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The U.S. Government's Global Hunger & Food Security Initiative

[Achieving coral reef fishery sustainability in the Kenyan biodiversity and climate refugia center]

Fish Innovation Lab

Final Technical Report [October, 2020 – August, 2023]

Cooperative Agreement 7200AA18CA0030

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The technical / scientific report is designed to communicate the research process(es) that took place under the activity, and to inform USAID about the outputs and outcomes of the research effort.

The project team should prepare one technical/scientific report using this template and uploading in the Piestar module. For formatting, use no smaller than Times New Roman 12 pt, double-spaced with one-inch margins, use the American Psychological Association (APA) style and the page count should not be longer than 25 pages, excluding the following sections: the title page, partners/institutions, abbreviations and acronyms, glossary, table of contents, references or appendices. Tables longer than one page should be added to the appendices. The required reporting sections are included in this template and each section must be completed.

[Achieving coral reef fishery sustainability in the Kenyan biodiversity and climate refugia center]

Final Technical Report

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[Date: 31st August 2023]

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This report is made possible by the generous support of the American people provided by the Feed the Future Innovation Lab for Fish through the United States Agency for International Development (USAID). The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government. The Feed the Future Innovation Lab for Fish is managed by Mississippi State University through an award from USAID (Award No. 7200AA18CA00030; M. Lawrence, PI) and provides support to Grant No. [111958]; [T. McClanahan], PI

Partners/Institutions

Beach Management Units

Kenya Marine and Fisheries Research Institute

Kenya Fisheries Service

Kenya Wildlife Service

Wildlife Conservation Society

Abbreviations and Acronyms

Beach Management Units	BMUs
Catch Per Unit Effort	CPUE
Community Based Organizations	CBOs
Free, Prior and Informed Consent	FPIC
Grievance Redress mechanism	GRM
Institutional Review Board	IRB
International Congress for Conservation Biology	ICCB
Kenya Fisheries Service	KeFS
Kenya Marine and Fisheries Research Institute	KMFRI
Kenya Wildlife Service	KWS
Locally Marine Managed Areas	LMMAs
Marine Protected Areas	MPAs
National Youth Service	NYS
Non-Governmental Organizations	NGOs
Small-Scale Fisheries	SSF
Transboundary Conservation Area	TCB
Underwater Visual Census	UVC
Wildlife Conservation Society	WCS

Glossary

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Abstract

The coral reef fishery project's goal was to address challenges of suboptimal seafood production and sustainability in a climate refugia due to national Blue Economy development ambitions potentially being unrealistic about biological limits to wild-caught fish production and coastal development, undermining the ability of the poor indigenous coastal communities to sustain their livelihoods and benefit from sustainable fisheries as benefits could accrue to people associated with national programs at the expense of local communities. Despite small-scale fisheries (SSF) management and control enhanced by Kenya's Beach Management Units (BMUs) over the past decade, overfishing and lost yields have not been reversed potentially due to poor knowledge of fisheries status and the use of destructive fishing gear such as beach seines and small-mesh nets coupled with, inadequate national and local level cost-benefit sharing, monitoring and information feedbacks, weak common-pool governance institutions, and compliance processes.

This study undertook a collaborative and participatory approach in addressing these challenges by training local communities within BMUs and County government fisheries officers at grassroot level on data collection protocols, resource mapping, underwater survey methods to estimate stock biomass of fish in different management zones, and use of mobile phones in data collection. This built their capacities in generation of reliable data on fisheries production, effort, catches and their trends, estimation of their fishery status and sustainable yield goals, and enhancement of their skills in management and knowledge that could be incorporated into national and local SSF and BMU management, and other fisheries by-laws. In addition, socio-economic and scenario studies measured perceptions of communities use and sustainability by estimating wealth and views of the benefits of restrictions, the efficacy of informal and formal governance institutions and perspective knowledge about their fisheries laws and their opinions about laws and alternative livelihood options. These activities created a comprehensive baseline to develop a potential restoration and sustainable fisheries program in this climate refuge.

