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WOMEN SHELLFISHERS AND FOOD SECURITY

Annual Report Fiscal Year 2023



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Cover photo: A meeting at Bullock oyster landing site in The Gambia (left). Narkwa shellfishers training on water quality instruments by Densu shellfishers in Ghana (right).

Photo credit: TRY Oyster Women’s Association (left). University of Cape Coast (right).

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ACRONYMS

CAP	Community Action Plan
CCM	Centre for Coastal Management
CRC	Coastal Resources Center
DAA	Development Action Association
DOPA	Densu Oyster Pickers Association
DFTC	DAA Fisheries Training Center
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information Systems
ICRAF	World Agroforestry (International Centre for Research in Agroforestry)
IRB	Institutional Review Board
KAP	Knowledge Attitudes and Practice
LULC	Land Use Land Cover
MEL	Monitoring Evaluation and Learning
MDD-W	Minimum Dietary Diversity for Women
NOHA	Narkwa Oyster Harvesters Association
SES	Stakeholder Empowerment Score
SFMP	USAID/Ghana Sustainable Fisheries Management Project
ToC	Theory of Change
TRY	TRY Oyster Women's Association
UCC	University of Cape Coast
URI	The University of Rhode Island
USAID	United States Agency for International Development
VSLA	Village Savings and Loan Association
WASNET	West Africa Shellfish Network
WEAI	Women's Empowerment in Agriculture Index

EXECUTIVE SUMMARY

The Women Shellfishers and Food Security Activity seeks to address the need for greater attention to food security for women shellfishers and their families while improving biodiversity conservation of the ecosystems on which their livelihoods depend. The Activity aims to strengthen the evidence base, increase awareness, and equip stakeholders to adapt and apply successful approaches to rights-based, ecosystem-based, participatory co-management of shellfisheries by women in mangrove ecosystems in West Africa. The first two-year phase of the Activity starting in September 2020 resulted in: the first-ever [participatory regional assessment](#) of women-led shellfisheries in the 11 coastal West African countries from Nigeria to Senegal; six technical studies published on site-based research in Ghana and The Gambia that tested the Theory of Change linkages between women's shellfish co-management, livelihoods, mangrove conservation, and nutrition, and; a community of practice and [Toolkit on women's shellfisheries co-management in West Africa](#).

A three-year Activity extension was approved on September 9, 2022, with two components:

Extension Objective 1: Demonstrate the biodiversity and socio-economic value of more fully integrated rights-based co-management of linked shellfish-mangrove-proximate landscape food ecosystems in two countries in West Africa: Ghana and The Gambia.

Extension Objective 2: A functional West Africa Shellfish Knowledge and Outreach Hub.

Under Objective 1, Activity partners worked at four sites in Ghana (Densu and Narkwa) and The Gambia (Lamin and Bulock) to implement four strategic approaches that were prioritized and customized for each site (women shellfishers empowerment, gender sensitive shellfishery co-management, mangrove co-management, and integration of adjacent landscape food production systems). Partners trained 391 people in sustainable natural resources management and/or biodiversity conservation. Of these, 83 percent were women, 90 percent were resource users, and 41 percent benefitted from two or more training events in FY23.

Two new women-led shellfishery co-management planning processes were initiated in Narkwa and Bulock using the Toolkit and catalyzed by a peer-to-peer study tour from Narkwa to Densu and Bulock to Lamin hosted by the shellfisher associations with delegated use rights under the established shellfish co-management plans in these areas. A participatory oyster landings data collection methodology was successfully piloted at Densu, Lamin, and Bulock during the open seasons. TRY Oyster Women's Association members at Lamin assembled mesh bags for twenty individual oyster aquaculture farms. Partners mapped land use and land cover and facilitated mangrove restoration Community Action Plans at all four sites. The Densu Oyster Picker's Association planted 4,500 mangrove seedlings over 12.4 hectares of the Densu Delta. Communities in Narkwa planted 15 demonstration plots with 1,150 seedlings of preferred tree species (57 percent food species) and recorded a 90 percent survival rate after one month. Partners conducted a baseline socio-economic

survey at the four sites to establish reference points for endline analysis of results and Theory of Change linkages.

Stakeholder engagement for shellfisheries co-management, mangrove ecosystem conservation, and landscape food systems faced the following challenges at both new and established shellfisheries co-management sites in Ghana and The Gambia:

- Limited engagement of local government authorities, such as departments of fisheries, departments of parks and wildlife management, and the Weija Dam Authority during management planning meetings.
- Weak or absent local extension services in fisheries, forestry, and agriculture to provide training, access to inputs, and monitoring, needed to support interventions that are of immediate interest to local communities but are beyond the Activity scope.
- The scale of the ecosystem to be managed and the actors influencing ecosystem resources were often broader and more dynamic than anticipated.

Under Objective 2, the University of Cape Coast Center for Coastal Management laid the groundwork for a functional and sustainable West Africa Regional Knowledge and Outreach Hub. This included a draft operational framework; consensus on a name for the West Africa Shellfish Network (WASNET); initiating registration of the name at the Registrar General in Ghana; a social media communication plan to guide effective and efficient social media information dissemination and engagement of shellfish stakeholders; on-going development of a Shellfish Co-management toolkit booklet in a visual format to facilitate use in the field with shellfishers; outreach to regional institutions; on-going development of a web platform to host and make information on shellfisheries in West Africa readily accessible; and planning for a regional study tour in FY24.

Key lessons learned include the following:

The four strategic approaches, curated and applied as designed using the Toolkit and associated tools at the four Activity sites, appear to be both robust and flexible enough to accommodate the complexity of situations that arise across sites with differing socio-economic, political, and environmental contexts. Integrating implementation of the approaches as required to inform the Objective 1 theory of change appears to be feasible based on the FY23 experience.

Stakeholder engagement challenges experienced in the site-based work highlight the relevance of the community-based co-management approach. Integrated implementation of the Activity's planned strategic approaches effectively identified the issues and promotes community-led solutions that provide pathways forward while advocating for government and other external support systems to provide needed services.

A significant proportion of the effort to establish the West Africa Shellfish Knowledge and Outreach Hub on a strong and sustainable foundation was internal rather than external in FY23. In early FY24 this should shift to a higher intensity of externally focused activity.

1. INTRODUCTION

1.1 Activity Background

The Women Shellfishers and Food Security Activity (hereinafter referred to as the “Activity”) seeks to address the need for greater attention to food security for women shellfishers and their families while improving biodiversity conservation of the ecosystems on which their livelihoods depend. The Activity aims to strengthen the evidence base, increase awareness, and equip stakeholders to adapt and apply successful approaches to rights-based, ecosystem-based, participatory co-management of shellfisheries by women in mangrove ecosystems in West Africa. Results of the first two-year phase of the Activity starting in September 2020 included:

- The first-ever participatory regional assessment of women-led shellfisheries in the 11 coastal West African countries from Nigeria to Senegal available at https://pdf.usaid.gov/pdf_docs/PA00Z67C.pdf.
- Six technical studies published on site-based research in Ghana and The Gambia that tested the Theory of Change linkages between women’s shellfish co-management, livelihoods, mangrove conservation, and nutrition (see next bullet for link).
- A community of practice fostered around development and dissemination of a toolkit on women’s shellfisheries co-management in West Africa (hereafter referred to as the ‘Toolkit’) available at https://pdf.usaid.gov/pdf_docs/PA00ZHT6.pdf. See Annex J for 11 individual country assessments and the technical studies.

A three-year Activity extension was approved on September 9, 2022. The original Activity goal was revised slightly to include mangrove and estuarine ecosystem restoration in addition to conservation, and to remove expected impact on reducing anemia in women of reproductive age. The revised Activity goal is as follows:

*“Foster the adoption and scaling-up of an integrated approach to conservation **and restoration** of mangrove and estuarine ecosystems in West Africa that provides cross-sectoral benefits in terms of gender equality and women’s empowerment, economic development, and household food resiliency.” (USAID 2022)*

These changes were made because, the initial two-year phase of the Activity demonstrated that drivers and threats to mangrove and estuarine ecosystems are complex, degradation in some ecosystems is already significant, and the full range of management options including both conservation and restoration need to be considered to influence mangrove and estuarine health. Also, Phase 1 research did not find a relationship between shellfisheries health, shellfish consumption, and anemia prevalence in shellfisher women of reproductive age despite the high iron and zinc content of oysters. This is most likely due to the limited quantities of shellfish consumed as part of the shellfishers’ overall diet and to other factors that may have a stronger influence on anemia prevalence. Additional research

on this relationship will not be pursued in this extension, which will focus its limited resources on fewer components that are more strongly linked to biodiversity outcomes.

The key Activity components of the extension (USAID, 2022) are:

Extension Objective 1: Demonstrate the biodiversity and socio-economic value of more fully integrated rights-based co-management of linked shellfish - mangrove - proximate landscape food ecosystems in two countries in West Africa: Ghana and The Gambia.

Extension Objective 2: A functional West Africa Shellfish Knowledge and Outreach Hub.

1.2 Objective of This Report

This report documents progress on project implementation at the end of the first year of the three-year extension (FY23), October 2022 – September 2023.

2. PROGRESS ON OBJECTIVE 1: Site-based research to demonstrate the value of integrated systems in Ghana and The Gambia

2.1 Theory of Change, Location of Field Sites, and Priority Strategic Approaches

The Theory of Change for the three-year extension site-based research in Ghana and The Gambia is:

IF implementation of women shellfishers empowerment, shellfishery and mangrove co-management, and adjacent landscape food production systems is integrated, THEN shellfishery and mangrove health, dietary diversity, and shellfisher livelihood resilience will improve.

Site based activities fall under three integrated strategic approaches as per the original Activity theory of change:

- Gender sensitive shellfishery co-management
- Mangrove co-management
- Integration of adjacent landscape food production systems

Women shellfishers empowerment and organizational capacity development of women-led shellfishery associations are an important crosscutting strategic approach that is integral to the gender sensitive shellfishery co-management model that is the focus of this Activity and includes: promoting women shellfisher use rights over shellfishery resources; organizational development of women's shellfishing associations; livelihood development and household economic resilience for women shellfishers (e.g., selling oyster shells, other income generating activities for closed seasons, literacy,

financial literacy, and village savings and loan associations), and focus on shellfishing households for improved landscape food systems.

Gender sensitive shellfish co-management is focused on molluscs and bivalves, including oysters, cockles, and periwinkles, which are harvested predominantly by women in West Africa including in The Gambia and Ghana. The co-management approach is a process of management in which the government shares power with resource users, with each given specific rights and responsibilities relating to information and decision-making, resource use, and enforcement. The Activity extension is strengthening gender sensitive shellfish co-management in the Densu and the Tanbi where approved shellfishery co-management plans delegating exclusive use rights to shellfisheries to resource user associations are in place. The Activity extension also facilitates development of new gender sensitive shellfishery co-management plans in Narkwa and Bulock using the Toolkit and peer to peer learning as resources.

Mangrove co-management, like shellfisheries co-management, is a process of management in which the government shares power with resource users, with each given specific rights and responsibilities relating to information and decision-making, resource use, and enforcement. Women shellfishers are among the resource users of mangroves, but the stakeholder group for mangrove ecosystems is broader than women shellfishers. The Activity extension facilitates mangrove co-management planning and management actions to address key threats and drivers of mangrove degradation. The focus is on those most intricately linked to shellfisheries habitat health, building on the mangrove situation analysis developed in the Activity's first phase. Considering past challenges on mangrove restoration, the Activity will follow an "option by context" approach to inform community-based restoration anchored in local solutions such as "social fencing." Mangrove replanting is not the highest priority in some areas (Tanbi and Bulock sites) and the Activity will therefore seek to support community actions that also promote conservation, natural regeneration, and better practices in handling diverse mangrove genetic resources.

Landscape Food Systems is an approach that expands the shellfish co-management approach to include assessment of the adjacent landscape of these estuaries and lagoons, particularly in the context of improving food resilience. Phase I Activity research demonstrated that oysters and cockles are not typically consumed in high quantities, so they must be supplemented with other food sources for a healthy and adequate diet. Food insecurity is seasonal, and if closed seasons are considered to manage shellfish, a readily available source of household food or income could be lost for several months in a year, which could exacerbate food insecurity. During this Activity's first phase, nutritious food portfolios were co-developed with local communities at each site. The adjacent landscape and food production systems activities implemented during the Activity extension are a result of the integrated model studied in the first phase.

Site-based activities are implemented at two sites in each country (Figure 1). These sites are a subset of the original six sites studied in the initial phase of the Activity and represent different contexts and

are described more fully in the extension’s implementation plan (USAID, 2022). The Tanbi and Densu are located adjacent to large, urbanized areas and each has an existing shellfish co-management plan. Bullock and Narkwa do not have co-management plans and are located in more rural areas. Priority Strategic Approaches per site vary as shown in Table 1. Activities implemented at each site were customized accordingly and are detailed by Strategic Approach in the sections below.

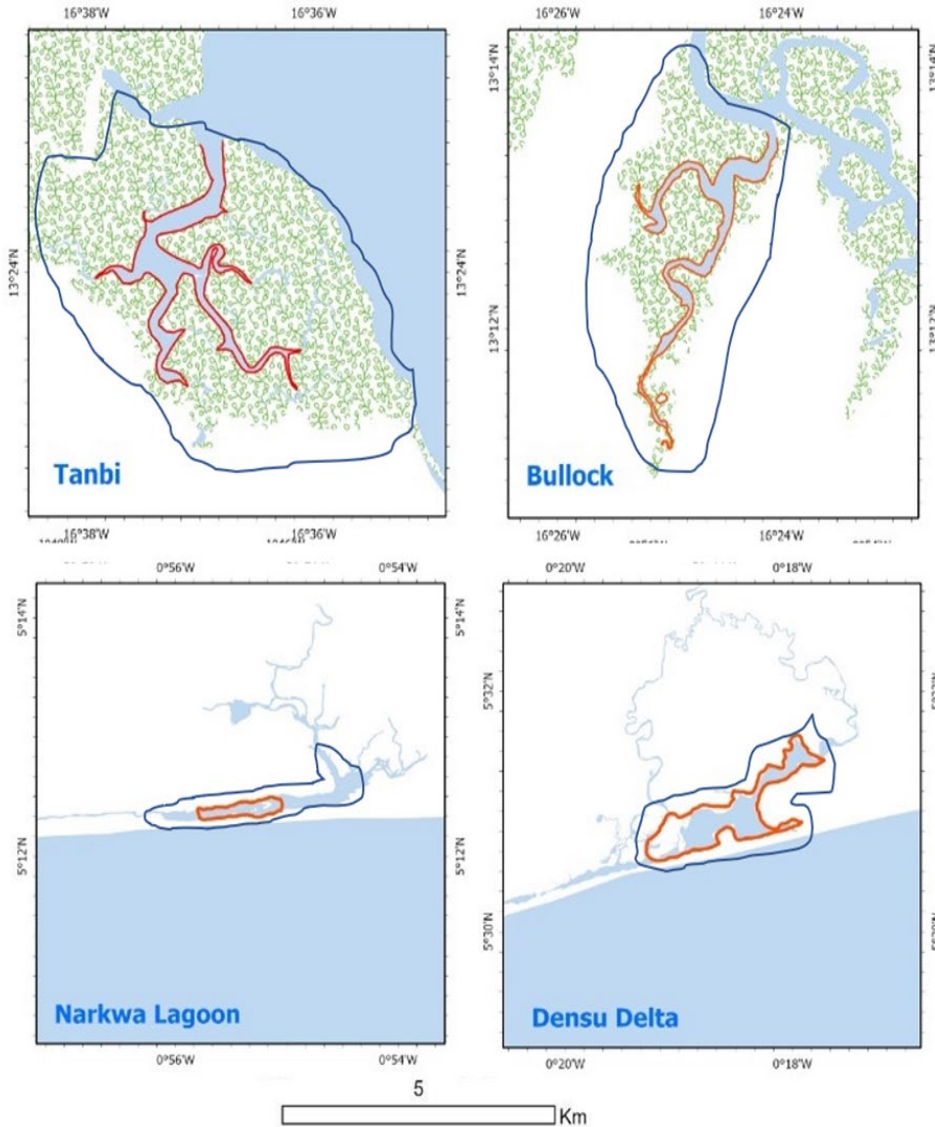


Figure 1: Sites for field-based activities in the Activity extension: in The Gambia – Tanbi (Lamin section) and Bullock; Ghana – Narkwa and Densu Estuaries. (Red polygons indicate areas where oyster harvesting occurs, and the blue polygons indicate planned areas of Activity activities in general and expected influence.)

