Promoting Sustainable Livelihood Initiatives among Poor Coastal Communities in Kilifi District, Kenya

KILFI INTEGRATED PROJECT REPORT

Report prepared by:
Diana Musyoka & Nyaga Kanyange

Coastal and Marine Resources Development, (COMRED)
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ABBREVIATIONS

CFA	Community Forest Association
COMRED	Coastal and Marine Resources Development
DFO	District Forest Officer
KCH	Kilio Cha Haki
KEMA	Kayole Environment Management Association
KFMCG	Kilifi Fisheries and Mangrove Conservation Group
KFS	Kenya Forest Service
KGTEI	Kilifi Greentown Environment Initiative
KIP	Kilifi Integrated Project
KMFRI	Kenya Marine and Fisheries Research Institute
MCG	Maya Conservation Group
NEMA	National Environment Management Authority
PIC	Project Implementation Committee
RECOMAP	Regional Programme for the Sustainable Management of the Coastal Zones of the Indian Ocean Countries
REDD	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
SWOT	Strengths, Weaknesses, Opportunities and Threats Analysis
TCK	Town Council of Kilifi
DRD	Disaster Risk Reduction
CVCA	Climate Vulnerability and Capacity Analysis

1 INTRODUCTION

Coastal and Marine Resources Development (COMRED), proposed to carry out the Kilifi Integrated Project (KIP) in urban and rural areas of Kilifi District Kenya. The project was implemented in a period of eighteen months (November 2009 to May 2011) and targeting four community-based organisations (CBOs/Groups), namely:

1. Maya Conservation Group(MCG)
2. Kilifi Greentown Environment Initiative(KGTEI)
3. Kilio Cha Haki Youth Group(KCH) and,
4. Kilifi Fishing and Mangrove Conservation Group(KFMCG)

The action sought to address problems defined by the groups themselves most of which have been identified at district level by the District Development Committee (DDC) and nationally by the Kenya Vision 2030. The action came at a time when the country is faced by challenges such as waste disposal mechanisms especially in urban areas, hunger, deforestation and general environmental degradation. Further, lack of basic requirements such as food is prevalent especially rural Kilifi. This coupled with imminent near-collapse of artisanal fishery in the area creating a need to seek alternative food and income sources. Lack of appropriate technology in mariculture compounds the problem of accessing livelihood alternatives.

1.1 Background

Kilifi district is a coastal zone area covering 4,779.2 km^2 with a population of 597,354 (unpublished data, 2002). The district is endowed with a rich natural resource base such as mangrove forests, fossil coral, coastal forest (Arabuko Sokoke forest) and numerous marine flora and fauna. Despite many opportunities presented by existence of these natural resources, local residents have not been in a position to exploit them to their utmost benefit. Majority living in the rural areas depend on subsistence farming and small businesses for livelihood while those living along the coastal strip depend on small businesses, fishing and tourism. This notwithstanding, the district is one of the poorest in Kenya with >60% living below national poverty level. According to a recent government report (2008), poverty threshold in Kenya is equivalent to an average monthly earning of $20 in rural areas and $40 in urban areas. According to local reports, the amount of fish caught in the area has decreased recently. In addition, illegal and unregulated mangrove cutting continues unabated. Indeed, one of Kenya's forest development objectives for the year 2000 is 'to increase the forest and tree cover in order to ensure an increasing supply of forest products and services to meet the basic needs of the present and future generations and for enhancing the role of forestry in socio-economic development' (Kairo et al, 2008). This objective cannot be realized unless concerted efforts to reforest degraded forests are made.

Land Tenure is a major problem that affects productivity. Many communities do not own land, and refer to themselves as squatters, therefore are unable to plan use of land for cultivation, or to develop the land without first seeking permission from Government or private land owners respectively. This has especially significant connotations on perennial agriculture and the allocation of grazing land for livestock

Kilifi Township is the third largest coastal urban centre in Kenya covering an area of 79.1 km ^{2} with a total population of 46,474 people and comprising of 8,248 households (Government of Kenya census report 1999). The creek south of Kilifi town has a great potential for mariculture while the beautiful sceneries outside the Town are an attraction to domestic and foreign tourists. Although the District development Plan (2002-2008) recognises the fast growing population of the town and the expected need for upgrading waste disposal mechanisms, no appropriate measures are in place.

Financial and technical support for various local initiatives was not forthcoming. Thus, it is against the background presented here that the groups sought assistance in solving their own problems in a sustainable way.

1.2 Project Objectives

The overall objective of this action was to strengthen indigenous groups in implementing coastal and marine related livelihood activities. The purpose was to create employment, provide of sustainable income to the Kenyans, restore degraded environment and promote use of appropriate mariculture technologies.

Specific objectives were as follows:

1. To improve solid waste handling and management through collection of garbage and recycling of plastics and flip-flops.
2. To create employment opportunities for rural and urban youth and women folk. Rural youth will benefit from employment created through mariculture activities while urban youth will participate in garbage collection and recycling. Women folk will benefit from sales generated from flip-flop recycling.
3. To beautify Kilifi town through tree planting and removal of inappropriately dumped litter.
4. To enhance environmental protection through planting of terrestrial and mangrove trees to contribute to prevention of upland and coastal erosion and sediment catchment.
5. To promote culture of fish and crabs on a pilot basis as an alternative source of livelihood amongst target beneficiaries.
6. To create awareness about waste disposal and environmental protection through use of various awareness strategies.
7. To enhance capacity building of target groups through training on different technical aspects of project activities and exchange visits to see best practices.

1.3 Project Management and Administration

Project management and administration entailed various elements and hierarchy. Filed operations were mainly coordinated by a Project Officer (Ms. Diana Musyoka) assisted by community filed volunteer officers while the general management was done by the Project Manager (Mr. Nyaga Kanyange). A Project Implementation Committee (PIC) met every month to oversee project implementation. It was composed of one representative from each group except KGTEI that was represented by 2 persons due to its larger involvement in the project. A representative from Kwetu Training Centre for Sustainable Development-the partner organisation in the project was also part of the committee. Group representatives fed into their project implementation sub-committee that

was composed of five to 10 group members. This committee worked closely with the project officer to ensure success of field activities. COMRED directors also participated in the project in various stages ranging from project planning to field work.

Project associates were also involved in project implementation. These were officers from government departments as follows:

1. National Environment and Management Authority(NEMA)
2. Kenya Forest Service(KFS)
3. Town Council of Kilifi(TCK)
4. District Fisheries Office(DFO)-Kilifi District

Project associates provided assistance in one way or another and also provided legal framework for implementation of the activities. Kilifi Forest Department in conjunction with the Fisheries Department provided a boat and outboard engine that were regularly used to access Maya located along Kilifi creek. Associates provided complementary assistance to the entire project activities. Overall, actual project implementation consisted of a well co-ordinated team of individuals, groups and institutions.

2 Kilifi Integrated Project Activities

The following activities were carried out:

1. Capacity building
2. Environmental Awareness Creation
3. Mariculture and Silvofisheries
4. Tree planting and nursery establishment
5. Solid Waste Management
6. Flip-flop recycling
7. Mangrove patrolling and Fishing

2.1 Capacity Building

Individual group members and representatives were trained on different skills relevant for project implementation. Training was provided on sustainable solid waste management, silvofisheries and entrepreneurship skills. Trainings were both theoretical and practical. Training was done as summarised in table 1.