The activities and feedback with stakeholders were well received, and gratitude was expressed for our involvement. The most preferred scenario was community and fisheries management programs with less support for offshore fisheries and coastal developments, though varied by communities, with those more dependent on natural resources strongly supporting community management while those dependent on trade supporting infrastructure development. The scaling of governance institutions was low during the initial survey, with some dissatisfied communities failing to support many fisheries restrictions. However, by the end of the study, all governance institutions were scaled higher along with support for restrictions. There were also indications of higher levels of wealth among all households and villages but also larger household sizes. Most women from non-fishing households had limited information on fisheries compared to men. The project shows that preference for strong restrictions such as gear and closures can increase when governance strength and wealth increase. The fisheries catch showed to overexploitation in all fisheries zones except for the national marine reserve, which had a close to optimal exploitation rate, and the further from the national park and reserve, the poorer the fisheries production, with many fisheries underperforming by 1 to 2 tons/km^2 per year. Fisheries away from the park were highly reliant on pelagic fisheries as their benthic stocks were depleted.

Introduction

Coral reefs and associated mangroves and seagrass habitats of the southern Kenyan coast are a network of ecologically connected coastal systems that support the highest diversity of coral and finfish in East Africa. The local communities, who are poor and highly educationally marginalized, depend on these ecosystems for livelihoods and food security. On the other hand, seafood consumption by local fishing communities is high and essential to community health in providing protein and critical micronutrients. Unfortunately, the high dependency by local communities on these coral reefs and associated ecosystems, threats related to overfishing, use of destructive fishing gears such as beach seines and small-mesh nets and coastal habitat clearing, and pollution further threaten the provision of ecological and social goods and services that these communities depend upon. These threats also undermine ecosystem's diversity, ecological processes, services, and ability to secure stable food for these reef dependent communities. In addition, the growing national and regional ambitions of the Blue Economy placing greater emphasis on marine production and coastal development further undermines the ability of poor people to access and benefit from sustainable fisheries-based livelihoods.

Although co-management of small-scale fisheries (SSF) through Beach Management Units (BMUs) was instituted in Kenya over the past decade, there are still numerous barriers to long-term sustainable management of SSF, for example, compliance and enforcement mechanisms, fair cost-benefits sharing, and protection of coral reefs and its associated habitats and species are still challenging. Consequently, the SSF sector often ignored in favor of the development agenda that poorly recognize fish catch limitations, and BMUs established to empower communities currently lack knowledge, relevant by-laws, management enforcement capacity and monitoring that contributes knowledge, and technical information needed to produce reliable data to estimate effort, catches, and sustainable yields. Further, the socioeconomic contexts that enhance adoption of adaptive management behaviors are rarely taken into consideration and awareness about climate change and consequences on the resilience and sustainability of SSF is also limited. Finally, active, and persistent community and practitioner

forums for information exchange, cooperative learning, and sharing of experiences in adaptive management that are critical for successful compliance that fully acknowledge SSF needs for the sector are lacking.

To address these challenges, the Wildlife Conservation Society (WCS) and its partners undertook a collaborative and participatory applied research project, creating awareness to communities of fisheries status within their region through feedback sessions, conducting participatory mapping and ground truthing exercises improving communities' knowledge of the need to manage and conserve the depleting resources. Also, community member's literacy was tested and high performing candidates and County government fisheries officers at grassroots level were trained on WCS data collection protocols, use of mobile phones for data collection, stock assessment and underwater survey methods to estimate the stock biomass of fish in different management zones. A training manual in the local Swahili language was also produced to enable and enhance their capacities to estimate the status of their fishery and gain management skills. Communities were also queried about their fisheries laws and preferred opinions about laws, and alternative livelihood options, providing a comprehensive baseline on which to develops sustainable management programs. The long-term goal was to help reduce food insecurity, elevate poverty levels, and improve and sustain fisheries management in this southern Kenya coral reef climate refugia.