Table 1: Prioritization of strategic approach implementation at each site.

Site	Strategic Approaches			
	Women shellfishers empowerment	Gender sensitive shellfish co-mgt (fishery status)	Mangrove co-mgt (health status, threat score)	Landscape food systems (opportunity)
Densu	Medium	Low (underexploited)	High (low health 26)	Low (limited opportunity)
Narkwa	Medium	High (over exploited)	Low (high health 11)	High (good opportunity)
Tanbi	Medium	Low (underexploited)	Medium (moderate health 28)	Medium (limited opportunity)
Bulock	Medium	High (overexploited)	Low (high health 20)	High (good opportunity)

SOURCE: Adapted from USAID, 2022.

Objective 1 results will be documented as per the Monitoring and Evaluation Plan for Site Based Activities in Furtherance of the Research Agenda (CRC, 2022) jointly developed by Activity partners.

The role of each Activity partner in the extension phase site-based activities is documented in the Revised Three-Year Extension Implementation Plan and Monitoring Evaluation and Learning Plan (Women Shellfishers and Food Security Activity, 2022) jointly developed by Activity partners.

2.2 Women Shellfishers' Empowerment

2.2.1 Densu

2.2.1.1 Leadership and Advocacy Training

DAA conducted a leadership and advocacy training workshop on March 7, 2023, at the DAA Fisheries Training Center (DFTC) conference hall. The purpose of the training was to bring together Densu Oyster Picker's Association (DOPA) leaders from the three DOPA communities to sharpen their leadership and advocacy skills. This enables DOPA leaders to facilitate DOPA membership and other stakeholders to work in unity and transparency, consider each other's point of view, and come to a common consensus on issues that they need to address. The workshop facilitator's methods were based on experiential and adult learning techniques. A total of 30 participants (80 percent women) were trained.

2.2.1.2 Village Savings and Loan Associations (VSLA) Revitalization and Replication

Village Savings and Loan Associations (VSLA) is one of the approaches that supports the socio-economic resilience of women shellfishers who are sustainably managing Ghana's shellfish resources

and habitats and is among the best practices the Women Shellfishers and Food Security Activity aims to demonstrate. The purpose of the VSLA is to create awareness of group savings systems which can help group members to save on their own and obtain very low interest loans.

In FY23, DAA facilitated establishment of one new VSLA in each of the three DOPA shellfishing communities, Bortianor, Tsokomey, and Tetegu, using the USAID/Ghana Sustainable Fisheries Management Activity (SFMP) field guide (SFMP, 2019). In Bortianor and Tsokomey, these represent a scale up from the three existing active VSLAs established under SFMP. One VSLA established under SFMP in Tetegu became inactive during Covid-19 as members were depending only on shellfish revenues during the open season to contribute savings. DAA reminded all members that the VSLA is not only for income earned from shellfish activities but a means of saving part of their income irrespective of the source. Table 2 summarizes the new VSLAs.

Table 2: New VSLA groups in Densu.

Name of VSLA	Community	Membership	Meeting Day	Meeting Time	Cycle	Minimum share value (Ghc)	Maximum share value (Ghc)	Social fund Amount (Ghc)
ADOM	Bortianor	27	Tuesday	8 am	6 months	5.00	25.00	1.00
AMENUVEVE	Tsokomey	29	Tuesday	12 noon	6 months	5.00	25.00	1.00
ARISE AND SHINE	Tetegu	18	Sunday	2 pm	6 months	5.00	25.00	1.00

2.2.1.3 Literacy and Numeracy Training

DAA organized a training of trainers from March 27-30, 2023, for literacy and numeracy facilitators from Bortianor, Tsokomey, and Tetegu. Resource persons from the Complementary Education Department from the Ga South Municipal Assembly facilitated this training. The training objectives were to:

- i. Train facilitators on the skills and techniques required for adult education.
- ii. Equip participants with methods of teaching adults effectively.

Seven trainees including six facilitators and one supervisor, learned basic literacy and numeracy facilitation methods and techniques. Four of the trained facilitators (two each from Tsokomey and Tetegu) are DOPA members. The other three are non-DOPA members from Bortianor.

Literacy and numeracy education started in May 2023 in the three communities. The program was organized into phase one (FY23) covering basic numeracy and literacy in local dialects (Ewe and Ga) and phase two (to be implemented in FY24 and FY25) covering literacy in English and further numeracy. Learners who successfully completed phase one graduated on September 25, 2023 (Figures 2 and 3). Seventy-two learners started the program (25 in Bortianor, 32 in Tsokomey, and 15 in Tetegu). At the end of phase one, 58 learners (two men and 56 women) graduated representing

81 percent of participants initially enrolled (96 percent in Bortianor, 84 percent in Tsokomey, and 40 percent in Tetegu). Tetegu had a poor graduation rate due to flooding of their homes a few weeks into the beginning of the classes resulting in absenteeism and eventually leading to loss of interest for many.



Figure 2: A literacy and numeracy learner in class (left). A literacy and numeracy learner demonstrating addition (right).



Figure 3: A group of literacy and numeracy learners with the dignitaries at the mangrove field visit and graduation event.

2.2.1.4 Participatory Shell Value Chain Study Tour for DOPA

Ten members of DOPA embarked on a shell value chain study tour facilitated by UCC and DAA to learn how oyster harvesters could derive optimum benefit from value addition to shells and observe how oyster shells are processed and used in different ways in Ghana. On September 20, 2023, the participants visited identified industries where shells are processed and saw a variety of shell products. DOPA members learned from the industry operators about where the equipment for grinding, processing, and adding value to the oyster shells can be sourced, and how to operate the equipment.

Participants obtained firsthand information on the costs and benefits of owning and running shell processing equipment to assess the profitability. Key findings included that grinding machines are made in Ghana and cost approximately \$4,450 (Figure 4). The main products produced are for poultry feed and fillers used in tiling. These findings will also contribute to the shell value chain study to be produced in FY24 and are important for shellfishery management in Ghana where oysters grow in the bottom substrate and returning at least some of the oyster shells enhances oyster reef habitat.



Figure 4: Shell crushing machine operated by a worker.

2.2.2 Narkwa

2.2.2.1 Establish and Register a Shellfishers Association

In FY23, UCC facilitated the formation of a shellfishers' association at Narkwa to provide a unified body, strengthen their collective voice, foster mutual support, and work towards a sustainable shellfishery and connected ecosystems. The newly formed shellfishers association at Narkwa was named the Narkwa Oyster Harvesters Association (NOHA), which translates into Fante as “*Narkwa Adentse Kuw*”. The chosen slogan of the association is “*Yen Adentse, Yen daakye*” which translates into, “Our oysters, Our future”. The association was formed on March 3, 2023, with a membership of 35, and is mainly constituted of resource users who depend on shellfishing as their only livelihood. A majority are women, some of whom had over 15 years of experience or more in the shellfish business. Three members were appointed to occupy interim leadership positions of President, Organizer, and Secretary. The UCC team assisted the association to develop a draft constitution, with processes for the registration of the association with the Ekumfi District Assembly (which covers Narkwa) initiated.



Figure 5: NOHA members during a voting exercise for the selection of interim executives.

2.2.2.2 NOHA Study Tour to DOPA and Orientation on the Use of Water Quality Instruments

UCC and DAA organized a peer-to-peer learning study tour for 21 NOHA members through a three-day (August 16-18, 2023) visit to DOPA. DOPA, with support from DAA, shared their co-management experience and provided basic orientation for NOHA on oyster biology and ecology based on their past training and experience. UCC procured simple water quality testing instruments (thermometer, refractometer, secchi disk and pH meter) for training NOHA members on the use of these equipment for water quality monitoring in support of future shellfishery co-management activities at Narkwa. Field work on the monitoring of some basic water quality parameters such as temperature, dissolved oxygen, turbidity, and pH was carried out at Densu (Figure 6). UCC will follow up with further training for NOHA on water quality, oyster biology and ecology in FY24, after which the equipment will be handed over to NOHA for participatory data collection and monitoring.

2.2.2.3 Leadership Training for Advocacy

As part of the NOHA visit to DOPA, UCC engaged an expert to facilitate training for NOHA on leadership to enhance their advocacy skills. The training focused on developing leadership skills, knowledge of oyster resource management, and ecological stewardship practices. NOHA members gained a deeper understanding of oyster resource management, including the importance of sustainable harvesting practices, habitat conservation, and the ecological significance of oyster populations on surrounding ecosystems. The acquired knowledge and skills will enable NOHA members to address challenges, engage in ecological stewardship and contribute to the long-term ecological health and sustainability of the Narkwa shellfishery.



Figure 6: The NOHA, UCC and DAA team after the Leadership and Advocacy training at DAA (left). DOPA training NOHA members on basic water quality monitoring at Densu Delta.

2.2.3. Lamin

2.2.3.1. Leadership Training for Advocacy



Figure 7: Leadership training participants from Lamin speaking (left) and role playing a misunderstanding during a session on conflict resolution (right).

TRY trained 29 Lamin shellfishers in leadership for advocacy in August 2023 during a one-day training event at the TRY office (Figure 7). Training objectives focused on identifying different leadership components (styles, functions, skills, and qualities), and how to carry out conflict resolution. All 29 training participants were women.

2.2.4. Bullock

2.2.4.1. Leadership Training for Advocacy

TRY organized two days of leadership training for advocacy for shellfishers in Bullock over two months (August and September 2023). Thirty participants completed the first day of training (1 man, 29 women). Twenty-seven participants (1 man, 26 women) completed the full training agenda. The training methodology was the same as used in Lamin. Bullock has not previously benefitted from such trainings for women shellfishers. Participants strongly appreciated the perspectives they gained to better lead shellfisher groups at the community level as they organize for co-management – for example, the importance of transparency in financial management.



Figure 8: A Bullock shellfisher practicing her leadership skills during the leadership for advocacy training in Bullock.

2.2.4.2. Peer to Peer Study Tour to Lamin/Tanbi

TRY oyster harvesters from the Lamin area of the Tanbi, along with other harvesting communities within the Tanbi Wetlands National Park (TWNP) – Old Jeshwang, Abuko, Fajikunda, Kamalo and Ibo Town – hosted a peer-to-peer study tour of shellfishers from Bullock and surrounding harvesting communities of Suma Kunda, Faraba Sutu, Sutsinjang, and Bajana in the fourth quarter of FY23. The primary objective was to facilitate peer-to-peer learning on co-management and to particularly

address trans-ecosystem management, including seasonal migration of Tanbi oyster harvesters into Bullock and surrounding oyster harvesting communities.



Figure 9: Shellfishers sharing their experience and points of view during the peer-to-peer study tour of Bullock shellfishers to Lamin in the Tanbi.

A major take-away from presentations and discussion over the two-day event was the collective respect and adherence to closed seasons and suggestions for a review to extend closure periods due to perceived mounting pressure on oyster resources. Some key recommendations identified during the study tour included the creation of a Foni (see Section 2.3)/Tanbi Working Group to collaborate on issues of trans-ecosystem management, Tanbi oyster harvesters' migration, data collection and sharing, as well as the need to obtain land tenure rights to prevent undue relocation or sale of processing sites to investors. TRY considered this one of the most powerful activities conducted this year for building the capacity of Tanbi and Bullock shellfishers as empowered co-managers and environmental stewards.

2.2.4.3. Shellfish Biology Training

The UCC team trained 28 participants (96 percent women) on oyster biology and ecology within the context of co-management of the oyster fishery at Bullock (Figure 10). The training was aimed at introducing the resource users to the basic science of the oyster as a living organism to enhance their understanding of the physical and environmental demands of the oyster. This was delivered using simple action-oriented pedagogy, which helped the women to follow material, share their opinions, and ask questions. For a better appreciation of the process of reproduction in oysters, the women examined stripped sex gametes of the oyster under a microscope, a first-time experience for them

visualizing magnified specimens under a microscope. At the end of the training, the women understood the importance of and could successfully measure temperature, salinity, turbidity, and pH.



Figure 10: Oyster biology and ecology training for the Bullock women oyster harvesters (left). Bullock shellfisher using a microscope for the first time to view oyster gametes (right).

2.2.5 Cross Cutting: Participatory Shell Value Chain Study

A shell value chain study covering both Ghana and The Gambia is planned for FY24. Some communication with actors in the value chain and discussion on structuring of the methodology were conducted in FY23. UCC plans to engage two of its graduate Masters students in the Blue Economy and Social Resilience program to undertake the study and for their thesis research. TRY was contacted earlier this year by prospective buyers in The Gambia to use shells as an agricultural soil amendment on groundnut crops, and in the U.S. for an oyster reef restoration initiative. Coordination with the FAO FISH4ACP project in The Gambia on their shell value chain activities is on-going. The participatory value chain study tour in Ghana by DOPA together with some UCC and DAA staff has served as a very useful opportunity and provided important insights to shape the focal areas and methodology for the study.

2.2.6 Crosscutting - USAID/Washington and U.S Embassy The Gambia site visits

The Women Shellfishers and Food Security Activity benefitted from a visit by the USAID Agreement Officer's Representative (AOR) in February 2023 to Lamin and Bullock, and from the U.S. Ambassador to The Gambia in March 2023 to Bullock.

2.3 Gender Sensitive Shellfishery Co-Management

2.3.1. Support Priority Shellfish Co-management Actions at Densu and Tanbi

2.3.1.1 Densu - Closed and Open Season Sensitization

DOPA observed the 6th Oyster fishery closed season from November 30, 2022, to April 30, 2023. The 6th open season announcement event took place on May 2, 2023. The opening event was

attended by representatives from UCC, the Fisheries Commission, the Narkwa Oyster Harvesters Association, “Sakumo We”, fish processors, Bortianor Chief fisherman, and brush park fishermen, with a total attendance of 123 (Figure 11 and 12). During the program, UCC educated DOPA and the public on the importance of conserving the water, mangroves, and oysters, and provided orientation on collecting simple landings data.



Figure 11: DOPA members announcing the 6th annual November 30, 2022, to April 30, 2023, closed season for oyster harvesting in the Densu.



Figure 12: DOPA members announcing the May 2023 open season.