Table 1: Individual Group Training Summary

Community Group	Training Area	Trainer
1.Maya Conservation Group	Silvofisheries	Kwetu Training Centre
2.Kilifi Greentown Environment Initiative	Sustainable solid waste management	Destiny Africa and Kayole Environment Management Association
3.Kilio Cha Haki	Flip flop recycling	Kiunga Women Group

Exchange visits to witness best examples of fellow coastal communities carrying out mariculture activities were also done. Visits were made to Kwetu training centre mariculture demonstration sites, Prawnto farm in Tanga, Tanzania and Makongeni Baraka women self-help group in Kenya's South Coast. During these visits the group members were able to have practical experience different stages of fish farming namely, stocking, feeding and harvesting.

A major outcome of the trainings, exchange visits and consultant visits has been the increase in knowledge, skill and experience in:

1. Mangrove replanting techniques
2. Mangrove nursery establishment
3. Pond engineering management
4. Fingerling(seed) selection, collection ,sorting and stocking
5. Crab rearing skills
6. Mangrove replanting

Figure 1. MCG group members in an exchange visit at Kwetu demonstration site.

2.1.1 Silvofisheries Training

Training and exchange visits were organised to equip group members of Maya Conservation Group with skill and knowledge to initiate this activity. The group received two trainings and participated in several exchange visits. Onsite training was facilitated by Kwetu Training Centre at the group's project site in Kwa Maya village along the Kilifi creek. The training focused on mariculture and mangrove conservation with the aim of creating awareness on the importance of the mangrove wetland and transfer sufficient mariculture technology required to initiate the project. A total of 35 community members were trained on Mariculture initiatives and sustainable mangrove replanting.

2.1.1.1 Mariculture Initiatives and practices

During mariculture trainings, participants received knowledge on milkfish (*Chanos chanos*) farming; its biology, ecology, and factors favouring its culture. Training also covered aspects of prawn and crab fattening. They were also taught pond construction and management techniques. Following this training, they were able to successfully construct two ponds covering a total area of 480m^2 and stocked them with prawns and fish. The group has also been able to construct floating cages for mud crab fattening.

In addition to periodic follow-up visits by Kwetu technical staff, technical advice was provided by consutants contracted directly by ReCoMaP. During these visits the consultants assessed the progress of projects and offered advice on how the community can meet some of the challenges they face in the mariculture project. Mr. Lugazo and Ms. Elgen from Tanzania visited the mariculture section during each quarter of project implementation period while Dr. James Kairo of Kenya Marine Fisheries Research Institute (KMFRI) provided expertise on sustainable mangrove replanting.

2.1.1.2 Sustainable mangrove replanting

In a theory class the community group received information on mangrove ecosystem such as:

1. Zonation of mangroves
2. Mangrove species
3. Challenges facing mangroves
4. Mangrove nursery establishment techniques

In addition to the theory class participants went through a practical session whereby they established a mangrove tree nursery of about six hundred propagules. Following this experience, mangroves have been planted in degraded areas along Kilifi creek.

Figure 2. A community participant is taught how to establish a mangrove tree nursery, Right: Participants excavating a pond.

2.1.2 Solid Waste Management Training

Training on solid waste management targeted Kilifi Greentown Environmental Initiative group, Town Council of Kilifi staff and a Pwani University student. Destiny Africa in collaboration with Kayole Environmental Management Association, Nairobi, delivered hands-on training on sustainable solid waste management. Practical skills passed to the group included weaving, composting, pole and tile making, charcoal briquetting. All the products were made out of used material, mainly plastics, polythene and charcoal powder. Composting was done using market organic waste. The group monitored the manure until it was suitable for use and tested some of it in their tree nursery seedlings, it proved successful. Theoretical skills on marketing and entrepreneurship skills were also included in the training.

The participants were taught how to develop a waste management strategy-management scheme by identifying possible challenges and problems likely to be faced in their waste management project; they also identified solutions to counter the challenges.

Figure 3. Participants learn weaving techniques out of used polythene material.

Figure 4. Fencing pole and roofing tiles moulded out of used plastic material.

Figure 5. Partcipants in a charcoal briquetting session; Right: Participants in a composting practical session.

2.1.2.1 Exchange Visits

Members of KGTEI visited the recycling plant owned by Watamu Marine Association (WMA) to learn how the plastic crushing is done. WMA is an initiative for local community members to conserve the environment in Watamu town. The organization is recycling plastic waste using a plastic crusher similar to what KGTEI proposed to use. During the visits the group received skills on plastic sorting, separation, crushing and packaging. Through the exchange visit the group has created market networks for recyclable plastic waste.

Figure 6. KGTEI members during exchange visit to WMA plastic crushing plant.

2.1.3 Flip Flop Recycling Training

Within KIP Kilio cha Haki Group proposed establishment of a flip flop recycling venture for single mothers within the local community. The group received flip flop recycling techniques training from community based trainers from Kiunga in Lamu.Members of Watamu Marine Association (WMA) also participated in the training. The training was practical, participants were taught to make creative cutouts of flip flops to make shapes of nature or aesthetic products such as curtains and jewellery. The members were actively involved in making the shapes and joining them.

At least 15 members of the community mostly women, were trained and they received awareness on the impacts of flip flops and other marine litter to marine life. They also learnt creative skills and techniques of making recycled flip flop products for sale. From the training they also learnt

about the tools used and where they can purchase them. The participation of WMA members who are curio dealers created an opportunity to make market connections in the future.

Figure 7. Participants take part in the flip flop training.

Figure 8. Left- Participants in sculpture making session during the training. Right-A sea turtle sculpture made during the training.

2.1.4 Summary of Capacity Building Activity

The capacity building strategy assumed the form of ToT (Training of trainers) whereby group representatives were trained on best practices related to individual project activities. The group members now have the capacity to implement activities as proposed as well as pass on the skills to the rest of the community. The consultant visits and monitoring activities for MCG have enabled the group to receive continuous technical assistance in progress of their mariculture project. They have been able to learn from mistakes and received guidance on where they have

gone wrong in relation to project activities. Exchange visits have acted as a platform for networking and has created contacts for the groups with other local community groups involved in similar activities which the group can share ideas in the future. This creates an opportunity for future collaboration in similar activities as well as in advocacy for policy change.

There is need for the groups to pass on skills and information that they have acquired to other community members. Other related development projects should also integrate the individual organizations so as to build on what is already in existence and prevent duplication of efforts. The groups also need further assistance in enterprise so that their activities can be converted into business projects by providing market linkages beyond the level they are in now. This will ensure considerable change in the socioeconomic status of the targeted local and urban Kilifi beneficiaries.

2.2 Environmental Awareness Creation

One of the specific objectives of the KIP was creation of awareness on conservation of the environment by the beneficiaries of KIP. This was to be done using various awareness methods suggested by the beneficiary groups. This action was aimed at increasing the level of awareness on conservation of the environment in urban and rural Kilifi. Awareness creation was carried out on sound solid waste management, quarry rehabilitation and mangrove conservation. Environmental awareness events in the form of tree planting and cleanup events were organized by the individual groups in their specific locations. The groups engaged the participation of key stakeholders related to the specific environmental areas. Stakeholders included local community members, government officers, local administration officers, learning institutions and commercial enterprises. Brochures were printed and distributed during these events, these portrayed messages such as group profiles and messages on environmental conservation; T-shirts were also printed and distributed to event participants; Billboards were also put up within Kilifi town. Group activities received media coverage from local radio stations, local and national newspapers.

