting along the seashore behind the mangrove forest.

Community planting Bamboo's along the seashore in their project area this may be used to control erosion too due to poor farming methods.

One year Bamboo's at one community member's village at Dabaso-Mida Creek.

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7. Walk boards

These are very necessary in crab culture to enable accessibility to the crab cages for monitoring purposes and feeding. The construction process was to be done in the initial phases of the project but could not be achieved due to the long process of getting permission from the Kenya forest service who is custodians of the mangrove forest. Therefore leading to its implementation in the last phase of the project; it was much well come even though due to budget constraints only 20m of the board walk was made for each group. Based on the expansive are that is suitable for crab culture in both groups, there were suggestions to expand the walking boards to cover substantial areas which will be used for mud crab culture in future. The boards also made it easier for visitors to access cages during high tide when water was covering the cages making it impossible to access.

Boardwalk constructed to access cages at Majaoni.

Preparing timber for boardwalk.

8. Joining SILVOFISHERIES FORUM

The two community groups were trained and motivated to joined the coast silvofisheries forum that was formed under the Umbrella of Kwetu Training Centre under funding from WWF at the start of 2007. The forum was required to work hand in hand with the local community based organizations in fighting for better prices for their silvofisheries products. However, this was not achieved since there were no funds to enable meetings to take place and organize the communities based on districts which could lead to a final umbrella body at the provincial level. At the moment the communities are keen to see how such body can be strengthened in future to help spearhead their activities.

Networking and collaboration

Throughout the project period, effective networking was done for the community through different forums and has been seen to bear fruit in the mud crab silvofisheries promotion in the respective groups and the general mud crab fisheries in Kenya.

- Through Lobby and networking, Majaoni Youth Development group managed to get a small funding from the Rotary Club of UK in the 3rd quarter of last year to expand on what they had started. They are therefore expected to expand their mud crab production and improve management of the silvofisheries area.
- Dabaso conservation group has in the 1st quarter of this year 2008 managed to get

funding from a program of the fisheries department in Kenya "Njaa Marufuku"- Meaning Keep hunger at bay; to expand their mud crab culture production.

- While making silvofisheries presentation at Durban-South Africa in a scientific symposium organized by Western Indian Ocean Marine Science Association (WIOMSA), there was curiosity from Swedish partners to have a more comprehensive research on mud crab ecology and biology in Kenya and Tanzania. There are proposals being developed for submission to MASMA (Marine Science for Management under WIOMSA) and SIDA/SAREC. If such funding is achieved the research will go along way in helping the silvofisheries initiatives being developed in the coast of Kenya.

Mr Mirera presenting at the WIOMSA Scientific Symposium.

Getting updated on pearl farming in Zanzibar during the WIOMSA poster session.

Conclusion

Silvofisheries is a new concept in Kenya that is aimed at achieving co-management of mangrove forests while improving the livelihoods of the mangrove dependent communities. The new government policy on forest management in Kenya allows for participatory management of forests by the Kenya Forest service and other stakeholders with some agreements. Its therefore seen as a driver for this project that was funded by Rufford Grant. The grant achieved quite substantial ground in training people on the significance of silvofisheries. The idea was widely appreciated even though the communities were not able to realize profits within the 1st year. I believe that if these activities were expanded in the respective communities, much will be achieved and finally sustainability will be achieved. With the kind of interest developing from other conservation and management partners, such avenue as "Coast Silvofisheries Forum" will be good vehicles for conservation entry ponds. I therefore wish to make a call for further funding from Rufford Grant for another year to enable project sustainability both technically and financially.

Recommendation/Way forward

Silvofisheries was an important component that can be used to conserve mangrove forests and improve the income of the coastal poor fishers as demonstrated by this project. Therefore I will propose the following as the necessary steps in establishing the following 2 communities that were involved so that they can become stable and act as learning centers for any other interested groups in the future.

- Expansion of the drive-in cage carrying capacity to 200 individual cages to ensure effective profitability.
- Utilize the pools in the mangrove forests for fish and crab culture as a way of ensuring constant monitoring such areas while obtaining income.
- Support open mangrove planting days and training of youth clubs in schools for effective knowledge transfer at an early age.
- Focus on community exchange visits so that the morale of the groups can be boosted while technology transfer and adoption is facilitated.
- Board walk expansion from the current 20m will be essential to enable accessibility to the expanded cage coverage and make it possible even for small school children who cannot walk through the mangrove mud.
- Bamboo planting is a good idea but combination with other species like casuarinas will be even a better idea. This will ensure support in terms of building poles and faster income from the faster growing casuarinas that have a wider market.
- If there is any possibility of supporting the coast silvofisheries forum; such move could be widely appreciated since it will form the engine of silvofisheries in the coast of Kenya.

Project Budget Break Down and Expenditure

Activity	Approved Budget (Kshs)	Expenditure (Kshs)	Expenditure details
Coordinator allowance	180,000	180000	12 months @15,000shs.
Community assistants			
Silvofisheries training-Mud crabs	60,000		
1. Majaoni trainings		25,000	10 members for 5 days
2. Dabaso Trainings		35,000	30 members for 3 days and 7 follow up days.
Community technology implementation			
1. Mud crab boardwalk	86,000		
(a). Majaoni mud crab		30000	50 drive-in cages and net down pond, with crab seed
(b). Dabaso mud crab		10000	100 drive-in cages and crab seed
(c). Majaoni board walk		20000	20m simple board walk to access cages
(d). Dabaso board walk		26000	20m simple board walk to access cages
2. Mangrove nursery and Bamboo planting	40,000		
(a). Majaoni Mangrove nursery		15000	1000 seedling mangrove nursery
(b). Majaoni Bamboo		5000	35 Bamboo pieces planted
(c). Dabaso mangroves		17000	300 seedling mangrove nursery
(d). Dabaso Bamboo		3000	65 Bamboo pieces planted
Networking, monitoring, assessment and evaluation	75,000		
1. Networking		20000	Per diem during an international symposium at Durban South Africa
2.Monitoring		42000	Travel to the groups once biweekly and phone calls
3. Assessment		5000	Quick 2 days individual assessment of the project per site
4. Evaluation		8000	Assistance to do an evaluation of the success of the project
Report development	25000	25000	Final report and updates
Public awareness	83000		
1. Trainings on right seed stock collection		13000	6 awareness trainings; 3 per site
2. Facilitation for attendance in meetings and other public forums		60000	Both for the coordinator and the community representatives
Incidentals	20000	12,000	Assistance to community members who had a weeding ceremony
		10000	Contribution to funeral expenses and other fundraisings
Total budget requested	629,000		
Total received and spent (Kshs)	616,000	631,000	
Total equivalent in $	4750		
Over spent	$116	15,000	