2.3.1.2 Shellfishery Biodiversity Study in Replanted Mangrove Areas

Although this activity led by UCC was planned for FY23, it was replanned for November 2023 (FY24) due to preparations required including allowing for the rains to subside for easy access to the replanted sites for the study. The methodology has been drafted and is being refined.

2.3.1.3 Lamin Scale-up of Family Oyster Farm and Provide Start Up Package

Following a study tour to Senegal organized by the FAO FISH4ACP project, TRY began efforts to adopt an observed oyster culture technique not currently used in The Gambia: the use of hard plastic mesh for clutch. In FY23, TRY imported mesh material from Senegal, constructed mesh bags, and is waiting for approval by the Department of Parks and Wildlife Management to construct platforms and deploy the mesh bags. Bag construction included hands-on training of 20 beneficiaries who made 100 mesh bags (Figure 13). Each trainee was provided five bags. This was determined to constitute one farm. As the pilot continues, individuals who find it successful can expand using their own resources. The women plan to try another approach seen in Senegal to make the mesh bags using discarded industrial fishing nets, a potentially lower cost and more environmentally friendly option.



Figure 13: Shellfishers at Lamin assemble mesh bags for oyster aquaculture.

2.3.1.4 Lamin Cockle Transplanting

UCC and URI are providing technical support for cockle transplanting activities in Lamin. UCC held discussions with TRY during the visit to Gambia in September 2023, focused on understanding why transplanting has been deemed necessary. The reason provided was that communities around Lamin are aiming to harvest bigger cockles, but further discussion revealed that the status of cockles in Lamin currently is not well understood. TRY was tasked to inquire on their status and perceived reasons for why cockles are not growing to bigger sizes. Initial scoping for transplanting site identification also began, with participation from oyster harvester beneficiaries and the Denton Bridge area proposed as a donor site (seed collection site). This information together with other follow-up assessments will be important in determining the way forward on the transplant.

2.3.1.5 Assessment of Denton Bridge to Ibo Town Dead Oyster Situation

At the Activity development stage of the Phase II, The Gambia partners reported observations of poorly performing oyster stocks in the Denton Bridge section of the Tanbi characterized by small-

sized oysters, leading to a truncation of harvesting by the women. The oysters here were reported to (1) have smaller sizes compared to those in adjacent mangrove stands, (2) characteristically show a whitish color, and (3) not harvested by the women due to the unproductive nature of this section of the wetland.



Figure 14: Site map of the assessed section of the Turbull Bolon at Denton Bridge.

On September 18, 2023, UCC conducted a rapid assessment of the basic ecological conditions of the site to understand the occurrence and recommend actions for restoration of the site. The affected site was demarcated into five sections from which water quality and oyster morphometric data were taken. In addition, two control sites described to have good oysters by the TRY partners were sampled for the same parameters. The water quality parameters measured included temperature ($^{\circ}\text{C}$), salinity (ppt), pH, transparency (m), and depth (m). The oysters sampled were also assessed for shell height (cm), length (cm), and visible epibionts on the shell.

There were no marked differences in water quality between the affected and good sites, and no apparent connection between oyster morphometrics and water quality at the individual sites. However, there appeared to be differences in the physical appearance of the oysters at the classified affected and good sites. At the affected sites, close observation revealed that most of the oysters in this section were dead (Figure 15). It was established that mortalities were the main causes of the reported whitish color of the oysters in the bolong, and the cause of mortalities at the affected site could be remote (not attributable to the water quality parameters measured in this assessment) and need a more detailed investigation.

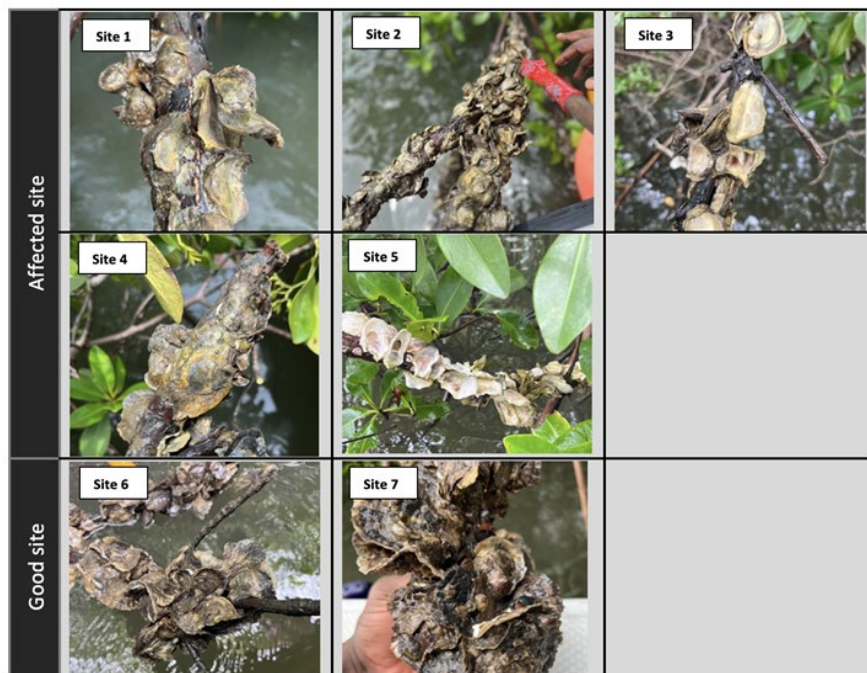


Figure 15: Physical inspection of oysters at the five affected and two good sites in the Turnbull Bolon at Denton Bridge, Gambia.

2.3.2. Develop Shellfish Co-management Plans at Narkwa and Bulock Using the Toolkit Steps

2.3.2.1 Narkwa

In Narkwa, a stakeholder engagement process towards a new shellfish co-management plan commenced with a community entry visit to the Narkwa Chief and his council of elders to share the overall prospects of the Women Shellfishers and Food Security Activity, as well as research outcomes and considerations for promoting co-management of the shellfishery. UCC also met with and raised the awareness of the Narkwa shellfishers, the Assemblyman and Unit Committee members, and the Narkwa community. Beyond the community, the state institutions with mandates related to the community, environment and fisheries—namely the Fisheries Commission (Central Region), the Ekumfi District Assembly, and the Forestry Commission—were consulted.

Related activities included the formation of the NOHA and UAV (drone) mapping of the shellfishery and connected ecosystem area. UCC also organized a two-day workshop to engage stakeholders (resource users, traditional leaders, government agencies and Fisheries management) in preparation for development of a shellfisheries co-management plan for the Narkwa oyster shellfishery. The workshop was held on May 4-5, 2023, in the Central Region of Ghana. Workshop participants included the representatives of the traditional authorities and members of NOHA from Narkwa Community; the Central Regional Director and the Zonal Officer of the Fisheries Commission; the

Forestry Commission Officer in charge of Winneba and its environs; the Assemblyman for Narkwa; the Coordinating Director and two members of the Ekumfi District Assembly; the Executive Director of DAA; Secretary of DOPA; and the Activity team from UCC.

The specific objectives of the stakeholder workshop were to: (1) define the fishery and boundaries of the management area; (2) conduct an in-depth stakeholder analysis and mapping; (3) to present a situational analysis of the oyster shellfishery at Narkwa to stakeholders; and (4) establish institutional arrangements for the implementation of the management plan. These represent phase 1, steps 1-4 of the Narkwa shellfishery co-management planning process as outlined in the Toolkit. A nine-member co-management planning committee (composed of the Zonal Fisheries Officer (FC), the Assemblyman of Narkwa, a representative from the Narkwa Traditional Council, the President, Secretary, Organizer (executives) of NOHA, and another three members of NOHA) was set up to lead the next phase (steps 5-8 of the Toolkit), with support and facilitation from UCC and DAA (Figures 16 and 17).



Figure 16: Newly constituted Narkwa shellfishery co-management planning committee.

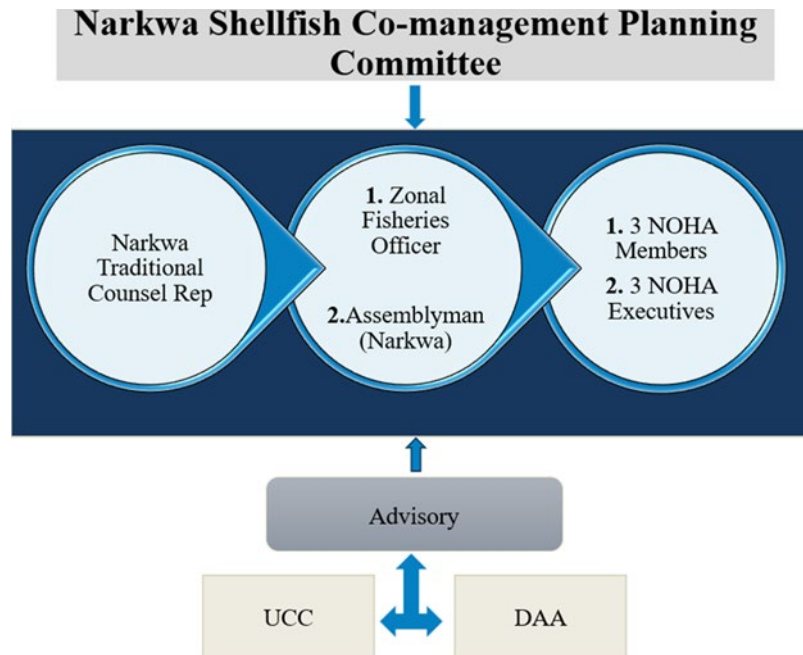


Figure 17: Illustration of the structure of the Narkwa Shellfish Planning Committee.

The newly constituted co-management planning committee organized a two-day meeting on the UCC campus, facilitated by UCC and DAA, on September 26 – 27, 2023. During the workshop, the co-management planning committee adopted an ecosystem-based adaptive management approach (similar to the Densu Delta oyster fishery co-management plan) and drafted the beginnings of a comprehensive shellfish co-management plan including a statement of vision, goals, objectives, and management measures to achieve them. Penalties and sanctions were also proposed for violations of management rules.

2.3.2.2 Bulock

TRY facilitated and led the Bulock co-management planning process to date through a series of eight monthly stakeholder meetings in Bulock (as shown in Table 3) designed to complete steps 1-4 of the Toolkit. TRY worked with 39 individuals on a regular basis as representatives of the various types of co-management plan stakeholders. They included 30 oyster harvesters (20 from Bulock and two each from Sutsinjang, Besse, Bajana, Kafuta, and Faraba Sutu), three fishermen representatives, and one representative each from the Department of Fisheries, the Department of Forestry, the Department of Parks and Wildlife Management (DPWM), Alkali (Village Chief), District Chief, and the Village Development Committee (VDC) representing Local Government Authority (LGA). The group of 30 oyster harvesters were the same individuals at every meeting. TRY identified them over the course of community meetings as the most active participants in order to work with a consistent group and to deal with Activity resource constraints that make it difficult to accommodate large meetings of all

resource users. TRY also conducted focus group discussions and one-on-one interviews during planning meetings to collect information.

Table 3: Shellfish Co-Management Planning Meetings at Bulock.

Date	Meeting Themes
Nov. 20, 2022	Community Entry: "Social mobilization" on the 3-year extension phase of the Activity including the regional knowledge and outreach hub led by UCC, support for shellfishery co-management planning in Bulock facilitated by TRY, and mangrove management community action planning and landscape food systems activities facilitated by ICRAF.
Dec. 17, 2022	Guiding principles for development of the Shellfishery Co-Management Plan: Participatory stakeholder approach; Rights-based related to rights holders and duty bearers' responsibilities; Gender Sensitive approach taking into consideration identification of gender barriers; Integrated approach or Ecosystems-Based approach to fisheries management; Adaptive management as it relates to learning-by-doing.
Jan. 15, 2023	Definition of Oyster Fishery and Boundaries of the Management Area managed.
Feb. 12, 2023	Incomes, number of harvesting days, catches/landings and oyster marketing channels.
March 19, 2023	Establishing Institutional Arrangements.
April 23, 2023	Vision and objectives development for the co-management plan.
May 21, 2023	Setting of management measures, penalties and sanctions including resources.
June 19, 2023	Planning to implement, evaluate, and review the co-management plan.



Figure 18: Participants selecting one of the seven principles (left); Seven guiding principles for managing shellfisheries (right).

A major outcome of the planning process to date is the expansion of the proposed management area at the Bulock site. The new shellfish co-management plan for Bulock was originally proposed to cover only areas directly surrounding the Bulock bolong (see Figure 19). Following extensive discussion and debate during planning meetings at the community level and with Activity partners, an understanding was reached that many shellfishers harvesting in Bulock bolong are doing so after traveling from surrounding communities and other bolongs. It was expressed that some of these shellfishers are not landing their catch at Bulock, and that harvesters landing their catch at Bulock may also be harvesting beyond Bulock bolong. Migrants from farther away also have paid access fees to the Bulock VDC to harvest in Bulock (from Mandinaba, West Coast Region, Kombo District and from TRY member communities in the Tanbi Kubuneh, Abuko, and Old Jeshwang). Due to this interconnectedness and the need to engage all relevant stakeholders to achieve effective management of a shared resource, the proposed management area was expanded (Figure 19). Corresponding with the expanded management area, the proposed name of the new shellfish co-management plan was revised to the Foni Bolong Shellfishery Co-Management Plan; 'Foni' is the local name of the region covered by the newly proposed management area boundaries.



Figure 19: Proposed boundaries of the Foni Bolongs fisheries management plan area and location of oyster and cockle harvesting communities around the Foni Bolongs.

A key challenge at this stage in the planning process is how to enable TRY to conduct more inclusive engagement with stakeholders in the other Foni bolongs communities. The institutional arrangements for decision-making and management of the Foni bolongs will require organized representation at this

broader, ecosystem-wide scale—beyond the two shellfishers from some surrounding communities who have been participating but are not identified by their communities as representatives in any organized way. The Activity team is supporting TRY to seek additional resources for this outreach. While the proposed boundaries of the management plan are now understood to be broader than Bullock belong, Activity efforts and resources for the planned site-based testing of the four integrated strategic approaches will remain focused on the more limited Bullock belong area.

To facilitate implementation and capture learning from the application of the Toolkit at these two new co-management sites, Activity partners participate in quarterly meetings (two so far in FY23) to share the status of the process and current drafts of the Narkwa and Bullock co-management plans.

2.3.3 Crosscutting: Development and Implementation of Simple Landings and Income Data System

UCC, URI, TRY, and DAA collaborated to develop a simple landings data collection methodology and a field guide to pilot the methodology in FY23 at Lamin, Bullock, and Densu. It will be piloted in Narkwa in FY24. The objectives of this activity are to:

- Collect basic information that is useful for oyster harvesters' decision making on sustainable management of the oyster resources/stock to ensure the fishery is not overfished. The basic data needed to determine if the fishery is underfished, overfished, or fully exploited is Catch Per Unit Effort (CPUE). This includes landings data and effort data by individual harvesters.
- Provide information for long term trends analysis of overall annual catch/landings and value of the oyster harvest.
- Pilot a data collection system that can be sustained by the oyster harvesters as a practice that is integral to behaviors that are considered by the women as essential for their own responsible stewardship of the resources (just as closed seasons, size limits and gear restrictions now are), and from which information can be utilized and analyzed in partnership with the Department of Fisheries and Academia.