2.2.1 Awareness Creation on Solid Waste Management

Among the specific objectives of the KIP was the goal to improve solid waste handling and management and create awareness about waste handling and management. The latter is the main objective for a cleanup exercise organized by Kilifi Greentown Environmental Initiative (KGTEI) on 3rd April,2010 in Kilifi town; KGTEI organizes an annual cleanup exercise as an awareness strategy to encourage residents to keep the environment clean. Participants included Primary school children; TCK, Ministry of Environment, Ministry of Public Health and Sanitation and

Figure 9. Left- one of the billboards Right-Kilifi Primary students participating in a cleanup event

NEMA officials and students of Kilifi Medical Training College and Pwani University College. The awareness event included waste collection at designated points within the town. At least eighty percent of waste collected during the event consisted of polythene bags. Branded t-shirts were distributed to even participants, they had a *Swahili* message on sustainable development, *"Mazingira yetu maisha yetu ya baadaye"(*Our environment our future).A public meeting was held as part of the cleanup at the stadium. Officers from the Ministry of Environment,NEMA,TCK and Ministry of public health and Sanitation addressed the congregation on the importance of sustainable waste disposal.

Two billboards have been put up, within the town. The billboards serve to inform the community about the solid waste management and greening activities of KGTEI.

The group printed brochures and stickers as part of the awareness, these have been distributed to Kilifi stakeholders. The brochures have information on the group's profile and solid waste management tips.The stickers have short messages encouraging people to carry out sustainable solid waste management using the Reduce, Reuse, Recycle slogan so as to 'green' the town and save the Indian Ocean.

Awareness creation strategies by KGTEI made available solid waste management information. As a result there has been increased effort by other stakeholders in Kilifi to participate in sustainable solid waste management activities.

In addition, a comprehensive survey on Solid Waste Management in Kilifi Town was conducted by Pwani University through this action. The report is available in a separate document.

2.2.1.1 Awareness Creation on Quarry Rehabilitation

One of the main activities of KCH within the KIP is tree planting and nursery establishment. The group organizes an annual environmental awareness and tree planting event in the Timboni quarrying site. The group organized such an event on 8th July,2010 at Ngalla Primary School, participants included the local community members; KFS,NEMA ,Plan International and World Wildlife Foundation(WWF) officers.

Branded T-shirts bearing a "paint our environment green" message,were distributed to participants; brochures were also distributed during the event bearing information on the group's profile.These also carried the message on the benefits of rehabilitating abandoned quarries. About 1500 assorted tree seedlings were planted during the event in an abandoned quarry opposite the primary school by the participants. The KFS Kilifi District Forest Officer(DFO) encouraged participants to plant trees to mitigate environmental impacts such as dust pollution; the NEMA Kilifi District Environment Officer(DEO) stated that the district NEMA office would provide administrative assistance to the group's efforts of quarry rehabilitation and especially in ensuring the "polluter pays principle" is applied

Figure 10. Students in the environmental awareness tree planting event.

2.2.2 Awareness creation in Mangrove Conservation

As part of MCG's silvofisheries project the group is replanting mangroves in degraded mangrove forest areas. The forest is a common resource and sustainability in replanting activities can only be achieved by concerted efforts of all beneficiaries of the forest.MCG organized two awareness events on mangrove conservation. A tree planting event was held on 29th May,2010 at Maya and Kibokoni forest areas along the Kilifi creek. Participants to the event included Pwani University College students, members of Kilifi Central Beach Management Unit (BMU) and forest adjacent community members. Mangrove replanting is technical due to mangrove zonation which is an important factor to consider in order to ensure sustainability .Dr James Kairo of KMFRI attended the event and provided technical advice to event participants on sustainable replanting activities. About 10,000 propagules of mangroves were replanted in the *Maya* and *Kibokoki* mangrove forest.

An awareness village meeting was held on 9th September, 2010 at Maya village. The meeting was attended by forest adjacent communities who directly or indirectly benefit from the vast Kilifi creek mangrove forest as well as local administrators including the village elder and assistant chief. Challenges facing the forest were discussed including the degradation that is taking place through illegal poaching (a separate report is available). During this meeting it emerged that some community members were aware of joint forest management and expressed willingness to be involved in joint management of the forest with KFS in order to benefit from the forest and reduce illegal poaching incidents. A decision was made to form village forest management committees to manage the forest at a local level .Local structures developed in these committees could be applied when getting in official joint forest agreement with KFS such as in formation of Community Forest Associations(CFAs).

In addition to knowledge on sustainable mangrove replanting, the awareness campaigns enlightened the community on the effects of mangrove degradation to fisheries.

Figure 11. Right-Surviving saplings (Rhizophora species) planted during the tree planting event at Maya mangrove forest. Left -A member of MCG addressing participants during a village meeting in Maya.

2.2.2.1 Summary of Awareness Creation

The awareness events organized by the beneficiary groups have played a key role in publicising the KIP project activities of the four groups. This was also a strategy to rally for support in the group's activities within their respective target areas. Most resources targeted for conservation in this project are common resources such as the mangrove forest and marine environment. Mangrove replanting activities held have involved representatives from households that depend on the mangrove resource and this earns concerted efforts towards forest conservation. It also reduces conflicts among the resource users because there is understanding on why such efforts are needed.

Awareness activities also made known to the public specific project activities of the target groups and administrative assistance that may be needed in order to facilitate achievement of objectives.KCH has maintained contact with the NEMA office and has received support in their advocacy activities towards quarry rehabilitation.

Communities adjacent to the Kilifi creek mangrove forest are empowered with information on the role of the mangrove forest in the fisheries industry as well as laws that govern it. They are more vigilant in protecting the forest and have been at the forefront in fighting forest degradation, For example members of a beach management unit reported a developer who was cutting mangroves to develop a beach. The developer was stopped by the relevant administrative authority but members of the local communities are at the forefront to seek justice against forest degradation.

2.2.3 Nursery Establishment and Tree Planting

KCH and KGTEI established terrestrial tree nurseries while MCG established a mangrove tree nursery along the Kilifi creek.KCH received assistance from Kenya Forest Research Institute while KGTEI was assisted by KFS to establish their nurseries; MCG received assistance by Kwetu training centre to establish a tree nursery.

2.2.3.1 Mangrove Nursery Establishment Planting

The training on nursery establishment by Kwetu Training Centre equipped MCG members with skills and knowledge in nurser establishment. Propagules were collected from mature trees in the mangrove forest and potted in polythene bags. The group established a tree nursery of about 2000 seedlings. *Rhizophora mucronata* and *Ceriops tagal* species of mangrove trees are dominant in Kilifi creek and their seeds are readily available, MCG's mangrove nursery is dominated by seedlings of this species.

Figure 12. Left-A mature Ceriops species propagule ready for replanting; Centre-a mature Rhizophora species propagule; Right-An established mangrove nursery in Maya.

The seedlings have been used to rehabilitate degraded areas of Maya forest especially where propagules cannot survive due to harsh weather and soil conditions. This has proved to be successful because seedlings have survived unlike propagules which fall directly from mother trees. A considerable part of the forest that has been degraded over the years has been reforested and the community aims at reclaiming it to the original state or better. Surviving seedlings of *Rhizophora mucronata* can be seen in figure 14.