The activities and feedback with stakeholders' sessions with communities and project partners provided important insights that the most preferred scenario was community and fisheries management programs with less support for offshore fisheries and coastal developments and varied by communities with those more dependent on natural resources strongly supporting community management while those dependent on trade supporting infrastructure development. Again, the scaling of governance institutions was low during the initial survey, and some dissatisfied communities failed to support many fisheries restrictions. However, by the end of the study, it was noted all governance institutions

scaled higher along with support for restrictions activity that created a comprehensive baseline to develop a potential fisheries restoration and sustainable fisheries program in this climate refuge. There were also indications of higher levels of wealth among all households and villages with larger household sizes. In addition, women from non-fishing households had limited information on fisheries compared to males. The project showed that preference for strong restrictions such as gear and closures can increase when governance strength and wealth increases. The fisheries catch showed overexploitation in all fisheries except for the national marine reserve, which had close to optimal exploitation rates while the further from the park and reserve, the poorer the fisheries production, with many fisheries underperforming by 1 to 2 tons/km^2 per year. Fisheries away from the park were highly reliant on pelagic fisheries as their benthic stocks were depleted. Again, the project found that community data collectors were more effective at measuring catch than the government officers. Data collectors were being paid incentives by the USAID-FIL project hence, moving the project to the next stage of recovery is a high priority to sustain the system.

Pre household surveys were conducted on 182 members of the community in Mkwiro, Wasini, Jimbo, Vanga and Kibuyuni during one-on-one meetings. The objective was to understand community perceptions on marine resources, fishery rules, social networking among fishers, essential resources and assets within the community, and the effectiveness of Beach Management Units (BMUs). Post household surveys were also completed. Data analysis is ongoing, and the data collected on fisheries laws and regulations will help managers understand the level of community understanding and agreement of the proposed fisheries laws of 2017 and future scenarios that the government and partners of interest need to consider.

Research Methods

The overall goal of the project was to improve the current state of Kenyan coastal communities' knowledge and their governance systems and enhance their health through achieving sustainable fisheries management using the approaches below:

Stakeholders' engagement*:* small meetings were held at project landing sites to communicate the project objectives and anticipated results, identify individuals for involvement in the literacy testing exercise, and communicate fisheries status to project beneficiaries and stakeholders. Research findings were presented at a Fishers' forum that included BMU members, fishers, and traders along the TBCA and Lake Victoria regions, National and County Kenya and Tanzania Fisheries officers, participants from management, research and academic institutions, Interior security, NGOs and community-based organizations (CBOs).

Development of survey tools: two different questionnaires were designed, one testing the literacy levels of BMU members potentially involved in fisheries measurement exercises, and the second tool was a structured questionnaire to gauge community members knowledge on demographic information including Material style of life (MSL), knowledge of fisheries laws and effort, fish resource dependency and fish consumption, perceived benefits of fisheries restrictions , strength of governance institutions , social networking among fishers and future scenarios. Data was first collected in 2020 and surveys were repeated in 2023 to assess social change.

Questionnaires administration: This approach was applied by administering literacy tests to volunteer members of the community to identify individuals who could be trained on WCS data collection protocols and use of mobile phones in data collection. In addition, Pre and Post household surveys were conducted in 5 transboundary villages of Mkwiro, Wasini, Kibuyuni, Jimbo and Vanga to measure *c*ommunity members perception on restrictions, governance and other fisheries and marine

related information. Questionnaire development and administration followed the required social safeguards protocols via the Internal Review Board (IRB), FPIC (Free, Prior and Informed Consent) and Grievance Redress mechanism (GRM). Data was collected by data collectors that were trained on IRB minimal standards to ensure that they complied with applicable regulations and commonly accepted ethical standards during the surveys.

Trainings: BMUs and County government fisheries officers at based at the landing sites were trained on data collection, use of mobile phone in data collection, stock assessment, fish biomass estimation, and fisheries resource mapping and zoning. This built their knowledge and skills on WCS data collection protocols, use of Atlan Collect and Kobo Toolbox Apps in data entries and coding and fish group identification. In addition, the resource mapping activity enhanced communities' skills in monitoring fisheries and their habitat. Government fisheries officers provided information on how to improve fisheries adaptive management.