The core rationale of the methodology is to collect daily harvest data during the open season from all harvesters every day by simply counting and recording the number of containers of each type they harvest. This involves one-time (or infrequent) calibrations of the weight of unshucked and shucked oysters in the various containers habitually used. In addition to the calibration information, daily catch data is collected including date, number of each type of container full with oysters, number of harvesters, among others. Market data is also being collected on the place of sale, type of market, and prices.

In The Gambia, data collection for this activity started on March 23, 2023, at Bullock and two Lamin landing sites in the Tanbi at the start of the open season in these locations and ended in late June. TRY staff procured scales and worked with shellfishers to calibrate the commonly used containers at each site as shown in Table 4 and Figure 20.

Table 4: Standard (mean) weights (kg) of each container commonly used in each site in The Gambia for oyster harvesting.

Site	Container	N	Minimum kg	Maximum kg	Mean kg	SE (Mean)
Lamin Siaka Tenda	Small Black Pan	10	12.00	13.50	12.54	.15070
Lamin Lodge	Large Black Pan	5	21.15	22.15	21.79	.16985
	Rice Sack	5	24.60	29.95	27.61	1.07021
Bulock	Black Bucket	71	16.89	20.92	17.49	.03409



Figure 20: Calibration of the black bucket at Bulock and the rice sack at Lamin Lodge in The Gambia.

In the Densu, data collection started in May 2023 at the start of the open season and is on-going as the season closes in November. In collaboration with UCC, DAA conducted a series of three sensitization meetings with DOPA communities on the landings data collection system. UCC procured and donated scales to DOPA and NOHA. UCC and DAA worked with shellfishers to identify and calibrate commonly used containers at each community as shown in Table 5 and Figure 21.

Table 5: Standard (mean) weights of each container commonly used in the Densu in Ghana for oyster harvesting.

Container	N	Minimum kg	Maximum kg	Mean kg	SE (Mean)
Big Pan (kg)	10	36.00	39.60	38.10	.39243
Small Pan (kg)	22	20.00	26.90	22.63	.38134
Big Sack (kg)	18	40.10	57.30	45.81	1.13177
Small Sack (kg)	16	17.30	20.80	19.18	.31192



Figure 21: Calibration of small pan and small sack in the Densu in Ghana.

The raw daily landings data from all harvesters was collected daily at The Gambia sites by a few literate shellfishers identified and provided a small financial incentive for this work. In Ghana, DAA staff are initially recording the data while identification of DOPA members is on-going. The idea is that the data collectors should be shellfishers local to the site and that the incentive should be minimal enough to be sustained after the Activity. Data collected so far was entered into spreadsheets at the level of TRY and DAA and submitted to UCC and URI for preliminary analysis (Figure 22). The general trend from all the sites is a drop off in harvest rates during the first month, after which, CPUE tends to level off. An initial decline in landings and CPUE is typical after seasonal closures. This does not necessarily indicate the oyster stocks are overharvested as many years of CPUE data are needed to make that determination.

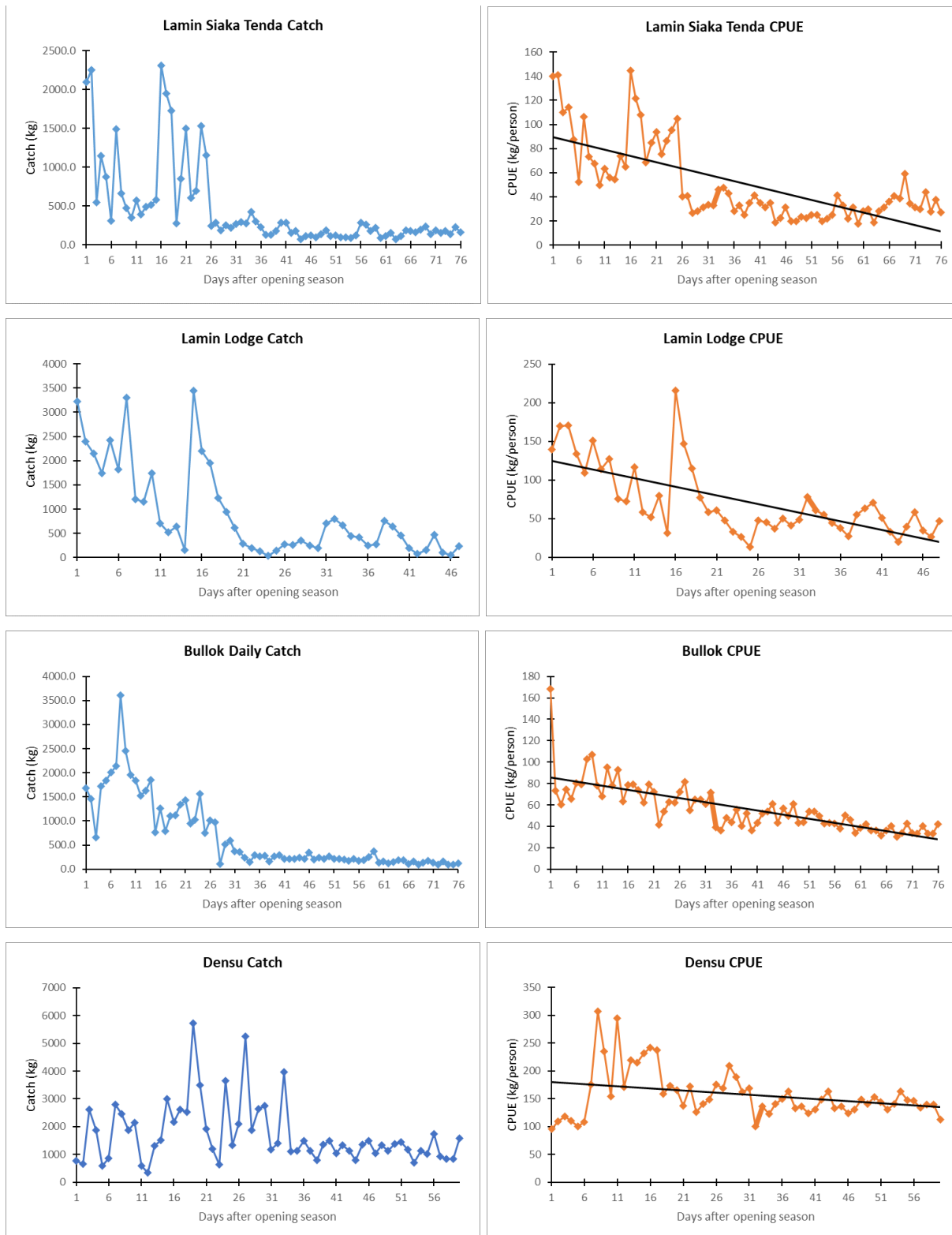


Figure 22: Catch and CPUE trends at sites in Lamin, Bullock and Densu after opening of the oyster harvesting season.



Figure 23: Loading sacks of oysters into a tricycle in the Densu.

TRY and DAA also facilitated determination of the conversion ratio of oysters in the shell to oyster meat (in order to relate catch amounts to shucked oyster meat for sale) and conducted market surveys to determine local oyster meat market values. These data have yet to be fully tabulated and analyzed. In The Gambia, data collection for the conversion ratio of unshucked to shucked oyster has begun at the Lamin Lodge landing site, and market survey data has been collected for the 2023 open season at market points around Lamin and Bulock. In The Gambia, a standard milk tin is used by all sellers as the unit of measure, and 8 milk tins convert to 1 kilogram of oyster meat. A single milk tin is priced depending on the perceived (i.e., not weighed) size of the individual pieces of oyster meat, with a single milk tin of 'small' oyster meat priced between 30-50 Dalasi and a single milk tin of 'large' oyster meat priced between 50-75 Dalasi. These prices vary between markets (producing the stated ranges) but appear to be consistent within a given market. In the Densu, the meat of the oyster is mainly sold within the communities. There are no standard measurements used for selling oyster meat. The women use their hands for measurements to make mounds of shucked oysters on trays. There are variations in the quantities in mounds from person to person, apparently due to different hand sizes, and from community to community (Figures 24 and 25). For example, a mound in Tsokomey and Tetegu measured between 0.134-0.201kg containing 45-71 oysters for 5 cedis and between 0.088-0.109kg containing 23-29 oysters for 5 cedis in Bortianor.



Figure 24: A display of the different measurements of 5 cedis worth oyster meat in Densu.



Figure 25: Mounds of oyster meat ready for sale in Densu.

A few challenges were encountered at the beginning of the data collection.

- The unwillingness of some harvesters to allow their data to be collected due to misconception on the activity where some of the women claimed that weighing their catch will eventually lead to taking money from them in the form of tax. Some in Densu wanted monetary compensation before collecting their data. These are in the minority and are not members of DOPA.
- After a hard day's job of collecting oysters, harvesters become very exhausted and need to be coaxed to get information on the quantity of their oyster catch.
- Finding data collectors from among the shellfishers is difficult.
- Statistical tests revealed that some of the container calibrations would benefit from further calibration due to non-normal data distributions.

A key lesson to date from this activity is that the participatory data collection model seems to be a workable and very useful tool for obtaining information to assess the state of oyster stocks and provides an important snapshot on trends of landings that can serve as a decision-support tool in the co-management of the shellfisheries. In FY24, there are plans to transition this from an Activity pilot

system to a state supported data acquisition approach where the Fisheries Commission of Ghana and the Department of Fisheries in The Gambia will own the process together with the shellfishers and their associations, carry out the data analyses, and share it back to shellfishing communities for decision making.

TRY and DAA, supported by UCC and URI, will develop simple visualizations to share and discuss FY23 results with stakeholders through meetings in FY24. Anticipated outcomes of the new data collection system are the engagement of shellfishers in responsible management through data sharing, generation of information on fishing pressure, and new fisheries data to inform the oyster co-management planning process and adaptive management going forward.

2.4 Mangrove Co-Management

2.4.1 Mangrove Restoration and Management Best Practice at Densu and Tanbi

2.4.1.1 Multi-stakeholder Review of Local Mangrove Restoration Initiatives, Opportunities, and Challenges on Improving Biodiversity

Reviews involved conducting multi-stakeholder forums to map and bring together stakeholders involved in mangrove restoration initiatives and associated biodiversity enterprises such as women shellfishers, project, government departments, NGOs, and others to raise awareness on possible areas of synergy and resource co-management. Forums were held for Densu, Ghana, and Tanbi, The Gambia on January 26 and January 19, 2023, respectively. Participants included diverse stakeholders drawn from local communities and groups, government institutions, research and academic institutions, and Women Shellfishers and Food Security Activity implementing partners. A total of 31 (48 percent women) participants in Ghana and 28 (39 percent women) in The Gambia took part in the forums. Reviews obtained from these consultative meetings will be complemented by secondary desk reviews and key informant consultations during FY24 to fully appraise the status of mangrove co-management in the Activity sites.

These activities have further helped contribute to overall objectives including; (1) sharing of evidence and lessons from the Activity; (2) mapping stakeholders involved in mangrove restoration initiatives and their priorities; (3) appraising lessons, constraints, and opportunities on mangrove co-management and how to promote site-specific food portfolios, and; (4) helping understand incentives and disincentives for mangrove restoration to inform strategies for future opportunities.

As a result of the multi-stakeholder review, the following outcomes were realized and are being integrated into ongoing Activity planning:

In Ghana:

- The role of brush park fisher folk in restoration and conservation of the white mangroves was identified and promoted. Past initiatives focused more on the red mangrove associated with

oyster fisheries, yet the white mangrove are currently also overharvested by fishermen undertaking bush park fisheries.

- The need to engage Weija dam management, considering their close association with the Densu estuarine flooding challenges and unintended consequences on mangrove planting work by the women shellfishers and the brush park fisher folks.
- The role of traditional authorities/chiefs in land allocation for both coastal area restoration and agricultural activities, especially in Narkwa communities with more pronounced food insecurity, deforestation, and mangrove resource fragmentation.
- The need to engage private actors such as salt mining companies in mangrove oyster restoration and conservation activities.
- The need to increase the capacities of women shellfishers, forest commission officers, and local authorities to undertake mangrove restoration under co-management approaches.

In The Gambia:

- Overall, investments in mangrove restoration are being manifested by several ongoing and past mangrove planting projects by government, NGOs, and communities. For example, the [Large-scale Ecosystem-based Adaptation \(EbA\) Project](#) supported by the Green Climate Fund (GCF). In FY24, ICRAF will provide a review of the various initiatives.
- Government and non-government actors identified concerns on mangrove area expansion. More consultation and sensitization are needed to adequately consider the views of the communities and the local government.
- The need to engage more diverse mangrove users was identified, particularly where there is high degradation in parts of the Tanbi due to illegal logging activities for mangrove wood.
- Conservation of the more intact mangrove resources in Bulock and Tanbi is supporting greater biodiversity goods and services such as oyster fisheries and ecotourism, especially around Lamin Lodge in the Tanbi.

2.4.1.2 Mangrove Restoration Site Mapping at all Four Sites

ICRAF conducted mangrove vegetation and related land use cover mapping on the four Activity sites: Densu and Narkwa in Ghana, and Tanbi and Bulock in The Gambia. The main objectives of this activity were to: (1) show the status of mangroves and associated land use land cover (LULC) types influencing the women shellfishery activities, and; (2) conduct community and stakeholder consultation (participatory GIS and ground truthing) to identify areas within each site for different types of land management interventions supporting restoration and biodiversity conservation (Figure 26).



Figure 26: Participatory mapping activities in Ghana and The Gambia sites, delineating and 'ground truthing' land use types and activities for community action plans.

The mapping work combined remote sensing analysis with local knowledge feedback to generate site-specific maps showing 10 and 11 land cover types (Appendix 1 and 2) around Activity sites in Ghana and The Gambia respectively. The status of mangrove and estuarine ecosystems are shown in Figure 27. The LULC maps for Ghana and The Gambia are shown in Appendix 1 and 2.

Furthermore, participatory GIS sessions involving community groups helped delineate sites for restoration, conservation, and food security improvement activities. In the Densu and Narkwa sites, there was consensus to restore and increase mangrove cover lost over the last few decades. At Densu, actions mapped included mangrove planting, mangrove conservation, coconut planting, and Indian almond planting along mangroves in close proximity. In Narkwa, mangrove planting, non-mangrove forest conservation, coconut planting, and agricultural intensification were identified (Appendix 3).

In The Gambia, in the Tanbi (Lamin area), shellfish complementary activities involving improved oyster farms, mangrove natural regeneration, fishponds, mangrove restoration, agricultural intensification, and tree planting around buffer zones were delineated. In Bullock, delineated areas included buffer areas for tree planting, tree nursery sites undergoing restoration, natural regeneration, and a site with large salt extraction activities (Appendix 4).

ICRAF produced a detailed technical report (Carsan, et. al., 2023) that can be accessed online from the USAID website at https://pdf.usaid.gov/pdf_docs/PA0214GR.pdf.