Figure 13. A degraded section of Maya Mangrove Forest.

Figure 14. Surviving mangrove saplings along Kilifi Creek (Maya).

2.2.3.2 Terrestrial Nursery Establishment and Planting

KGTEI established a terrestrial tree nursery of *Casuarina* tree species and assorted ornamentals. The group targeted to expand its town beautification and greening initiative using the seedlings raised and also sold some to earn income. About 10,000 seedlings were raised in the nursery. The group targeted sale of seedlings to cement industries that were engaged in mine rehabilitation after extraction of raw materials.

Figure 15. KGTEI tree nursery.

Similarly, KCH established a tree nursery of *Casuarina* species at their site for use in quarry rehabilitation. A tree nursery of about 8000 seedlings was established by the group, seedlings raised have been used to rehabilitate quarries in Timboni mines. The group works in collaboration with land owners and quarrying company in the rehabilitation work.KCH usually proposes tree planting to the land owner after quarrying and requests the company to facilitate tree planting by the group. Regular monitoring and management of seedlings planted is overseen by the land owner and the quarrying company. The group has successfully rehabilitated two quarries in Ngala area (*Timboni*). Quarrying of coral building blocks has continued without coordinated rehabilitation efforts in Tezo area. The use of *casuarina* tree species that survive the saline soils and harsh weather conditions was effective with the species showing high survival rates.

Figure 16. An established tree nursery by KCH; Right-seedlings planted in a quarry under rehabilitation.

Figure 17. Left-A rehabilitated quarry in Tezo by KCH; Right-One of the quarries awaiting rehabilitation in Tezo.

2.3 SOLID WASTE MANAGEMENT

2.3.1 Waste Collection and Plastic Recycling

Kilifi Green Town Environmental Initiative engaged Kilifi town community in waste collection and plastic waste recycling. The group distributed wastebins to Kilifi town in places such as commercial enterprises and training institutions like Pwani University College. Waste collection and transport trailers were also fabricated and are in use for waste collection in collaboration with

Town Council of Kilifi. The trailers are used to transport waste to the dumpsite using TCK tractors, this has helped reduce accumulation of waste when the authority's capacity is overwhelmed. The group also submitted a proposal to the TCK for consideration in commercial solid waste collection in Kilifi. In the proposal the group suggested distribution of waste bins to 100 households in an identified residential estate; sorting of waste for plastic waste to be used in the recycling activity; and transport of waste to the dumpsite. The initiative targets to provide employment to Kilifi urban youth; earn income for the group and also mitigate the negative impacts of littering. An economic analysis of the waste collection initiative was done prior to initiation of the project.

Figure 18. Commisioning of Trailers at Kilifi Town Council ground

KGTEI acquired a motor operated plastic waste recycling crusher as proposed. Land was leased and a recycling premise constructed with electricity connection. The group targets to recycle plastic waste generate in Kilifi town; door to door collection of plastic waste by hired youth using handcarts will be used as one of the ways of acquiring plastic waste. The group targets plastic manufacturing companies that use recycled plastic as raw material. The initiative will create employment, earn income for the group and contribute to conservation of environment.

Figure 19. Sorting of plastic (left) the plastic crusher in operation (right)

2.3.2 Flip Flop Re-use

Kilio cha Haki Youth group proposed a flip flop re-use venture for single mothers within the local community. Group members were trained on flip flop re-use techniques. Washed away flip-flops are collected from a nearby beach for re-use. The venture aims reducing the negative impact of

flip flop waste to marine life and the beach while generating income for the single mothers. Products made include, jewellery and sculptures which fetch attractive prices in the market in the tourism industry. Marketing options are being looked into.

Figure 20. Left-Wall decorations made from recycled flip flop; Right- a sea turtle sculpture made from recycled flip flops.

2.4 MARICULTURE

Mariculture activities were carried out strictly on sand flats unoccupied by mangrove trees hence leading to no destruction of environment. The activity also considered the dynamics of the sea by leaving out natural channels that drain the sand flat during tidal fluctuations unhindered. No chemicals were used such in the case of fish farming that required fertilisation of the pond. Instead, organic manure was used which has no impact on the environment. Fingerlings were sought from the wild in the project area and no exotic species were introduced such as to change species composition of biodiversity. The project is small scale and poses no threat of depleting wild stocks.

2.4.1 Fish Culture

MCG proposed pilot culture of milkfish (*Chanos chanos*), prawns and mangrove crabs (*Scylla serrata*) along the Kilifi creek. In a period of one year the group constructed two ponds one measuring 180m^2 and the other 300m^2, making a total area of 480m^2.The group members contributed manual labour for pond construction with equal participation of women and men. Pond construction was supervised by staff from Kwetu training centre the partner organisation in the project. Staff from the district fisheries office visited the group and offered advice to the community group. The Fisheries office also provided subsidised boat transport to the site for

periodic monitoring and follow up of the activity. In the period of one year the group was able to undergo all the stages of fish farming i.e. pond excavation, seed collection and stocking, pond management and harvesting. This helped the members to learn lessons in every stage.

The prawns fed entirely on natural algae-lablab. Growth of algae was enhanced by increasing water fertility using chicken manure suspended in the ponds in sacks. Weaved coconut leaves were also suspended on the water to act as substrate for growth of algae. The pond was under management and monitoring for five months after which sampling was carried out and harvesting done. The following are results obtained during harvesting:

Table 2. Harvesting Results

Species	Average Total Length(cm)	Average Standard Length(cm)
Penaeus monodon	11	9.1
Penaeus indicus	12.8	10.6
Chanos chanos	34	27.1

As can be noticed from the harvesting results, milkfish were caught and their average total length and standard length within the five months indicates the potential of the species for use in fish farming. Mullets, mudfishes and banana prawns intruded into the pond and were part of the harvest. This being the first experience of fish farming for the community it was beneficial for learning lessons.

Although the activity is mainly subsistence, economic gains are expected from sale of fish. According to an economic analysis done prior to start of fish farming, milkfish fingerlings take four to six months to reach table size.

Figure 21. MCG members during pond excavation; Right-The pond already stocked and under management.

2.4.2 Mud Crab Fattening

MCG also proposed pilot culture of mud crabs in floating cages. The group received training on crab culture including cage construction. Cages were constructed using bamboo poles. Each cage had five compartments with each holding one crab. The crabs were kept under monitoring for behaviour change and fed by group members. This activity was entirely commercial.

Figure 22. Community members carrying out cage construction; A mud crab stocked in a cage.

2.5 Mangrove patrolling and Fishing

This activity was carried out by Kilifi Marine Fishing and Conservation Group. An inboard engine with ability to haul about 4 tonnes of fish was purchased to enable the group carry out fishing and patrol the mangroves in order to curb illegal cutting. Fish catch and mangrove patrolling data collection forms were developed for use. The group has since then been able to venture into deep sea fishing and patrol mangroves when free. Mangrove offenders are reported to the Forest Department, Kilifi as the group do not have permission to arrest.