Research Results

Small inception meetings were held at each landing site to communicate and inform stakeholders of the project objectives and anticipated results, and a total of 220 community members participated in these meetings, creating an opportunity for the project team to communicate fisheries status to individual members of the community and identify volunteers to participate in literacy level testing. A total of 81 volunteers from target communities participated in the literacy testing survey, and 15 individuals were selected for training in WCS data collection protocols and mobile phone data collection procedures, while seven trained individuals were engaged in fish landing and monitoring activities. The rest of the participants were encouraged to work together as a team to benefit the community at large and become proficient in coral reef fisheries and ecology monitoring. During the exercise, communities were knowledgeable and quick to adapt to new technologies due to previous interactions in various forums and collaborations with government and NGOs working in the area. The research study findings were communicated during the annual fisher's forum meeting that brought together a total of 250 participants including fishers and fish traders from the Kenyan coastal region, Kenya Fisheries Service and County fisheries officers, officials from management, research and academic institutions, security, NGOs, and CBOs.

The participatory mapping activity targeted 94 members of the communities, with representatives being individuals using different fishing gears, resource managers from relevant government departments (Fisheries, Kenya Marine Fisheries and Research Institute or KMFRI), academic institutions, and other marine resource users including boat operators and seaweed farmers, with priority given to women participated in the process. The activity led to the production of hand-drawn and digitized maps of fishing ground landmarks and fishing zones and validation in three communities- Vanga, Jimbo & Mkwiro. In addition, it led to the realization that some fishers still fish within locally Marine Managed Areas –(LMMAs) or Marine Protected Areas (MPAs), as witnessed during the ground-truthing, and the field team had to inform the immediate Beach Management Units and the

warden for follow up. It was evident that the community members are always aware of the patrol timings to avoid arrest, hence the need to work closely with the government institutions and community to help identify the lawbreakers. The 94 participants, 27 were females, and 7 were youths.

Pre household surveys were conducted in 2020 to 182 members of the community in Mkwiro, Wasini, Jimbo, Vanga and Kibuyuni during one-on-one meetings to understand their perceptions on marine resources, fishery rules, social networking among fishers, essential resources and assets within the community, and the effectiveness of Beach Management Units (BMUs). Post household surveys were conducted and completed between April to June 2023, where participation of women and youths increased by 11% and 1% respectively. Preliminary results show that there was positive change in perceived benefits of restrictions, governance institutions effectiveness, demographics, and both community and individual level wealth. However, this varied between villages, age categories (youths and adults), and gender groups.

In general, changes were within groups (sites, age category, and gender) rather than between them. Most positive changes were significant, and there were no areas with negative changes. Demographically, there were more changes in males and adults as compared to youths and female participants.

There were slight differences in the number of occupations per village during the pre and post survey period. The number of jobs per household increased, but not significantly in all villages except in Kibuyuni, where jobs decreased by approximately 3%. There was no significant change in number of occupations among gender groups, youth, and adults.

Social capital, which is the number of groups each community member is involved in, increased by 33.5%. The most significant change was in Jimbo and Vanga. Types of groups included credit and savings groups, conservation groups, table banking for women, and a few welfare groups. There was general improvement in both individual/household material style of life and community /overall

wealth. However, there were no significant changes for both individual and community types of wealth for youths.

Preferences of the 6 management restrictions increased from 1.02 to 1.53 (33%). The major increase in preferences was 78% and 22.65% for Vanga and Kibuyuni respectively. Jimbo and Wasini, which were generally positive during pre-surveys, did not report significant changes in post surveys. Overall preferences for various restriction increased by 35.6 % and 28% for youths and women, respectively.