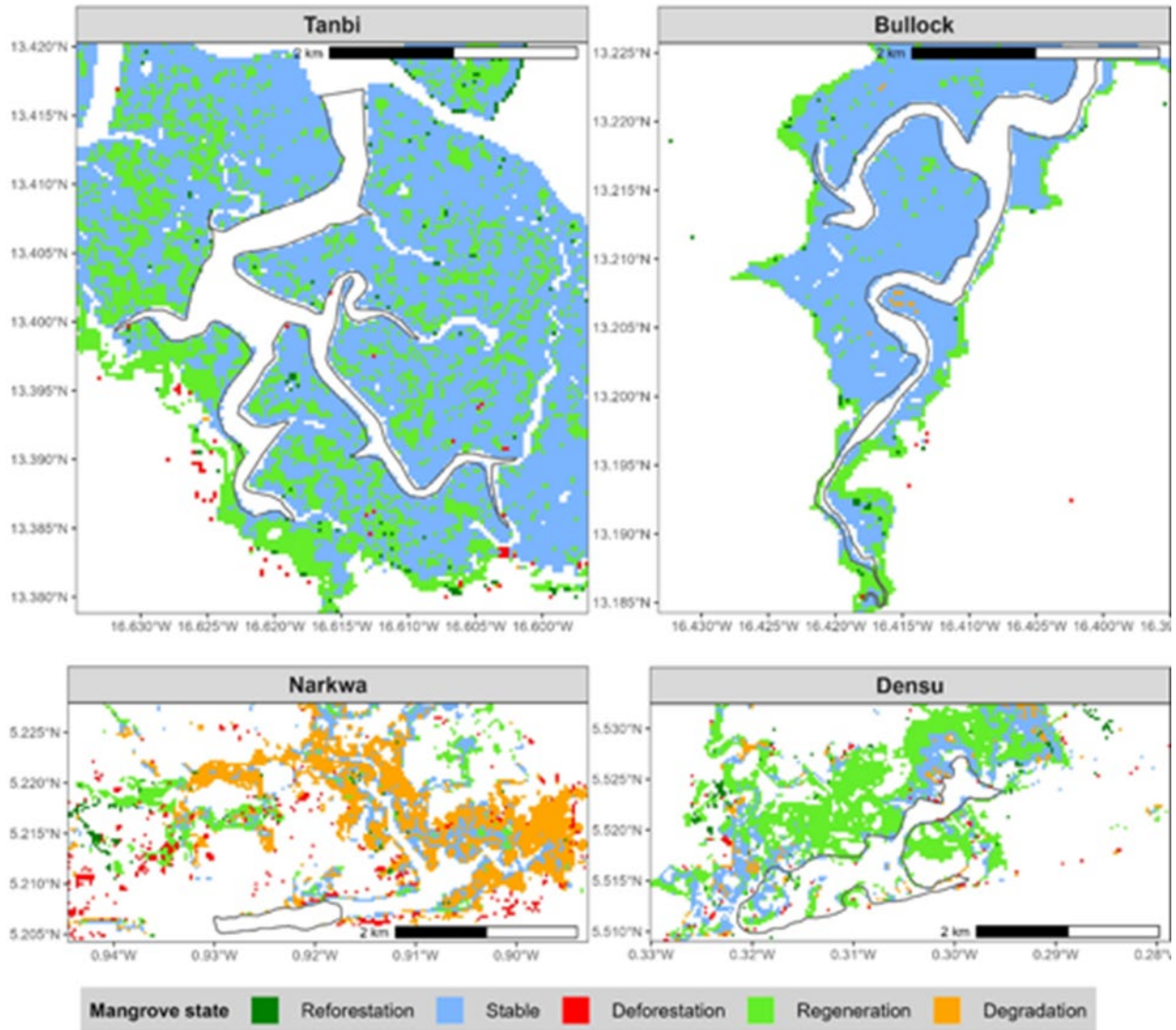


Figure 27: Mangrove status in the study areas.

The maps are being used directly by Activity implementing partners at the four sites to support stakeholder engagement in restoration and conservation activities; plan mangrove planting; monitor natural regeneration by supporting data collection; and as a tool for developing and implementing shellfisheries co-management plans. These plans are on-going in the Densu and Tanbi/Lamin, are being developed for the first time for the Narkwa and Bullock sites and will be integrated into the mangrove ecosystem management planning.

2.4.1.3 Training and Learning Sessions on Mangrove Restoration Best Practice in Densu and Lamin

ICRAF, DAA, and UCC conducted a training workshop on best practices for mangrove restoration targeting different stakeholders including members of the Densu Oyster Pickers Association (DOPA), the “Atidza” (brush park) fishermen group, Traditional Authorities, the Wildlife Division of the Forestry Commission (Ramsar site management), and the Zonal office of the Fisheries Commission. The

training was held on May 9, 2023, at the DFTC in the Densu. All major stakeholders were represented at the workshop involving 41 participants except the Weija Dam management and District Assembly.



Figure 28: Training session for DOPA and Atidza fishermen in the Densu (left) and community mangrove planting work in Bullock (right).

The objectives of the training were to: (1) share learnings on mangrove restoration best practices including practical demonstrations; (2) share ideas on mangrove restoration; and (3) document and share lessons, constraints, and opportunities in mangrove restoration and management. Six training modules were developed and delivered during the workshop which covered the following topics:

1. Understanding the characteristics of the restoration area to inform restoration choices/methods;
2. Identification of appropriate planting sites, zoning and preparation;
3. Germplasm/planting material propagation;
4. Mangrove planting;
5. Management after planting including potential constraints and alleviation measures, and;
6. Institutional arrangements for sustainable mangrove restoration and conservation.

As a result of this training, technical skills on mangrove germplasm sourcing, nursery management, planting, survival assessments, and protection from flooding have been highlighted. DOPA will adopt nursery calendars to schedule mangrove nursery work, planting, and survival assessments considering past losses of planted mangrove saplings due to flooding events associated with water releases from the Weija dam every rainy season. ICRAF received important feedback to improve on survival monitoring, and simple tools were prepared and shared with DAA who are leading the planting of red mangroves (*Rhizophora mangle*) with Activity assistance. Subsequent training and backstopping activities will focus on sensitizing DAA and DOPA members on planting zonation, mangrove species diversification, and monitoring. It will include other resource users (such as the Atidza brush park fishermen) to contribute to restoration and conservation efforts.

Discussions with mangrove resource users, made clear that there is interest in planting white mangroves (*Laguncularia racemose*) and black mangroves (*Avicennia germinans*). Specifically, the group expressed interest to plant white mangroves to harvest branches for the brush park fishing method

that is extensive in the Densu Delta. To ensure mangrove resource sustainability, the group plans to implement a five-year mangrove harvesting rotation plan. Illustration of the brush park activities and the white mangrove and red mangrove types are shown in Figure 30. The "Atidza" fishermen also piloted and are scaling up other sources of branches for brush parks, including neem that they purchased and transported in large quantities to the Densu Delta this year (Figure 29).



Figure 29: Neem branches transported to Densu for brush park fishing.



Figure 30: Counterclockwise: White, red mangroves and fish traps using mangrove branches within the Densu Delta.

2.4.1.4 One-day Training on Mangrove Nursery Establishment at Densu

Mangrove replanting is one of the main activities for the Densu site. To equip DOPA members with the requisite knowledge and skills on this activity, DAA organized a one-day training for 40 DOPA members (85 percent women) in February 2023 at Tsokomey with a mangrove expert. The objectives of the training were:

- To train participants on mangroves nursery establishment;
- To educate participants on the importance of mangroves in our environment.

The training was in theory and practical sessions. The theoretical aspect outlined the importance, threats, conservation needs, and nursery establishment for mangroves. The practical aspect dealt with the actual nursery establishment in the field. The facilitator guided participants in the filling and arrangement of polypots, methods for nursing the mangrove propagules in polypots, and best culture practices in the nursery.

2.4.1.5 Transplanting Mangrove Seedlings at Densu

A total of 4,800 mangrove seedlings were nursed. After two months and eight days—from February 9 to April 17, 2023—a total of 4500 seedlings were transplanted on three sites covering 12.4 hectares of land on April 17 and 18, 2023 by 143 DOPA members (Figures 31, 32, and 33).



Figure 31: DOPA members watering the mangrove nursery.



Figure 32: Planting mangrove seedlings in the Densu (April 2023).

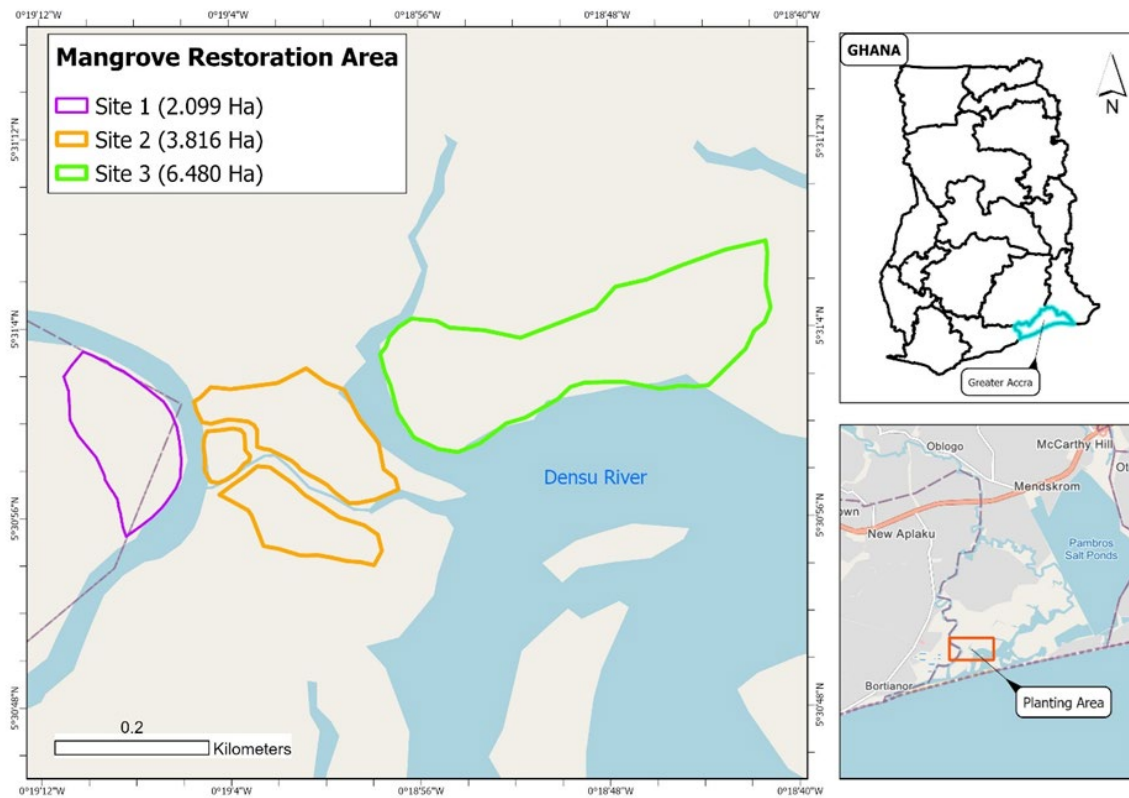


Figure 33: Mangroves restoration area for 2023.

2.4.1.6 Visit to Mangrove Planting Sites

A field visit to mangrove planting sites at the Densu Delta and a “*durbar*” (community meeting) was organized on September 25, 2023. The main objective of the visit was to see how the mangroves planted are performing and to appreciate the role of DOPA in the restoration of mangroves in the Densu Delta. The *durbar* created a platform for both DOPA and stakeholders to discuss observations made during the field visit and share ideas on how to improve future mangrove restoration actions and related issues. Stakeholders from the Fisheries Commission, the traditional authorities, ICRAF and UCC were present.

As shown in the figures below, some of the mangroves planted by DOPA during the USAID/SFMP project were thriving and had oysters attached to the roots, demonstrating that improved mangrove habitat improves oyster habitat (a key hypothesis in our theory of change). Mangrove seedlings planted in April 2023 were observed to be surviving. UCC will conduct a more detailed review of the planted mangrove success, including a biodiversity assessment in these areas, in FY24.

An issue raised by one of the participants was the encroachment of the land adjacent to the estuary by people for development such as housing. It was discovered that the part of the land being encroached belongs to another community (Aplaku), which falls between Bortianor and Tetegu. After deliberations among the stakeholders, it was concluded that, going forward, Aplaku should be included in any stakeholder engagement with regards to the Densu Delta.

Some DOPA members also raised concerns about the timing of the oyster closed and open seasons. According to them, the open season usually coincides with Weija dam spillage which sometimes does not allow them to harvest oysters. They asked UCC to provide scientific inputs that they may use to possibly reconsider the open season timing. A total of 159 participants were present.



Figure 34: Participants on a field visit (September 2023) to observe results and discuss lessons learned from planted mangrove areas in the Densu.



Figure 35: Mangroves planted during the USAID SFMP project circa 2016-18 (left) with oysters visible on the prop roots, and middle showing height of mangroves after several years of growth. Mangrove seedlings planted in April 2023 (right).

2.4.2. Develop Mangrove Community Management Plans

2.4.2.1 Mangrove Stakeholder Mapping and Engagement Workshops (1 per site)

Site level stakeholder meetings were conducted in Ghana and The Gambia to: (1) raise awareness of the Activity, and (2) assess stakeholder types with interest and influence on the Activity goal of conservation and restoration of mangrove and estuarine ecosystems. Stakeholder types were evaluated as either ‘internal’ or ‘external’ to the community with regard to mangrove forests and mangrove oyster fisheries resource management.

In Ghana, stakeholder forums conducted in the Densu on January 26, 2023, identified stakeholder types as shown in Table 6.

Table 6: Internal and external stakeholder types identified in Densu and Narkwa relevant for mangrove ecosystems development.

External Stakeholder Types	Internal Stakeholder Types
Forest Commission	DOPA
Fisheries Commission	Chiefs
Weija water company	Co-management committee
UCC and UG	Assembly person
Municipal Assembly	Chief fishermen
USAID	Fish processors
TRY Oyster Women’s Association	Village Elders/Traditional leaders (Sakumo Family Elders)
Line Ministries: Ministry of Fisheries and Aquaculture Development (MOFAD), Ministry of Food and Agriculture (MOFA)	

External Stakeholder Types	Internal Stakeholder Types
Local NGO's e.g., DAA, AROCHA, Tropenbos	
International NGOs e.g., ICRAF, IUCN, University of Rhode Island	

In The Gambia, assessments on stakeholder types relevant for the Activity implementation revealed a combination of local resource users, other actors, and government officials. Discussions on stakeholder types undertaking various roles has helped Activity implementers improve stakeholder engagement processes, particularly for developing co-management and capacity building activities. Further, these engagements are expected to help the Activity gain “buy in” from different stakeholders throughout the Activity implementation process. Internal and external stakeholders that play a key role in the management of the communities’ natural resources are identified in Table 7.

Discussions with the communities in Bulock and Lamin confirmed the various benefits obtained from the mangroves and interest in additional livelihood activities such as vegetable gardening and nursery production.

Table 7: Internal and external stakeholder types identified in Bulock and Lamin, The Gambia relevant for mangrove ecosystems development.