Figure 23. Anchored fishing and mangrove patrolling inboard fibre glass boat

2.6 Collaboration and networking

Implementation of KIP the project led to establishment and strengthening of links with many stakeholders. Through the partner, KWETU training centre, strong links were established with the mariculture group. New links were also established between KCH group and Kiunga flip flip women group and between KGEI and solid waste management groups in coast region and Nairobi. Existing links between these groups and government agencies were strengthened through government participation. Overall, COMRED acted as the network and collaboration hub.

2.7 Summary of KIP activities

Table 3. A Summary of KIP activities by CBO (Group), outputs and results

Activity	CBO	Outputs	Results
Capacity building	All	Trainings (3) targeting 70 group members, exchange visits (3)	Increased individual and group knowledge about best practices in mariculture, mangrove rehabilitation and solid waste management
Solid waste collection	KGTEI	Branded dustbins (200), gloves, rakes, wheelburrows, branded trailers (2), hand carts (10), 30 households involved in garbage collection	Dustbins distributed to Pwani Univ, commercial places, banks, hotels and market and efficiency in waste collection along those areas. General reduction in waste dumped in undesignated areas.
Plastic and polythene waste recycling	KGTEI, KCH	Perimeter fenced recycling premise, recycling machine in operation. Flip flop re-use apparatus, office and store in operation.	General reduction in plastic waste and increased individual and group income (expected since now is just a beginning)
Awareness creation	All	Community awareness activities (4), T-shirts (300), bill boards (2), banners, brochures, stickers	Increased awareness in environmental management in Kilifi Town, township schools and rural areas (Mnarani, Maya, Tezo and Ngala).
Boardwalk	MCG	40 M boardwalk for cage access and connecting to the open creek-might serve as tourism attraction.	Production of fish and prawns--increased production expected with experience and practice. Crabs still posed with challenges.
Fish pond and crab cage construction	MCG	Stocked ponds (2, 480 sq m), crab cages (30)	
Mangrove replanting	MCG, KFMCG	Surviving mangrove trees (4,500)	Increase in mangrove cover in the rehabilitated areas. Will eventually lead to overall reduction in erosion and increased canopy.
Nursery establishments	MCG, KGTEI, KCH	Seedlings (25,000)	Increased production of seedlings for sale and planting. Greener streets witnessed in Kilifi Town.
Quarry rehabilitation	KCH	Surviving trees planted (1,800)-Casuarina & indigenous	Improvement in quarry rehabilitation method and increase in rehabilitated area.
Mangrove patrolling and fishing	KFMCG	Inboard fibre glass boat capacity up to 4 tones	Increase in incidents of mangrove poaching reports to KFS, increased group income due to sale of fish. Increase in asset base of the group.
Building partnerships and networks	All	Strong links and networks strengthened and or established with Fisheries Department, KFS, Kwetu Training Centre, NEMA, Town Council of Kilifi, Pwani University, Watamu Marine Association, Destiny Africa, Arunai, Kayole Environment Management Association, Kiunga Women group and similar local groups and NGOs	Improved communication and collaborations between and among involved parties.

3 PROJECT STRATEGIC RELEVANCE AND SUSTAINABILITY

3.1 Strategic Relevance

3.1.1 KIP and Integrated Coastal Zone Management (ICZM)

The action has addressed the priority issues that ReCoMaP intends to tackle in the region as well as crosscutting issues in Integrated Coastal Zone Management (ICZM). Currently, Kenya is developing an ICZM National Plan of Action whose purpose is to present the actions needed for addressing the major concerns for Integrated Planning and Management of the Kenya coast. The NEMA led draft ICZM-NPA (2010) clearly outlines guiding principles for the good management of Kenya's coastal zone applied in the ICZM-NPA which the KIP addressed, as follows:

1. Use of **ecosystem-based approach,** recognising the relationships and inter-linkages between components of the wider ecosystem in addressing coastal zone management issues, effectively addressing issues affecting ecosystems that stretch beyond the coastal zone administrative area
2. **Application of multiple resource use** management, necessarily adopting an integrated approach to ensure that ecosystems are managed as a whole jointly, so that their impacts on the environment and impacts on each other can be addressed;
3. Provision for a **balance between development and conservation requirements** to ensure conservation and sustainable development of the coastal zone

The action also directly addressed three thematic areas of the ICZM NPA namely:

1. Promotion of Sustainable Economic Development
2. Conservation of the Coastal and Marine Environment
3. Capacity Building, Education, Awareness, and Research

3.1.2 Promotion of Sustainable Economic Development

According to the draft ICZM- NPA, over-harvesting of coastal natural resources has resulted in their depletion and degradation of the habitats that support the resources.

The NPA has suggested 2 objectives to address this issue and one of them is **empowerment of the communities to sustain livelihoods.** Strategies towards fulfilling this objective have been identified to include the following:

1. Promotion of off-shore fishery;
2. Promote alternative livelihoods;
3. Introduce mechanisms for co-management, rehabilitation of coastal ecosystems, and sharing of benefits;
4. Promote shared responsibility with the private sector, NGOs, CBOs and FBOs in the conservation and management of resources;
5. Restore and promote traditional values and practices that ensure sustainable management and exploitation of resources;
6. Promote multi-sectoral approach to the management of coastal resources**.**

In this action promotion of off-shore fisheries was addressed directly though the mariculture initiative by MCG. This initiative has empowered community members who cannot practice sea fishing such as women a chance to alternatively rear fish in ponds. This has acted as a substitute

to farming which is the major activity women are involved in this area and thus contributing to low poverty levels by increasing food security.

Creation of alternative livelihoods was addressed by empowering the beneficiaries in knowledge, skill and material to establish projects that earn them income against the conventional income earning activities of farming, fishing and employment which are prone to failure due to climate change and changing economic situations. These projects are mariculture, plastic waste recycling and flip flop venture.

3.1.3 Conservation of the Coastal and Marine Environment

According to the ICZM-NPA draft report, coastal ecosystems including freshwater resources, coastal forests, mangroves, coral reefs, seagrass, estuaries, deltas, beaches, and sand dunes are the resources that sustain livelihoods of coastal populations. However, destruction and alterations of these habitats, over-exploitation, and pollution are impacting the ability of these resources to provide livelihood options in addition to undermining their ecosystem functions.

To conserve the coastal and marine environment, six strategic objectives are mentioned in which KIP contributed to two of them, namely:

1. Preserving, Protecting and Restoring the Integrity of Coastal and Mangrove forests
2. Improving the management of municipal wastewater and solid waste

The first objective was addressed through awareness was also created on sustainable mangrove use at community level through community meetings at the village, during the meetings community members were encouraged to organise themselves into committees with the responsibility of overseeing sustainable mangrove exploitation. The partner organisation Kwetu Training Centre organised a series of stakeholder workshops to train participants on joint forest management through formation of Community Forest Association (CFA), the members of MCG were fortunate to be part of the workshops and are well informed of the procedures.

The second objective was addressed by facilitating the establishment of a public private partnership between KGTEI and TCK. Some of the components of this activity are purchase of two waste transport trailers which are in use by the council to transport waste to the dumpsite and provision of waste bins in Kilifi town which are emptied during TCK's routine waste collection activity.

3.1.4 Capacity Building, Education, Awareness, and Research

Inadequacy in capacity, education, awareness and research in institutions and in human personnel to address coastal zone management issues have been identified as bottlenecks to sustainable coastal development (NEMA,2010)

The series of awareness events in form of clean ups and tree planting events were used as avenues of addressing the community on the environmental problems being faced at the coast. The capacity building activity though targeting few beneficiaries directly contributed to empowerment in tackling the prevailing environmental challenges. The beneficiaries received information and knowledge that they could pass to the rest of the community in order to achieve sustainable environmental activities.