There was a small improvement in fisheries monitoring, probably due to trained community members. Mkwiro and Vanga had fewer areas of significant changes. There was still negative perception on governance effectiveness among women compared to men. Governance effectiveness increased by approximately 82%. This change was significant for 11 governance principles except graduated sanctions and membership benefit, which reduced by approximately 50%. Notably, there were no major changes on problematic principles that include conflict resolution between neighbors, cost benefit sharing, graduated sanctions, and ecological monitoring. Youths and women perceived low effectiveness for cost benefit sharing. Women rated decision making, monitoring in fisheries, and monitoring resources higher than men. Improvement in monitoring could be due to gender focused activities like literacy interviews, training on WCS data collection protocols, use of Atlan Collect, and Kobo Toolbox Apps in data entries and coding. Women were also part of the participatory mapping exercise.

Acceptance of the fisheries laws for better resource management was higher than the knowledge of the laws, but acceptance of the law was driven by how well the respondent knew that law. The difference was more within sites, age category, and gender groups but not between groups. The least agreeable laws were 5-year renewal of fishing rights, limit of 5 kg or 5 fishes for artisanal fishers, and law on targeting mixed species.

A total of 33 community members in 19 BMUs along the Kenyan coast, 2 County fisheries officers at grassroot level, and one officer each from KMFRI and National Youth Service (NYS) trained and gained knowledge on WCS data collection protocols, mobile phone data collection procedures, and fish group identification and grouping, in addition to enhanced skill on Atlan Collect and Kobo Toolbox Apps use in data entry and coding. All gained skills and knowledge on fish counting and were engaged by WCS in monthly fish landing monitoring activities along the Kenyan coast where WCS work and mobile phones and internet bundles provided for data collection and communication.

Community fish biomass training was done for 45 individuals from five (5) communities and government officers who learned how to evaluate fish biomass for the 19 fish families often fished in eight (8) sites within the Vanga -Shimoni seascape area and 31 survey transects done in Shimoni-Vanga seascape. Measurements included fish biomass, fish discrete group sampling, and coral bleaching surveys in Kisite, Kibuyuni, Mkwiro, Wasini, Shimoni, Sii & Mijira sites. The activity involved fish biomass estimation in fishing areas, community closures, and government closures (Marine Protected Areas; MPA), enhancing their knowledge of the status of fish biomass and yield data in their fishing and non-fishing areas. This allowed collated information to be compared to fisheries data collected monthly by trained community persons. In addition, WCS team trained participants on how to record data directly on slates and had the opportunity to communicate feedback results of the data collated over the past years on social and ecological research within the transboundary conservation area. Underwater video clips and recorded video presentations on the status of the Vanga -Shimoni seascape were shared with the communities during the fish biomass training activity and on the WCS social platforms (Fishers Forum Facebook page, WCS YouTube & WhatsApp groups) to improve their knowledge and that of different stakeholders within the fishing sector on the status of fisheries within the area. A fish biomass training manual was developed in both English and Swahili languages for use when conducting monthly fish landing data collection to assist them in reference in case of difficulty in fish identification.

Outputs and Conclusions

Kenyan coastal communities highly depend on coral reefs and associated ecosystems. However, provision of ecological and social goods and services is threatened, eroding coral reef diversity, ecological processes, services, and ability to secure stable food for the communities. Vanga-Shimoni seascape communities received several trainings that included participatory fisheries resource mapping, data collection procedures, stock assessments, and fish biomass estimates, enabling them to locate their resources on their own, estimate coral reef fisheries and key species during monthly fish landing monitoring activities, and to use new applied technology in fisheries yields measurements in addition to improving their knowledge and awareness on the need to conserve and plan for their management for livelihood development.

The socio-economic scenario data indicated the most preferred scenario was community and fisheries management programs with less support for offshore fisheries and coastal developments, but results varied by communities, with those more dependent on natural resources strongly supporting community management while those dependent on trade supporting infrastructure development. Perceptions on the scaling of governance institutions were initially low as some dissatisfied communities did not support many fisheries restrictions. However, perceptions toward all governance institutions scaled higher with support for restrictions at the end of the study. There were also indications of higher levels of wealth among all households and villages but also larger household sizes, and most women from non-fishing households had limited information on fisheries compared to males.