External Stakeholder Types	Internal Stakeholder Types
Government ministries – Fisheries, Agriculture, Environment and Climate Change, Forestry, etc.	Resource user groups such as shellfishing groups, fishermen e.g., Bullock Gulloya Association, Bullock Kapogha Youth Development Association, Santaba Youth for Advanced Development Farmers, wood collectors
Government departments – fisheries, forestry, parks and wildlife	Village Development Committee
NGOs such as Red Cross and WAPSA	Community Forests Associations
Tourist guides and birdwatchers	Alkalo (traditional chiefs)

2.4.2.2 Community Action Plans on mangrove restoration

ICRAF conducted Community Action Plan (CAP) forums in the four Activity sites. In January 2023, activities were implemented following three objectives: (1) to appraise priority challenges and solutions on implementing mangrove conservation, restoration, and food security improvements; (2) to develop community owned action plans to further improve shellfisheries, mangrove ecosystems, and food

security, and; (3) to conduct participatory mapping of Activity sites and activities of influence. The activity brought together 119 participants (Table 8)—drawn from different interest and resource use groups—who were engaged in the process to also reflect on the LULC changes in their landscapes and develop a land use plan.

Table 8: Participants during the CAP process in the four sites.

Site	Male	Female	Total
Bullock	11	34	45
Tanbi (Lamin)	5	17	22
Densu	5	19	24
Narkwa	2	26	28
No. of Participants	23	96	119

The CAPs have helped align proposed mangrove co-management activities with community aspirations and timing. Broadly, proposed CAPs have identified community owned activities to be implemented, desired outcomes, indicators, responsible actors, and resources needed to achieve the outcomes. All Activity partners and other stakeholders were identified as crucial in continuously supporting the communities to achieve the set objectives. As an example, CAPs developed through participatory focus group discussion activities for Narkwa and Bullock are shown in Figure 36 and Appendix 5 and 6.



Figure 36: Community Action Plan preparation sessions with women shellfishers groups in Ghana and The Gambia.

As a result of this activity, consensus on activity implementation is being achieved quicker as Activity beneficiaries evaluate challenges and opportunities more closely. Once fully prepared, CAPs are expected to serve as a 'blueprint' to organize and implement local mangrove and oyster fisheries restoration and conservation work. Detailed site level CAP reports will be prepared in the first quarter of FY24.

2.4.3 Review Mangrove and Forestry Co-management Plans in Ghana and The Gambia

Reviews of mangrove and forestry co-managements plans are underway and will be completed in quarter one of FY24.

2.5 Landscape Food Production Systems

2.5.1. Implement Portfolios Developed in Phase 1

2.5.1.1 Stakeholder Meetings and Workshops on Adoption and Dissemination of Food Portfolios

ICRAF conducted women shellfishers community group meetings to appraise food types commonly consumed by communities to support nutrition and fill hunger gaps. Findings— assembled from site level assessments—were presented to communities using posters during feedback sessions. An example listing of local food commodities identified by communities in The Gambia is shown in Table 9. Food items such as rice, yams, and cocoyam were not cultivated locally but are widely consumed.

Table 9: Example listing of local food commodities commonly consumed.

Staple Crops	Vegetable Crops	Fruit Crops	Seafood	Meat
Cassava	Eggplant	Mango	Tilapia	Chicken
Maize	Tomatoes	Banana	Anchovy	Beef
Beans	Okra	Orange	Catfish	Goat meat
Sweet potatoes	Pepper	Coconut	Seabream	Pork
	Capsicum	Pawpaw	Snappers	
	Spinach	Guava	Barracuda	
	Cabbage	Soursop	Tuna	
	Lettuce	Custard Apple	Sardines	
	Onion	Watermelon	Mackeral	
	Carrot	Sugarcane	Sea snails	
		Palm Tree	Crab	
		Plantain	Shrimp	
			Oysters	
			Periwinkle	
			Octopus/ Squid	
			Lobster	

2.5.1.2 Tree Nursery Recruitment and Germplasm Support With Diverse Food and Non-food Plants

As part of tree nursery recruitment and germplasm support, ICRAF conducted a rapid assessment of nursery sites adjacent to the estuaries and lagoons in Tanbi and Bulock on November 3-4, 2022, using a simple interview tool. The objectives were to: (1) identify farmer groups/individuals dealing with tree nursery enterprises and seedling production in the two sites, and (2) assess the status of nursery production including agronomic practices, seed sourcing, collection, procurement, marketing, and challenges encountered in the seed system. Some of the parameters considered were the nursery location, size of the nursery, ownership, years of operation, common species, source of planting materials, inputs used, challenges, and sales volume. The assessment established that the tree nurseries are operating at small scales, have inadequate water supply, have limited enterprise development orientation, and need technical support on seed sourcing and business training to improve their performance. Around the Narkwa Activity site in Ghana, there were no community nurseries close by to support proposed tree planting for food and non-food objectives. Nurseries operating outside the communities have been relied on to source planting materials for the food and non-food portfolio demonstrations in Narkwa.

2.5.1.3 Establishment of Food and Non-food Portfolio Demonstration Sites

An objective of the landscape food production systems dimension of the Activity is to diversify the nutritional and income needs of shellfishers through: (1) installation of customized food tree, crop portfolio; and non-food portfolio (wood fuel etc.) demonstration sites; and (2) natural regeneration of a diversity of preferred species that were identified in phase one of the Activity and further validated through community engagement in the current phase of the Activity.

In Ghana, ICRAF discussed preferred food and non-food tree and crop portfolios with the Narkwa women shellfisher group during a training on food portfolio adoption and dissemination in March 2023. Twenty-two (18 women and 4 men) participants volunteered to plant food portfolio demonstration gardens on their land. Fifteen plots (13 food crop-tree crop, 2 non-food) were subsequently demarcated, pegged, and planted in June and July 2023, as these are the critical months of the main growing season with adequate soil moisture to facilitate plant growth. The remaining seven demonstration plots belonged to participants whose lands were not typical farmlands, i.e., home compounds and undeveloped building plots. These were provided with a few seedlings to plant. Advice on maintenance—including fencing to avoid browsing by stray livestock—was provided for such participants.

A total of 1,150 preferred tree species seedlings, comprising 57 percent of food (coconut, mango, xylopia) and 43 percent of non-food trees (*Cassia siamea*), and 53 kg of maize seeds were acquired and distributed for establishment of the food and non-food demonstration plots (Figure 37). Maize seeds were supplied by the Activity while the farmers provided cassava sticks for planting (Figure 37). Plans to integrate pawpaw and waterleaf (*Talinum triangulare*) locally called bokoboko to enrich

particularly women's fields with fruits and green leafy nutritive vegetables did not materialize because seeds/seedlings were not readily available. Efforts will be made to acquire them for integration whenever available. Five hundred cassia seedlings acquired were planted for the non-food option for fuelwood production, 340 seedlings and 160 seedlings were line pegged and planted on a farmer's field and on Genesis Educational School Complex compound at Narkwa. The school head teacher (not part of original participatory validation and planning activity) expressed interest in planting a woodlot on the school premises to provide shade, wood, and to serve as wind break.

Initial data on growth parameters, height, and collar diameter of seedlings planted were recorded at the time of planting to help in monitoring performance of tree species planted. Survival of tree species was over 90 percent after a month of planting for those established in June 2023. There is no agricultural and forestry extension service office at Narkwa and its environs, hence, ICRAF provided some field maintenance training during a visit in July. One of the participating shellfishers was recruited to assist in periodic monitoring of the fields.

Overall, the installation of the food and non-food demonstration plots was successful. The main challenge was the initial land preparation to ensure fields were ready for planting, while heavy rain during the establishment period was also hazardous.



Figure 37: Distribution of seedlings to participating community members, and a participating woman shellfisher planting a mango seedling in Narkwa, Ghana.

In The Gambia, the communities evaluated food types (fruits, vegetables, staples/cereals, legumes, and oils) that they either plant or consume. Following this work, several food and non-food perennials were identified for planting at the landing sites, public places such as schools, community prayer grounds, and individual backyards, particularly by the women shellfishers. Planting is ongoing and the following species have emerged as the communities' preference: mango, orange, mahogany, detarium, lemon, gmelina, moringa, and bamboo. The bamboo is of particular interest to the women shellfishers in both Bullock and Lamin, as they can potentially be used as poles for oyster farming.

2.5.1.4 Training on Home Gardening Techniques for Diverse Food Supply

These training events are underway in September 2023 in Ghana and The Gambia and further reporting will be provided in FY24. The emphasis on this activity is to show the range of food available in the local food systems (to complement staple foods) and how combinations involving perennials can help close food and nutrition shortages, including for seasonal oyster-based diets. The food portfolio assessment survey already conducted in Phase I has formed an important reference point. Following community requests, efforts now include demonstrations of nutritious recipe combinations or improvements on staple based diets using perennials.

2.6 Objective 1 Baseline Data

As per the monitoring and evaluation plan for Activity Objective 1, the following baseline data was documented in FY23.

Table 10: Baseline data collection and other related activities.

Type of Data/Activities	Year		
	2023	2024	2025
Mangroves			
Number of mangrove seedlings planted per year (Densu only)	4,500	×	×
Hectares under mangrove planting and/or management (conservation) (Densu only)	12.4	×	×
Hectarage of the overall area of Activity influence in the first year (boundaries mapping)	3,600		
Percent of mangrove cover change - baseline to endline	2021 report as baseline		×
Annual survival rate		×	×
Hectarage under sustainable mangroves harvesting	0	×	×
Shellfishery			
Catch per unit of effort ¹	See Figure 20	×	×
Biodiversity and shellfish recruitment in replanted areas (Densu only)**	TBD in FY24 Q1	×	×
Stakeholder empowerment* (Stakeholder Empowerment Score; SES) (see Section 2.6.1.)	Ghana: 8.03 ±2.40 Gambia: 9.81 ±2.20		×
Household food production systems** (Household Food Diversity Score)	Ghana: 1.97 ±1.16 Gambia: 2.79 ±1.55		×
Human well being			
Socioeconomics - Individual/household survey *,**	See Tables 14-16		×
Knowledge, Attitudes and Practice (KAP) of resource users – individual** (KAP Score)	Ghana: 18.04 ±3.80 Gambia: 18.87 ±3.49		×

Type of Data/Activities	Year		
	2023	2024	2025
Nutrition (MDD-W of WRA) individual*	Adu-Afarwuah et al. 2022 as baseline		×

* - collected in Phase 1, ** - new variables to be collected in Phase II, *** - includes both some old and new variables., ¹ - new method of collection in Phase II.

2.6.1 Socio-economic Baseline Survey

Surveys were deployed to collect socio-economic baseline data through one-on-one interviews by field staff beginning in March 2023. The survey questionnaire was designed to collect information on shellfish and mangrove resource use; household structure; household food systems; income including the proportion coming from natural resource use activities; stakeholder empowerment; and knowledge, attitudes, and practices (KAP) relating to natural resource management. The survey aimed to gather baseline data mainly from shellfishers, though also recorded information on mangrove resource use. Survey interviews were completed in shellfishing villages around Bulock and the Lamin area of the Tanbi in The Gambia, and around Densu and in Narkwa in Ghana. For each site, Table 11 shows the target sample size and final participant sample size based on resource user type. The majority of participants (87 percent) were women.

Table 11: Socio-economic baseline survey target and final sample sizes. (* = target sample size for participants using shellfish resources at each site).

Country	Site	Resource Use		
The Gambia	Bulock (*37)	Shellfish	no	8
			yes	37
		Mangrove	no	45
			yes	0
	Tanbi (*33)	Shellfish	no	2
			yes	33
		Mangrove	no	33
			yes	2
Ghana	Densu (*92)	Shellfish	no	14
			yes	91
		Mangrove	no	93
			yes	12
	Narkwa (*46)	Shellfish	no	3
			yes	46
		Mangrove	no	49
			yes	0
Shellfisher Target				208

Shellfisher Sample	207
Total Sample	234

The survey measured stakeholder empowerment as a composite score (Stakeholder Empowerment Score; SES) based on responses to questions covering the following areas: decision making on shellfishing; access to and decision making of assets and credit; control over use of income; group membership; and workload from shellfishing/mangrove harvesting. The maximum SES that could be achieved is a score of 16. An important caveat to this result is that shellfish co-management planning meetings had already begun in Bullock at the time of socio-economic survey data collection, meaning that the 2023 SES data does not convey a true pre-activity baseline. However, data will still be informative as a comparison for 2025 post-activity socio-economic survey results. The survey showed participants from The Gambia have a mean 2023 SES of 9.81 ± 2.20 , while participants from Ghana have a mean 2023 SES of 8.03 ± 2.40 (see Table 12 and Figure 38).

Table 12: Stakeholder Empowerment Scores (SES) of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Stakeholder Empowerment Score (SES)		
country	mean	sd
The Gambia	9.808219	2.19632
Ghana	8.028169	2.39664

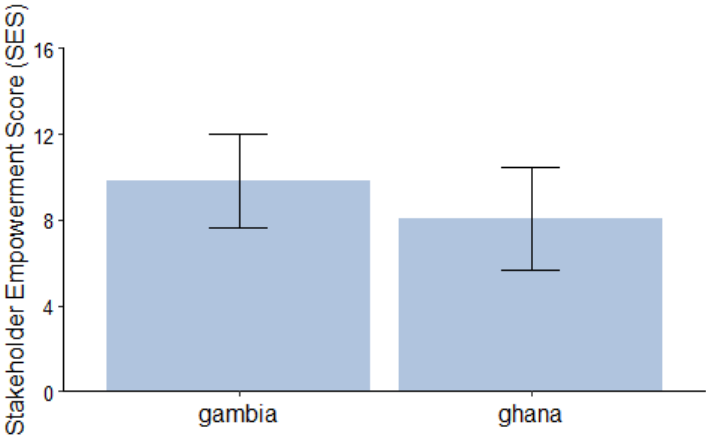


Figure 38: Mean Stakeholder Empowerment Scores (SES) of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey). Maximum achievable score is 16. Error bars show standard deviation.

The 2023 socio-economic survey introduced a composite household food diversity score as a new variable. The definition of a household is complex in both The Gambia and Ghana – it was decided based on expertise from TRY and DAA office staff members that a household should be defined as those individuals who make and share meals together. The score measured participation in seven different household food production activities, with scores ranging from 0-7 (see Table 13 and Figure 39 for results by country). Figure 40 shows household food portfolios as the breakdown of household participation in each of the seven food production activities.

Table 13: Household food diversity scores of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Household Food Diversity Score		
country	mean	sd
The Gambia	2.794872	1.548849
Ghana	1.966667	1.16098

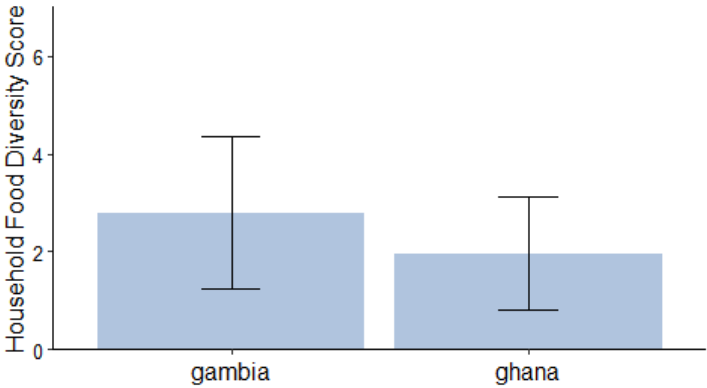


Figure 39: Mean household food diversity scores of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey). Maximum achievable score is 7. Error bars show standard deviation.