3.1.5 KIP and REDD +

Deforestation and forest degradation, through agricultural expansion, conversion to pastureland, infrastructure development, destructive logging, fires etc., account for nearly 20% of global greenhouse gas emissions, more than the entire global transportation sector and second only to the energy sector. It is now clear that in order to constrain the impacts of climate change within limits that society will reasonably be able to tolerate, the global average temperatures must be stabilized within two degrees Celsius. This will be practically impossible to achieve without reducing emissions from the forest sector, in addition to other mitigation actions (UN-REDD Programme, 2009).

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

According to REDD+ Magazine, 2011, Kenya plans to save its forests through the REDD+ program by:

1. Building the capacities of local communities to enable them to participate in forest management and conservation activities.
2. Promoting nature based micro enterprises.
3. Increasing afforestation and reforestation to reduce the current national timber deficit.

KIP has contributed to the achievement of the three objectives at a local level. Through training of community members in Maya, they are able to carry out sustainable mangrove forest replanting activities; the mariculture project which utilises the mangrove forest ecosystem without will enable the community to earn some income without damage to the environment. The mangrove replanting activity of the group as well as quarry rehabilitation of quarries directly addresses the third objective of increasing afforestation, and reforestation.

3.1.6 KIP and Millennium Development Goals (MDGs)

The Millennium Development Goals (MDGs) are eight international development goals that all 192 United Nations member states and at least 23 international organizations have agreed to achieve by the year 2015 (UNDP, 2009).Among these eight goals are 2 goals that the KIP action has addressed directly, goal 1 and goal 7 which is to **Eradicate extreme poverty and hunger** and **Ensure environmental sustainability respectively**.

By creation of alternative livelihood activities of mariculture, plastic recycling and flip flop enterprise, and large-scale fishing the action has created decent employment for Kilifi men, women and young people thus meeting target 1b.

Goal 7 which is to ensure environmental sustainability has been addressed by the combined activities of quarry rehabilitation, mangrove forest rehabilitation through replanting and solid waste management through plastic waste recycling.

3.1.7 KIP and Coast Provincial Environment Action Plan 2009-2013

According to NEMA's Provincial Environment Action Plan (PEAP), mariculture would provide an alternative source of income to ease pressure on the inshore fishery in Kenya. Possible culture systems including the cage culture, pond culture, tank culture, pen culture and inter-tidal pond

culture are identified as well as suitable species being milkfish for brackish water. The strategy also states potential along creeks like Mtwapa, Kilifi, and bays like Gazi, Shirazi for shrimp, oyster's crabs and seaweed farming. It is evident that the KIP mariculture action is in line with this strategy in that it chose intertidal pond culture of milkfish and cage culture of mud crabs.

Development of Aquaculture and mariculture is one of the priority issues needing intervention according to PEAP; therefore KIP mariculture pilot project plays a role in achieving this role. Capture fisheries development and exploitation on sustainable basis is also one of the priority issues to be addressed and includes purchase of deep sea going fishing vessels for pilot organized groups. This has been addressed through purchase of a fiber boat for Kilifi Fishing and Marine Conservation Group(KFMCG) a fisherman group. The group is able to venture into deep sea fishing and reduce exploitation of the creek which is a breeding area for fisheries.

3.2 Project sustainability

3.2.1 KIP Sustainability in the Light of the Sustainable Livelihoods Approach (SLA)

According to International Fund for Agricultural Development (IFAD), 1999, 'A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'. The KIP action's main objective is 'to strengthen indigenous groups ability to implement coastal and marine livelihood related activities', an objective in line with SLA.SLA is guided by six key principles which are as follows:

1. Focusing on people
2. Being responsive and participatory
3. Working at various levels
4. Working with partners
5. Being dynamic
6. Taking a wide view of sustainability

3.2.1.1 Focusing on people

The KIP action is a combination of different ideas of Kilifi rural and urban community members who strive for livelihood enhancement. Project ideas which were transformed into project activities were identified by local community members and policy makers in the districts such as NEMA, DFO,TCK, KFS as priority issues and avenues of socioeconomic change. A SWOT analysis of small-scale mariculture indicates 'Willingness and eagerness of coastal communities to adopt mariculture' as one of the strengths of the venture in Kenya (Shipton and Hecht, 2007).

3.2.1.2 Being Responsive and Participatory

The action design was such that all project activities were suitable to specific needs of the beneficiaries; for example quarry rehabilitation action was suitable to be implemented by the KCH community group living near the quarries and with a experience in lobbying and actual quarry rehabilitation; purchase of fibre boat for deep sea fishing was relevant for the fishing group; silvofisheries project was relevant for MCG community group that was already rehabilitating degraded mangrove forest in Maya; and the solid waste management activity was relevant for KGTEI whose mandate was to 'green' the town and solid waste management was a sure approach to achieve this objective.

3.2.1.3 Working at Various Levels

The action sought all the way to involve policy makers who influenced decisions and activities in Kilifi, these included NEMA, KFS, TCK and the District Fisheries Office. Officials from these offices were involved in the community project activates such as awareness event; they were also consulted for administrative assistance for project implementation. Inclusion of the policy makers exposed them to the impact of existing policies to achievement of social development objectives by the beneficiaries and avenues in which their different sectors could offer assistance in order to ensure sustainability of such actions as KIP. During the action the beneficiaries were also exposed to different policies and their application and relevance at heir level. The overall output of these interactions was that conflicts were reduced between the key stakeholders in socioeconomic development namely the government, on-state actors (NGOs), and local community.

3.2.1.4 Working with Partners

The KIP action was implemented in partnership with Kwetu Training Centre for Sustainable Development. This is a local NGO that has extensive experience in similar actions of silvofisheries in Kenya. The partner organisation was fully responsible for executing the mariculture project activity including capacity building and monitoring of activities. The institution had technical capacity for mariculture development including consultants who offered technical advice in periodic monitoring activities.

Watamu Marine Association (WMA), a community association in Watamu town, is carrying out similar plastic waste recycling activities as KGTEI; the KGTEI community group was involved in exchange visits as an example of best examples. Members of the organisation with the skill of flip flop recycling took part in training KCH members in the skill.

3.2.1.5 Being dynamic

Livelihoods, and the factors that influence them, are constantly changing especially in this time that the human race is experiencing climate change. As much as alternative adaptation measures are sought, flexibility mechanisms have to be adopted on the same measures. The KIP action implementation was done in ways that the beneficiaries acquired skills and knowledge on different approaches to implement the activities suggested so as to still achieve socioeconomic development. For example the KGTEI solid waste management capacity building exposed the beneficiaries to charcoal briquetting, an alternative way of earning income apart from plastic waste recycling ;another skill learnt was composting of organic waste to make 'green' manure as well as weaving using polythene waste.

MCG beneficiaries proposed milkfish farming but they also received skills in prawn culture which is viable incise milkfish fingerlings are not available as they are seasonal while prawn fingerlings are readily available. Milkfish fingerlings are available during rain seasons, a season that has become unpredictable due to climate change which makes it impossible to depend on. Other economic difficulties also impair the beneficiaries from acquiring fingerlings from other sources. In any case the returns from prawn culture are almost the same as from milkfish farming.