Education and awareness materials were produced and distributed during the fisher's forum meeting with information about good governance and benefits to people and their resources printed on the t-shirt fronts, and four (4) principles of good governance proverbs (Collective decision making, Polycentric governance, Conflict resolutions and Cost benefit sharing) printed in Swahili on the back of the t-shirt.

The project showed that preference for strong restrictions such as gear and closures can increase when governance strength and wealth increase. The implication is that the activities increased stakeholder perceptions of the strength of governance and desired fisheries restrictions. The fisheries catch proved to be overexploited in all fisheries except for the national marine reserve, which was close to optimal exploitation rates. At further distance from the park and reserve, fisheries production was poorer, with many fisheries underperforming by 1 to 2 tons/km2 per year. Fisheries away from the park are highly reliant on pelagic fisheries as their benthic stocks are depleted. The project found that community members are more effective at measuring catch than the government. Data collectors were paid by the Fish Innovation Lab project, so moving it to the next stage of recovery is a high priority to sustain the system.

The project established that Shimoni-Vanga seascape had a maximum potential of 3.4 tons/km^2/year of fisheries production, which is half the production recorded in fringing reefs (6.8 tons/km^2/year) in Kenya. Additionally, the recovery rate of fish biomass investigated seascape were (r=0.10) twice as low as recovery in fringing reefs (r=0.24) along the Kenyan coast. The yield data from the studied landing sites indicated that all sites except for the marine reserved had stocks and yields below the maximum. Therefore, the seascape is overfished, recovery rates are slow, and it would therefore take considerable time for fish stocks in these island reefs to recover compared to the fringing reefs. Dependent fisheries evaluations, specifically catch-per-fisherman, yields, and income, showed declining trends away from government marine park and reserve. The park and reserve (Kisite park) have effective management from the park service which ensures implementation of restrictions. These restrictions regulate the type of fishing gears, which consequently regulates fishing effort and allows fish stocks to recover. For instance, communities further from the border with occasional government enforcement are prone to use of illegal fishing gear, namely beach seine. Moreover, these sites use reef seines on shallow water, damaging corals and seagrass. These findings call for community and local government actions to provide localized management

approaches appropriate for different fisheries systems. For instance, there is need for communities further from park and reserve to emulate management and restrictions implemented by communities closer to parks and reserve. Additionally, local government should subsidize conservation measures while national government should improve enforcement in communities further from the park.

Table 1. Summary table of activity/deliverable table

Year	**Activities/Meetings**	**Objective**	**Deliverables**
2021	▪ Fish catch monitoring training. ▪ Baseline fisheries assessments of fish landings to guide management. ▪ Pre-socio-economic households surveys	▪ To record fish, catch length and weight at landing sites. ▪ Estimate fish biomass in fishing areas, community closures and government closures (park). The collated information shall be compared to surveys that trained community persons will collect. ▪ To gather information on demographics, fish dependency and consumptions, perceived benefits of fisheries restrictions, future	▪ Generation of a database with datasets and information on summaries of recorded data ▪ A total of 31 surveys were done in Shimoni-Vanga seascape namely, fish biomass, fish disgreed group sampling and coral bleaching surveys. ▪ A total of 182 household questionnaires administered in 5 project sites

		developmental scenarios, and strength of governance institutions	
2022	▪ Community fish stock assessment training	▪ To create awareness on the current status of fish biomass and yields in Kenya's coral reefs and train BMU members to undertake an underwater visual census (UVC)of fish in coral reefs to enable them to enter and interpret data on biomass and yields in their fishing areas.	▪ A total of 12 community BMU members trained to undertake UVC after an evaluation of swimming and fish identification skills, and each community provided with data entry slates and line transects to enable them to monitor fish biomass and yields in their respective fishing grounds.
	▪ Fisheries monitoring	▪ To conduct baseline fisheries assessments of fish landings to guide management actions and monitor fish weights and lengths landed in BMUs. ▪ ▪ ▪	▪ Conducted training to BMUs on WCS data collection protocols and generated database sets for catch landing monthly records. ▪ Collected fish length and weight data and provided weighing scales to 5 BMU within Vanga-Shimoni seascape. ▪