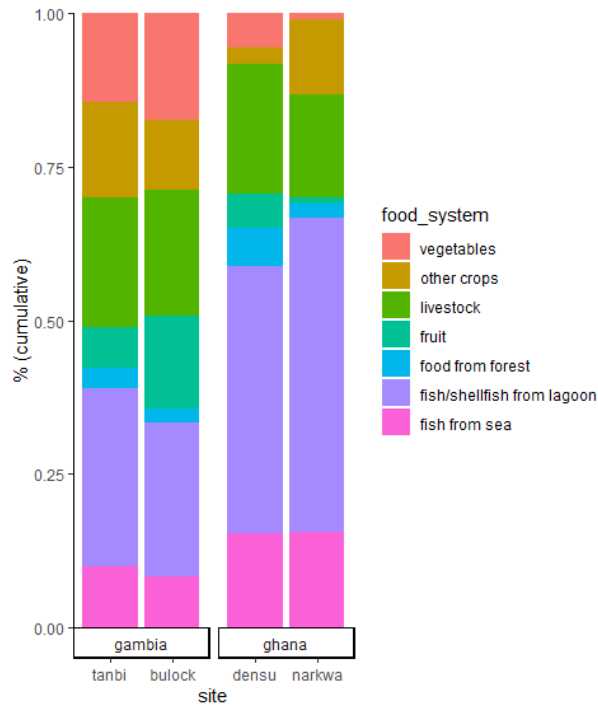


Figure 40: Household food portfolios of shellfish and mangrove resource users in Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Total household incomes of 2023 survey participants were measured on a six-point ordinal scale and was articulated as total weekly income of all members of one’s household (Table 14). Total household income made from shellfishing activities (harvesting, processing, selling, etc.) was assessed using a three-part question that measured: 1) average revenue earned by the household from a typical day of shellfishing activity; 2) average daily costs required to complete these activities; and 3) average number of days per week that the household participates in shellfishing activities. Costs were then subtracted from revenues (see Table 15) and the remainder was multiplied by average days per week spent shellfishing to produce mean weekly shellfishing income for shellfishing households in Activity sites in The Gambia and Ghana in 2023 (Table 16). In all cases, monetary amounts were expressed and recorded in local currency, and then converted to USD for comparative analysis. Both shellfishing activity revenues and costs were highly variable in The Gambia and in Ghana, leading to high standard deviations shown in Table 15 and 16.

Table 14: Mean total weekly household income of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Total Household Income (weekly)		
country	mean*	sd
The Gambia	2.564103	1.168746
Ghana	2.856164	1.19764

*ordinal scale: 1 = 0 - 50 Cedis/0-500 Dalasi; 2 = 51-100 Cedis/501-1000 Dalasi; 3 = 101 - 250 Cedis/1001-2500 Dalasi; 4 = 251- 500 Cedis/2501-5000 Dalasi; 5 = 501 - 2000 Cedis/5001-20000 Dalasi; 6 = >2000 Cedis/>20000 Dalasi

Table 15: Revenue, costs, and income (revenue – costs) coming from a typical day of shellfishing activities in Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Shellfishing Income (USD) (daily)			
country	variable	mean (USD)	sd
Gambia	revenue	14.841993	14.910948
Gambia	costs	1.690148	1.201606
Gambia	income	13.151845	14.651232
Ghana	revenue	5.509212	4.259758
Ghana	costs	3.346707	2.254293
Ghana	income	3.424188	3.09943

*outliers removed

Table 16: Typical levels of weekly shellfishing activity and associated income for shellfishing households in Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

country	Shellfishing Activity (days per week)		Weekly Shellfishing Income (USD)	
	mean	sd	mean	sd
The Gambia	5.172414	1.390922	67.105747	81.83329
Ghana	3.07563	1.397089	8.888559	13.17302

*outliers removed

The 2023 socio-economic survey introduced a second, new composite variable designed to measure an individual’s knowledge, attitude, and practices (KAP) regarding shellfish and mangrove co-management. KAP scores are informed by survey questions on awareness of and compliance with management regulations, and a series of belief statements regarding the impact of various environmental conditions or interventions (e.g., “Having a closed season no harvest period for shellfish helps provide more and bigger oysters during open seasons.”). The maximum KAP score that could be achieved is a score of 22. The survey showed participants from The Gambia have a mean 2023 KAP score of 18.87 ± 3.49 , while participants from Ghana have a mean 2023 KAP score of 18.04 ± 3.80 (see Table 17 and Figure 41).

Table 17: Knowledge, Attitudes, and Practices (KAP) scores of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey).

Knowledge, Attitudes, and Practices (KAP) Scores		
country	mean	sd
The Gambia	18.86567	3.485448
Ghana	18.04396	3.800328

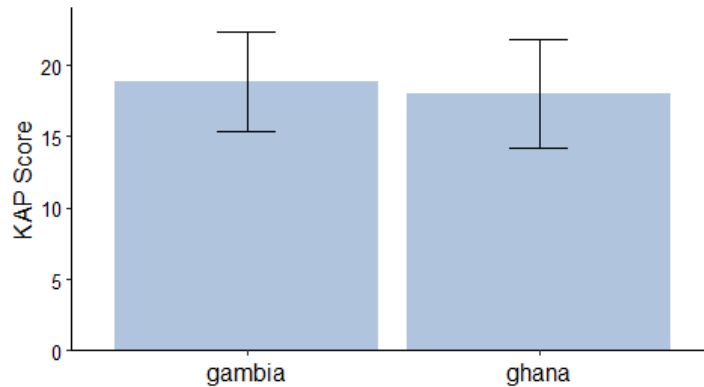


Figure 41: Knowledge, Attitudes, and Practices (KAP) scores of shellfish and mangrove resource users from Activity sites in The Gambia and Ghana (data from 2023 socio-economic survey). Maximum achievable score is 22. Error bars show standard deviation.

2.7 Objective 1 Challenges and Lessons Learned

2.7.1 Challenges

Stakeholder engagement for shellfisheries co-management, mangrove ecosystem conservation, and landscape food systems faced the following challenges at both new and established shellfisheries co-management sites in Ghana and The Gambia:

- Limited engagement of local government authorities, such as departments of fisheries, departments of parks and wildlife management, and the Weija Dam Authority during management planning meetings.
- Weak or absent local extension services in fisheries, forestry, and agriculture to provide training, access to inputs, and monitoring, needed to support interventions that are of immediate interest to local communities but are beyond the Activity scope..
- The scale of the ecosystem to be managed and the actors influencing ecosystem resources were often broader and more dynamic than anticipated.
 - In The Gambia at Bullock bolong, the scale required to include all oyster harvesters is well beyond a single community, landing site, and bolong. Harvesting patterns include more than nine communities in the Foni bolongs complex, as well as seasonal migrant harvesters from the Tanbi.
 - In The Gambia, lack of coordination on mangrove restoration initiatives by government, NGOs, and communities is contributing to lack of clarity on stakeholder engagement.
 - In Ghana in the Densu, a community that had not previously been engaged in shellfisheries and mangrove management discussions was found to be encroaching within the boundaries of the Delta during a field day to monitor new mangrove plantings.
 - In the Densu, Weija dam management (water release) has significant impact on oyster harvesting and mangrove restoration activities, but releases prioritize dam integrity, flood risk, and public safety. They are difficult to plan and communicate as precipitation patterns are increasingly more intense and less predictable.
 - Open access systems in established and new co-management sites allow for new entrants and increasing pressure on resources. In The Gambia an influx of school going youths was observed harvesting oysters during school breaks in a destructive manner due to lack of awareness of best practices. In the Densu, unlimited numbers of brush park fishermen are using the space and harvesting mangrove branches.
- The status of some women shellfishers as mothers and wives sometimes makes it difficult for them to fully participate in capacity-building activities that keep them away from home for more than one day.

Sourcing quality and diverse planting materials for food and non-food planting work was challenging. Where nurseries were available, desired seedlings were missing or there were cost limitations to providing large quantities of materials. At the Narkwa site in Ghana, nurseries were entirely missing within community areas. This resulted in high transportation costs to source materials. This was complicated by community requests for a large number of planting materials as free input. Field planting work in Narkwa was hampered by heavy rainfall events at the time of planting work.

The planned study tour of Gambia shellfishers, from Lamin and Bullock, to Senegal for women's empowerment was postponed until FY24 due to seasonal timing to view the most relevant activities and workload scheduling.

The Phase I Technical Report by the University of Ghana and URI entitled, "Dietary Intakes, Food Security, and Anemia Prevalence Among Women Shellfishers in Selected Estuary Sites in Ghana and The Gambia", had to be revised to change, by an order of magnitude, the units on the concentrations of some minerals and heavy metals from oyster meat in Ghana due to a transcription error. Findings on concentrations of heavy metals were significantly reduced and fell below standard thresholds of concern to human health. The updated version is posted online at the same link as the original 2022 document at: https://pdf.usaid.gov/pdf_docs/PA00ZMNC.pdf. The University of Ghana/URI technical team, in collaboration with the USAID Feed the Future Innovation Lab for Fish that partially funded this work, produced a Brief Report disseminated to stakeholders in Ghana and USAID, and hosted a webinar discussion on October 10, 2023.

2.7.2 Lessons Learned

The four strategic approaches, curated and applied as designed using the Toolkit and associated tools at the four Activity sites, appear to be both robust and flexible enough to accommodate the complexity of situations that arise across sites with differing socio-economic, political, and environmental contexts. Integrating implementation of the approaches as required to inform the Objective 1 theory of change appears to be feasible based on the FY23 experience.

Stakeholder engagement challenges experienced in the site-based work highlight the relevance of the community-based co-management approach. Integrated implementation of the Activity's planned strategic approaches effectively identified the issues and promotes community-led solutions that provide pathways forward while advocating for government and other external support systems to provide needed services.

It is helpful to factor seasonality in planning field ecology assessments at the mangrove sites as seasonal impacts are complex. The CAP preparation process has emerged as a useful approach/tool to help work more closely with communities in areas of their interest.

The Densu mangrove nursery will be started in October/November 2023 and be out planted in January/February 2024 to take advantage of the dry season. This will allow for planting lower along

the riverbanks—a location that favors establishment of the mangrove seedlings before high water levels threaten their survival, and that better facilitates attachment of oyster spat.

The proposed boundaries of the new co-management plan at the Bullock site in The Gambia are now understood to be broader than Bullock bolong and will cover the Foni bolong complex. The Activity team will support TRY to seek additional resources for outreach to the additional nine shellfishing communities. Due to limited resources, Activity efforts for the planned site-based testing of the four integrated strategic approaches will remain focused on the more limited Bullock bolong area.

3. PROGRESS ON OBJECTIVE 2: West Africa Shellfish Knowledge and Outreach Hub

UCC had a strategic role in leading region-wide research and community engagement during the first two years of the Activity and has an intrinsic mandate and existing capacity to do so as a leading institution in West Africa (and in Africa) on coastal resource management. For these reasons, UCC is well placed to lead Objective 2, the knowledge management, dissemination, and support for the application of findings and best practices in the region on a sustainable basis with the contribution of Activity partners.

3.1 Establish a Regional Network

At an Activity partner meeting, a consensus was reached on a name for a regional shellfish network to be called West Africa Shellfish Network (WASNET). WASNET will be one of the operational arms of the West Africa Shellfish Knowledge and Outreach Hub (Figure 42), to interconnect stakeholders of shellfisheries within the sub-region through social interactive platforms. A manual to guide the operationalization of WASNET was prepared. A draft copy of the document was reviewed by the UCC team and subsequently by the URI team. The document covers the network's operational framework, network structure (Figure 43), stakeholders, implementation, membership, and code of conduct. A process to register the name of the network was initiated at the Registrar General's department in Accra, Ghana.

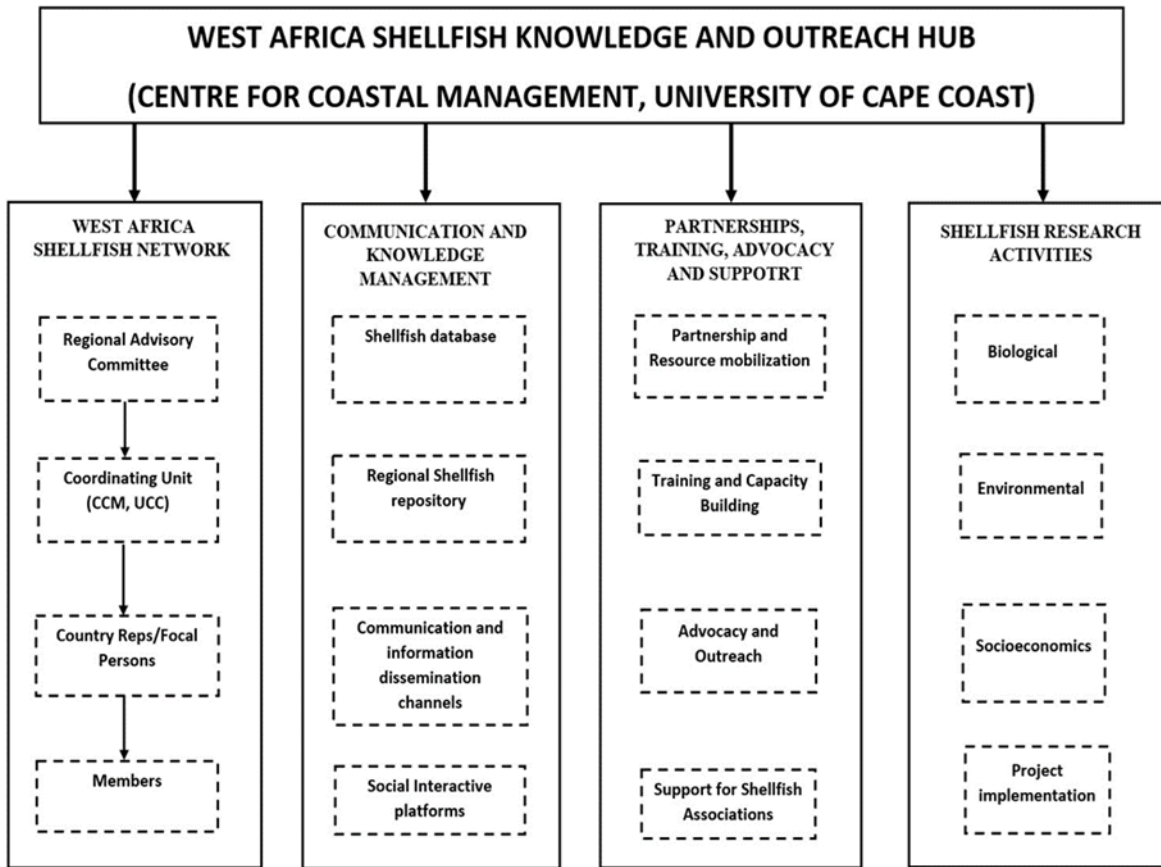


Figure 42: Operational framework of the West Africa Shellfish Knowledge and Outreach Hub.