3.2.1.6 Taking a Wider View of Sustainability

The KIP action is environmentally sustainable in that none of the project activities have the potential for environmental degradation, infect the nature of the action is to bring environmental conservation. Quarry rehabilitation contributes to reduced environmental and human hazards as

well as contributing to reduction of carbon dioxide accumulation in the atmosphere therefore contributing to a reduction in global climate change; Mangrove rehabilitation is restoring the ecological integrity of the forest; Solid waste recycling is contributing to environmental conservation, plastic waste recycling using the crusher involves no release of environmentally damaging by products.

The activities for mariculture, waste collection, recycling and re-use, forest rehabilitation, fishing and mangrove patrolling will continue after the action as they are income generating. Reasonable technical sustainability has been secured through various trainings. However, continued technical and financial support is required for mariculture projects since the current initiative was done on a pilot basis. Financial support may also be required for the waste recycling to diversify and upgrade their machines and to add value to the product.

4 CHALLENGES ENCOUNTERED AND LESSONS LEARNT

4.1 Challenges

4.1.1 Poor Weather Patterns

Unpredictable weather patterns particularly rainfall, influenced project activities. Delay in rainfall affected tree planting for quarry rehabilitation and mangrove rehabilitation by KCH and MCG groups, the targeted size of quarries and degraded mangrove forest areas to be rehabilitated was not achieved; Rainfall failure also affected the greening and town beautification activities of KGTEI.As a result the groups spent money on water bills with no returns.

Intense rainfall also led to dyke erosion during pond excavation by MCG, this was exacerbated by very high unanticipated tide levels. The result was delay in pond excavation and preparation for stocking and as a result the group missed out on availability of fingerlings by the time the pond was ready for stocking-i.e. end of rainfall marked end of milkfish fingerling season thus availability. Drastic adaptation measurers were taken which included stocking the ponds with mullet species and prawns. As a result fish ponds were stocked with slow growing mullet fish species as compared to milkfish. As a result targeted size in Kilograms was not achieved, thus killing the morale of the beneficiary community group-MCG.

4.1.2 Poor Stakeholder Participation in Project Implementation

Project implementation was affected by poor stakeholder participation .KGTEI proposed solid waste management activities of waste collection and plastic waste recycling, these activities required a consensus on waste collection with the local authority-TCK, and land to construct a recycling plant premises respectively. Land acquisition took long than anticipated and delayed the plastic crusher purchase as this would be done with a condition that land was available; a waste collection proposal was written and presented to the town clerk but an agreement was not received from the full TCK council.

KCH beneficiary group proposed quarry rehabilitation, an activity that required quarry preparation for tree planting mainly return and spreading of top soil. This was the responsibility of the quarrying company which did not assume its responsibility. The responsible authority did not provide timely administrative assistance in this case. The result was that the beneficiary group was only able to rehabilitate land according to its capacity-in this case very minimal.

MCG proposed mangrove rehabilitation through replanting in the KIP project, however any other intervention to ensure protection of the forest was relevant to achievement of the KIP purpose. Destructive mangrove harvesting emerged as a concern during the project; however the beneficiary group did not have capacity to regulate this as there was no legal infrastructure to enable the group to carry out mangrove harvesting surveillance. There exists a legal framework in the Kenya Forest Act, 2005 which could be applied to enable the group to assume authority in collaboration with KFS to ensure sustainable forest use, however this has not been implemented.

4.1.3 Community Group Dynamics

Community group dynamics emerged during project implementation in form of leadership and group cohesiveness shortcomings. The challenge was mainly in communication from representatives on important decisions arrived during the PIC meetings, as a result actions needing attention were not executed. Some beneficiaries did not actively and consistently

participate in project activities especially those needing a lot of labour input, this resulted in delayed completion of activities like in the case of pond construction by Maya Conservation Group.

4.1.4 Inadequate seed for mariculture development

The major challenge that faced fish farming was unavailability of milkfish fingerlings during the stocking period. This was as a result of the seasonality of the fingerlings, such that by the time the pond was ready for stocking the fingerlings season of availability had passed. As an alternative the community group opted to stock the ponds with prawn fingerlings readily available at the creek. A stocking rate of 3 fingerlings per m^2 was applied and about 600 fingerlings were sought from the wild along the creek and stocked in the $180m^2$ pond.

4.2 Lessons Learned

A number of lessons emerged following implementation of this project:

1. Community contributions in kind and labour are not always forthcoming
2. Community groups do not have full capacity to implements projects on their own. They lack technical and organisational skills and funds.
3. Partnerships terms should always be spelt out clearly at the beginning of the project-during project planning.
4. Involvement of government agencies is key to success of a project
5. Supplementary donor support in form of technical assistance, monitoring and evaluation is important in success of the project
6. Successful implementation of a project may lead to desirable spin-offs
7. Mariculture venture has not yet reached its full potential in Kenya and further research and effort are needed

5 RECOMMENDATIONS

5.1 Adaptive Management

Adaptive management (AM) is a structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management (Wikipedia, 2011). Given that some level of uncertainty always exists in environmental resource management, decision-makers should continuously gather and integrate appropriate ecological, social, and economic information with the goal of adaptive improvement (Costanza,1998).This approach should be followed during project planning in order to anticipate any changes during project implementation period. Information generated should be actively used to guide project work and should also be shared with all stakeholders.

Ecological studies are most relevant in resource conservation and should be carried out as part of the project. Secondary data especially most recent can also be used to guide conservation activities. Such studies will guide in setting specific targets that will be used to measure success at the end of the project implementation period. For example an ecological inventory of the Maya mangrove forest would have produced information on the current status, identified critical biodiversity needing conservation and acted as a basis for analysing change due to the action of mangrove replanting.

Social structures of beneficiary communities, civil societies (NGO'S) and government departments are dynamic. The relation of government departments, civil society groups (NGOs) and of local communities need to be understood so as to find a common ground of integration for successful project implementation. It is evident that some project activities such as quarry rehabilitation, solid waste collection, and mangrove conservation require administrative assistance by responsible government offices. These relevant officers should be involved in project development and a close relationship developed and maintained during project implementation in order to ensure sustainability. Civil Society groups who are the key players in development of development projects should take a strong stand and enhance the ties between the community and relevant authorities.

Information on local community economic status is also critical in analysing a livelihood project's success. Such studies will enable the identification of the relevant interventions and also act as a measure of project's sustainability in achieving economic development.

5.2 Integrating Adaptation into Development Projects

Weather patterns are now dynamic due to climate change. As a result climate change is a risk that should not be left out when anticipating risks in project development stage. A vulnerability assessment should be made a component of the project proposal or should be done of the proposed area before project initiation. Secondary data can also be used in order to ensure informed project activity. In line with this disaster risk reduction (DRR) strategies- with reference to climate change, should be integrated in such projects as KIP that seek to enhance livelihoods.

CARE has developed a tool that can be used to assess risk to climate change- Climate Vulnerability and Capacity Analysis (CVCA). The CVCA methodology provides a framework for analyzing vulnerability and capacity to adapt to climate change at the community level(Daze,2009).This can be used to measure the vulnerability of livelihoods to climate change

and development of adaptation strategies to climate change. Integrating or "mainstreaming" climate change adaptation into development projects can increase the sustainability and impact of interventions in sectors such as water, agriculture, livelihoods, and health. Climate change impacts can seriously affect development results, in some cases completely setting back gains that have been made (Daze,2009).