	▪ Fish catch monitoring training	▪ To train and refresh data collectors on mobile data collection using Kobo Collect to help monitoring the fish catch and prices and test the Kobo Collect tool at the landing sites and inform and mobilize members of the BMU on the ocean resources and the need to monitor using real time data	▪ Communicated feedback on Impacts of Covid curfew to stakeholders and received feedback from each BMUs. ▪ Training conducted and enumerators evaluated and tested on data collection process using Kobo collect
2023	▪ Fish catch monitoring training	▪ To communicate on scientific studies in Kenya and individual landing sites, evaluate community understanding of basic fisheries knowledge, train communities on Kobo online monitoring tool to record fish catch and length-weight at landing sites, and identify representatives from each landing site to be engaged in data collection and recording.	▪ Community awareness enhanced through feedback session on their fisheries status. Evaluated communities understanding of the basic fisheries skills and trained them on KoboTool Box use in data collection in addition to generation of list of representatives to be involved in fish landing data collection and generation of database with datasets.

	▪ Post household surveys	▪ To assess changes on demographics, fish dependency and consumptions, perceived benefits of fisheries restrictions, future developmental scenarios, strength of governance institutions and knowledge on fisheries laws.	▪ A total of 189 household interviewed.

Technologies/Innovations developed, and what phase was achieved

The project facilitated the use of digital fisheries monitoring tools. Initially, Atlan Collect tool monitoring application was employed. The application is developed by SocialCops (https://socialcops.com), a company that helps execute big data projects. The application allows the management of data through surveys and has the capability to convert to different formats. Additionally, the application allows creation and modification of data collection forms. However, the application is paid for hence the introduction of free KoboToolbox (https://www.kobotoolbox.org) digital monitoring tool to our fisheries monitoring.

KoboToolbox works like Atlan Collect which was easy to transition to. The application is compatible with android phones and has no limitation to number of users. Initially, 15 community members and 2 fisheries officers were trained on the use of this application. However, at least 100 community members are currently trained. The data enumerators are trained to access new forms, fill data, upload, edit uploaded forms and submit forms online. The fisheries officers' trainees are capable of logging into online database and evaluate the quality of the data. The KoboTooolbox application provides a dashboard that gives basic summaries of monitoring frequency, fishing gears, catch landings and location of sampling. These summaries ensure accountability, general quality of data and subsequent data driven objectives which are community driven. The success of adoption of this digital monitoring has seen expansion to additional 30 communities along the Kenyan coastline. Many of the lessons and products from the FiL project are now informing fisheries work throughout the other WCS study locations.

Key Beneficiaries

BMUs – Approximately 117 BMUs were involved in the project through trainings, awareness, and dissemination of results.

Community members- Approximately 189 members of the community reached out during pre and post household surveys.

Fisheries- Approximately 6 officers both from the national and county governments.

Kenya Forest- 1 officer from the county government.

Kenya Wildlife Service- 4 officers were involved during fish biomass estimations.

How the scientific results were disseminated.

The scientific results have been disseminated through peer reviewed publications and Fishers' Forum meeting which brings together managers, policy makers, researchers, government leaders, fishers, traders, and relevant stakeholders. Additionally, the research findings were presented using branded t-shirts containing key management options chosen by communities. Moreover, community level meetings were conducted to feedback on results which at least 50 community members. In addition, research findings were presented at International Congress for Conservation Biology (ICCB 2023) forum.