5.3 Capacity Building of Local Community

Community cohesiveness of the beneficiary group should be analysed at project development stage before initiation of project. Although this should be the responsibility of the direct beneficiaries, the implementing organisation should seek ways and means of ensuring community level understanding and support of the project. The implementing organisation can reach the community through local administration structures as low as village heads.

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Annex 1. KGTEI Waste Collection Proposal

WASTE COLLECTION PROJECT AT NEW MNARANI ESTATE, KILIFI
Project Proposal Presented by Kilifi Greentown Environmental Initiative (KGTEI) to the Town Council of Kilifi in Consideration for Solid Waste Collection at New Mnarani Estate, Kilifi
September 2010
1 INTRODUCTION
Solid waste in Kilifi is generated by households, hotels markets, commercial premises, and learning institutions. According to a baseline survey on solid waste management in Kilifi town carried out by COMRED, the largest amount of about 5.3 tones of the waste, equivalent to 85.15% of total waste generated is from households. Town Council of Kilifi (TCK) has not yet privatized solid waste management. TCK collects solid waste from designated collection points within the town and transports it to the dumpsite .KGTEI wishes to get into a public-private partnership in solid waste management with TCK.
Kilifi Green Town Environmental Initiative (KGTEI)
KGTEI is a community based organization, non-profitable making and registered by the government of Kenya under the ministry of culture and social service. The organization carries out activities advocating for responsible environmental behavior in Kilifi town. Its main activities are environmental awareness creation, tree planting and solid waste management. The group also manages the public toilet facility next to the bus station. Together with the TCK the group is carrying out a beautification project by planting trees within Kilifi town. Group members of KGTEI and staff from TCK have received sustainable solid waste management training. In the period 2009-2011, the group has received financial support from ReCoMap through COMRED to implement a solid waste management project in Kilifi town.
Coastal and Marine Resources Development (COMRED)
Coastal and Marine Resources Development (COMRED-Africa) is a registered not-for-profit organisation based in Mombasa and Kilifi, Kenya. COMRED works with the grassroots coastal communities of Kenya empowering them to seek local solutions to local problems. Currently, COMRED is supervising the implementation of a one and half year livelihood enhancement project in Kilifi funded by ReCoMap.
Regional Programme for the Sustainable Management of the Coastal Zones of the Countries of the Indian Ocean (ReCoMap)
ReCoMap is an initiative of the Indian Ocean Commission (IOC), funded by the European Union. The specific objective of RECOMAP is to strengthen the capacity of all stakeholders in order to promote sustainable management of marine and coastal resources in the countries of the Indian Ocean.
2.0 Relevance of waste collection
The projected waste generation in Kilifi town is far outreaching the rate of collection with a lot of waste uncollected if adequate measures are not taken. According to Environmental Management and Co-ordination Act (EMCA 1999), section 3 “every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment”. There is need for concerted effort by the TCK, NGO’s, CBO’s, the community and private sector to invest in solid waste management in order to provide a habitable environment and create employment through solid waste management in Kilifi. KGTEI aims to achieve the following objectives in the solid waste management project:
Creation of Employment
The main objective of the initiative is creation of employment for the youth in Kilifi town. Both waste collection and recycling activities will need manual laborers to collect waste, sort it and operate recycling machines. This will ensure that youth in Kilifi are living responsible livelihoods and their economic status improved.

Improve aesthetic value of Kilifi Town
Achievement of concerted effort of waste collection between TCK and KGTEI will ensure that waste does not accumulate; intensive awareness campaigns to the community will ensure that the community dumps waste in designated locations. The group's tree planting programme will also be integrated to improve the aesthetic value in the estate.
Improve Public Health
Waste collection will ensure that waste is taken to the dumpsite and does not lie around harboring disease causing vectors such as mosquitoes.
3.0 Methodology
According to the TCK Solid waste management by-laws 2008, the council may appoint individual or companies to carry out refuse collections with conditions. KGTEI is aware of the by-laws and wishes to carry out an integrated solid waste management project in Kilifi as a private enterprise. With support from ReCoMap and COMRED, KGTEI has capacity to provide the following in the solid waste management project:
PVC waste bins and polythene bags
Waste collection hand carts
Street dustbins
Waste collection staff/Waste collection services
Trailers
The group has distributed waste collection bins to commercial enterprises and learning institutions for the first phase, the bins are already in use; the group has also received waste collection trailers to be used by the town council and KGTEI; and the group has initiated a composting activity to produce organic manure. As a pilot project, KGTEI proposes to be allowed to collect waste from New Mnarani Estate for a period of one year and may extend to other areas such as Mtaani estate. Waste bins, trailers, and handcarts will be used in the waste collection.
100 households are targeted first; two waste bins will be allocated to each individual house. Each waste bin will come along with a polythene bag in which waste will be put directly; households which will not receive waste bins will also receive polythene bags to put waste.
Ten street dustbins will be constructed in strategically selected areas accessible by TCK trailers; these will act as receptacle and sorting areas.
Workers employed by KGTEI will collect waste from the households at a frequency of two days per week; Workers will wear protective clothing including gloves, dust mask, overalls and protective boots at all times on duty; Waste will be taken to the street dustbins constructed as waste receptacles.
Waste will be sorted and recyclable waste will be packaged separate from waste meant for dumping; waste will be transported to the dumpsite using trailers operated in collaboration with TCK. Recyclable plastic waste will be transported to the group's recycling plant.
As a pilot project sorting of waste at source will be started at selected locations whereby differently colored bins will be used to separate organic from other waste during disposal.
A garbage collection service fee per month will be charged per private house and individual household; a consultative meeting is to be held with the community in order to educate people on benefits and financial obligations set and review fee; fee collection plan; and encourage regular payment. Safety issues will be considered during handling of solid waste to ensure safety of waste handlers, these issues are:
Wearing of protective clothing when on duty
Medical examination for waste collectors
Awareness creation on correct handling of waste during collection and sorting
4.0 Outcomes
Outcomes expected from the project are as follows:
Targeted number of households actively participating in sustainable solid waste management increased
Effective and efficient household garbage collection system in place

Awareness about garbage collection and environmental protection improved
Number of youth living responsible livelihoods through solid waste management increased
Number of illegal dumpsites within residential places reduced
5.0 Conclusion
KGTEI is ready to work together with the town council to meet the challenges of solid waste management that the town is facing. Through the provision of waste management infrastructure KGTEI will ensure that waste production does not exceed collection in the area designated for the group to work on. Through the mentioned solid waste management activities, KGTEI will be participating in the achievement of Kenya Integrated Coastal Zone Management (ICZM) policy objective of improving the management of solid waste through public-private sector partnership in waste management. The initiative will also conserve marine life in the Indian Ocean.
Proposal signed by:
Chairman Kilifi Green Town Environmental Initiative
_____
Name:_____
Date:_____

Annex 3. Fish catch monitoring form

Date	Name of Captain	No. of Crew	Name of Gear	Area fished	Total weight caught	Species composition

Annex 4. Mangrove Patrol monitoring form

Date	Area (s) observed	Name of observes	Signature of observers	Observations