References

You can access our activates via Fisher's Forum face book page

You can access presentations via our YouTube channel

More photos can be accessed via our X formally known as Twitter handle

Appendices

Program-Fishers' Forum Meeting

FISHERS FORUM 24th August 2023 PROGRAM

DIAMOND LEISURE LODGE DIANI

THEME: *GRASSROOTS ACTIONS FOR RESTORING SMALL-SCALE FISHERIES AND LIVELIHOODS*

Program	Time	Facilitator
OPENING SESSION		
Arrival and registration	08:30 AM - 09:00 AM	Mr. Christopher Cheupe/Ms. Purity Kananu/Ms. Jane Nyanapah/Ms. AlphineMbpdze
Opening prayers	09:00 AM - 09:05 AM	Community member/Mr. Jillo Katelo
Welcoming & Opening remarks	09:05 AM - 09:15 AM	Kwale County Fisheries, Kenya Fisheries Service Wildlife Conservation Society
Introductions of participants	09:15 AM - 09:25 AM	Mr. Charles Odindo/ Mr. Jillo Katelo
FISHERIES TRENDS UPDATES AND STUDIES SESSION		
History and objectives of fisher's forum and trends in fish catch in southern Kenya	09:35AM - 10:30 AM	Dr. Tim McClanahan
Questions & Answers	10:30 AM - 10:40 AM	Dr. Tim McClanahan, Mr. Hamadi Mwamlavya & Dr. Emmauel Mbaru
Fisheries production in fringing and island reefs in East Africa	10:40 AM -11:10 AM	Mr. Jesse Kosgei
Tea Break/Health break	**11:10 AM - 11:40 AM**	**All**
Governance of fisheries commons, laws, preferences, and needs for improved governance	11:40 AM -12:00 NOON	Ms. Caroline Abunge
Management and development preferences and their changes in the TBCA	12:00 PM - 12:20AM	Mr. Remy Oddenyo
		Dr Andrew Wamukota
Major focus of KeFS and changes in fisheries policies, laws and regulations.		Ms Elizabeth Mueni
Questions and discussion		Ms Elizabeth Mueni

UPDATES ON NEW FISHERIES AND CONSERVATION PROJECTS SESSION		
Introduction - Miamba Yetu project	12:20 PM - 12:30 PM	Dr. Fahd Al-Guthmy
Digital fish catch	12:30 PM - 12:40PM	Dr. Alex Tilly
Introduction - Global fish project	12:40 PM - 2:50PM	Mr. Maxwell Azali
Questions & Answers	1:05 PM - 13:10PM	Dr. Tim McClanahan, Mr. Hamadi Mwamlavya & Dr. Emmauel Mbaru
Lunch break and working groups	**13:10 PM - 14:10 PM**	**All**
WORKING GROUP SESSION		
Introductions of break out groups and Focus group formation	14:10 PM - 14:25 PM	Focus group leaders
Group 1. Governance focusing on coordination needs and pathways to solutions	14:30 PM - 15:10 PM	Ms. Caroline Abunge/ Mr. Remy Oddenyo
Group 2. Preferred tradeoff between fisheries production income, and employment in the TCBA	14:30 PM - 15:10 PM	Mr. Jesse Kosgei/ Mr. Peter Musembi
Group 3. Digital Fisheries tools and improving fisheries management	14:30 PM - 15:10 PM	Dr. Alex Tilley/Mr. Jillo Katello
Tea Break/Health break	**15:10 PM - 15:40 PM**	**All**
GROUP RECAPS	15:40 PM - 16:10 PM	Working group Representatives
Closing remarks	16:15 PM - 16:25 PM	National fisheries
Vote of thanks and closing prayers	16:25 PM - 16:35 PM	Beach management Unit Network-Mr. Mtengo Omar
Logistics	16:35 PM onwards	Ms. Catherine Kiecha/Ms. Asha Kirigha/Ms. Purity Kananu

Images- Fishers' Forum Meeting

Dr. Tim McClanahan presenting on history and objectives of fisher's forum and trends in fish catch in southern Kenya.

Presentation by Ms. Caroline Abunge on governance of fisheries commons, laws, preferences, and needs for improved governance.


Questions and answer sessions

Mr. Jesse Kosgei presenting on fisheries production in fringing and island reefs in East Africa