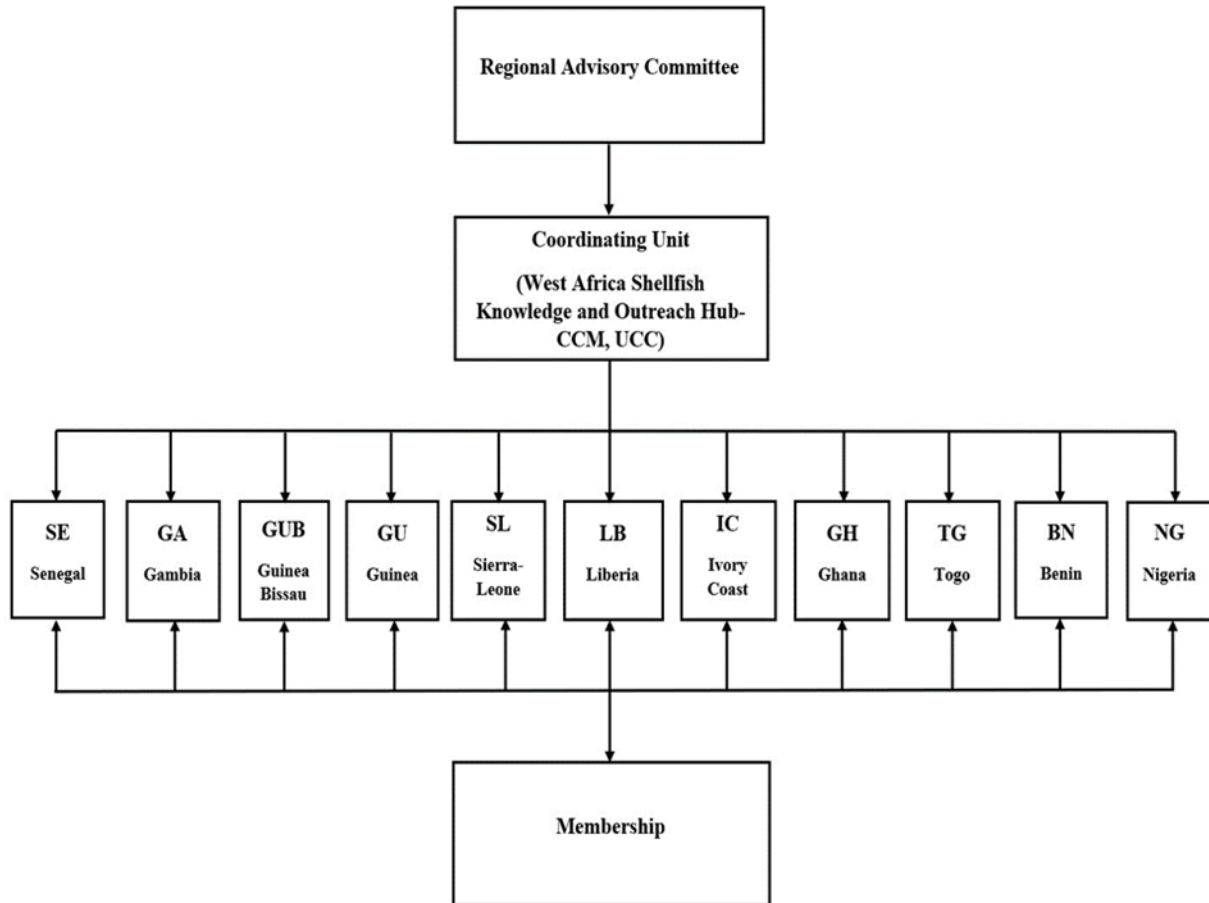


Figure 43: Organogram of the West Africa Shellfish Network.

3.2 Social Media

As part of the strategies to complement the communication and information dissemination effort of the West Africa Shellfish Knowledge and Outreach Hub, UCC developed a comprehensive social media communication plan to guide effective and efficient social media information dissemination and engagement of shellfish stakeholders. The document covers the social media content development strategy, branding (which will be the subject of further discussion with USAID), information update consistency and scheduling, and audience engagement, among others. A draft copy of the plan was reviewed by the URI team, and inputs have been incorporated for the final communication plan document. Social media platforms are being set up on Facebook, LinkedIn, Instagram and Twitter (now known as “X”).

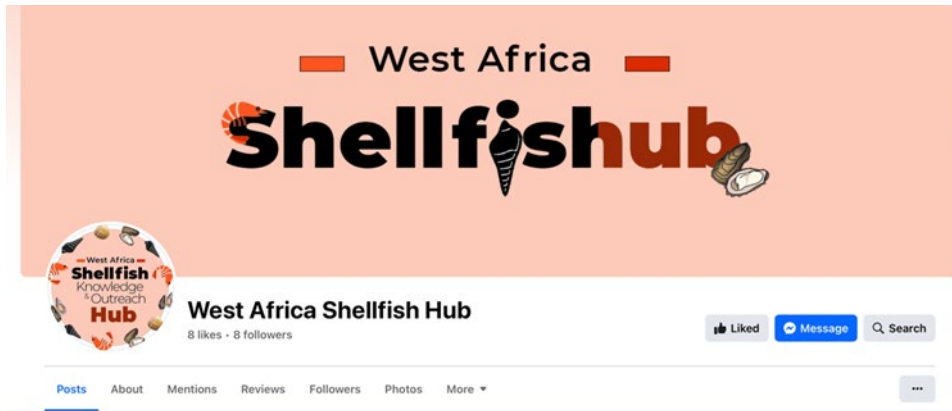


Figure 44: Banner and display image for the Facebook page created for the Shellfish Hub.

3.3 Toolkit Extension

UCC led the dissemination of hard copies of the Shellfishery Co-management Toolkit both within and outside Ghana (Figure 45). Copies of the toolkit were delivered to other Activity partners, officers of government agencies, NGOs, and relevant institutions outside Ghana.



Figure 45: Presentation of copies of the toolkit to ECO-BENIN.

Development of a Shellfish Co-management toolkit booklet in a visual format to facilitate use in the field with shellfishers is also progressing steadily. Initial narrations and illustrations were submitted by a design consultant to the UCC team for input, UCC shared a draft of the illustrations with Activity partners for input (Figure 46), and revisions have been completed. Full coloration of the illustration is underway. UCC has also initiated the process to develop the toolkit into audio-visuals as a one-minute video and a five-minute video. When completed, these will be dubbed into local languages of all eleven focal countries.

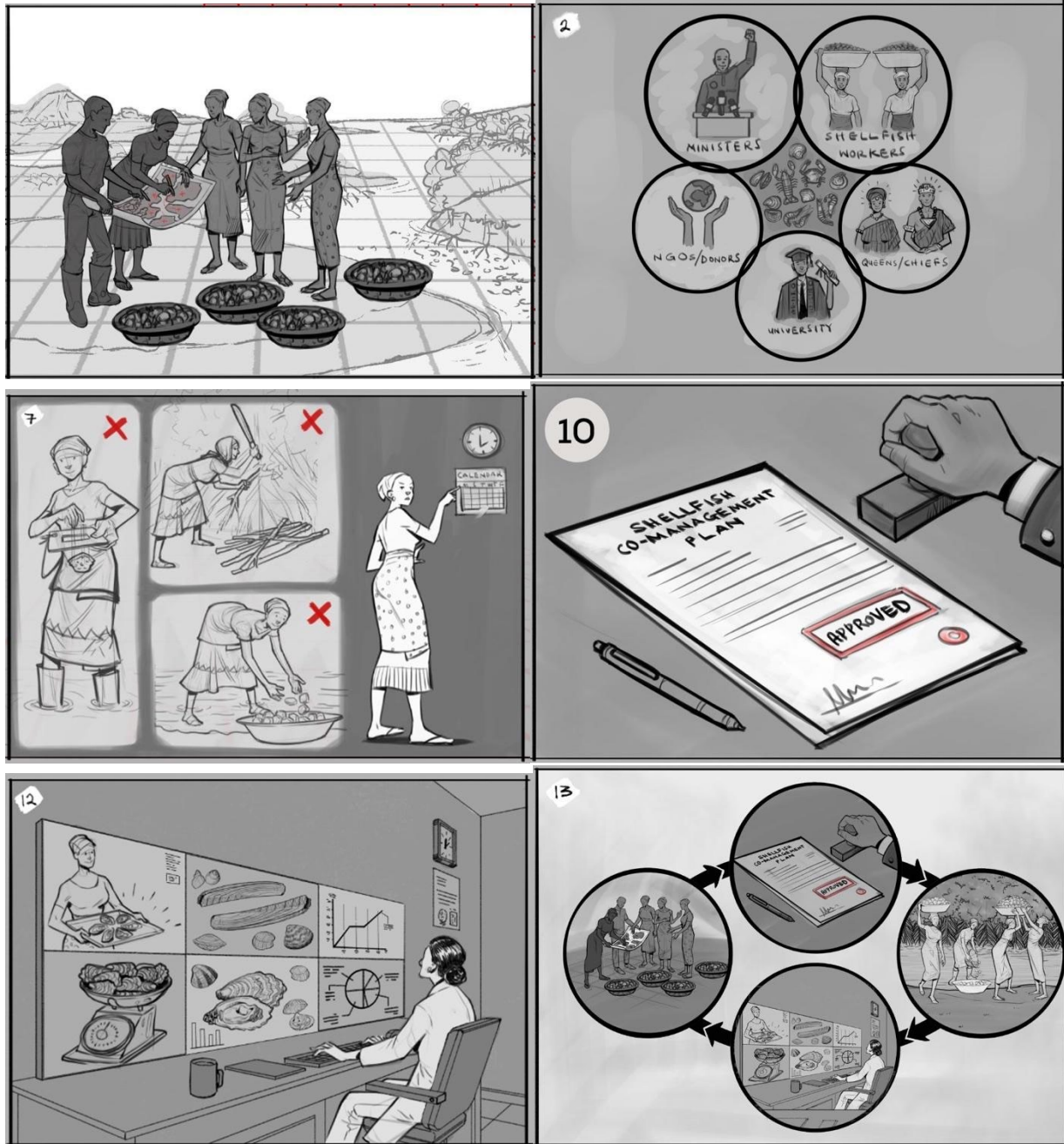


Figure 46: Examples of the revised pencil illustrations completed for the co-management toolkit steps, which are under development into a booklet to be used for community education on oyster co-management.

3.4 Peer to Peer Exchange Visits/Study Tours

In FY23, UCC began planning for the regional peer to peer exchange study tour to take place in FY24. Preliminary ideas focus on inviting women shellfishers from Anglophone West African countries (Nigeria, Ghana, Liberia, and Sierra Leone) to visit The Gambia for the tour due the heterogeneity of

language among the women which might be more complicated by having a mix of participants from Anglophone and Francophone countries. During UCC's visit to The Gambia, this was discussed with TRY, and it was suggested that the tour be scheduled for May 2024 during the oyster season, in order to have the full complement of the Gambian women and active shellfishing activity. These decisions will be discussed with partners input to finalize the plan.

3.5 Web/Data Platform

Development of a web platform for the West Africa Shellfish Knowledge and Outreach Hub led by UCC is well advanced. The web platform is intended to host and make readily accessible all information gathered, particularly on this Activity, as well as other relevant information on shellfisheries in West Africa. Key features on this website will be the "Knowledge" section, which will profile the shellfisheries of individual countries; the "Network" section, which will highlight activities of the WASNET; and the "Associations" section, which will be used to catalogue shellfisher associations in the Region. In this reporting year, UCC engaged two IT specialists for this purpose. UCC developed an initial draft of the interface of the web platform homepage that was reviewed by Activity partners. Following the initial review, UCC conducted an internal reassessment and revision of the platform, leading to the complete overhaul of the design. UCC has completed the mock-up design stage for all components (pages) of the web platform in line with the updated design (Figure 47). The implementation of the designed pages and further discussion with USAID on branding will be done in the first quarter of FY24.

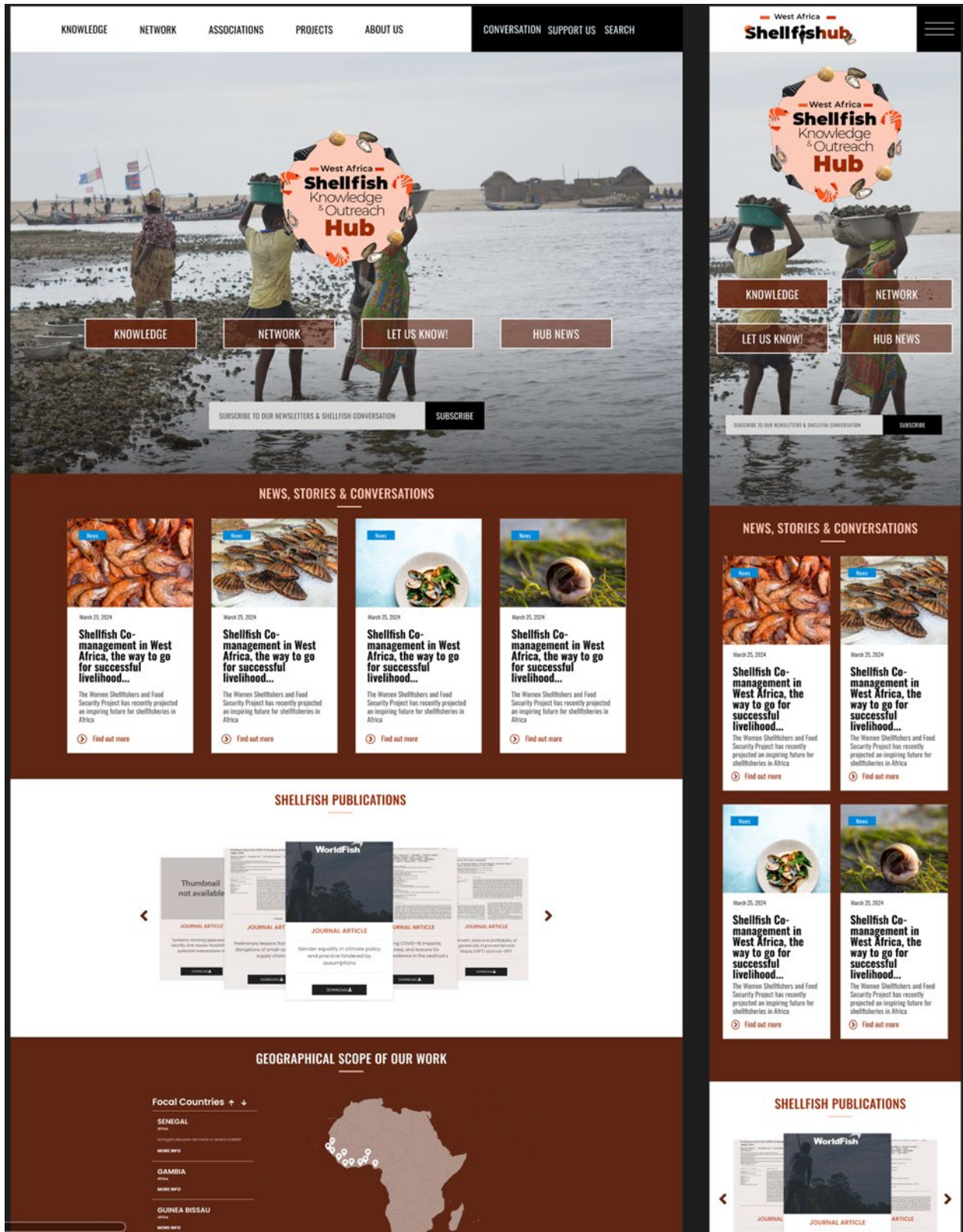


Figure 47: Snippet of the desktop (left) and mobile phone (right) versions of the homepage of the West Africa Shellfish Knowledge and Outreach Hub displaying dummy content.

3.6 Advocacy/Awareness Raising Targeting Regional Institutions

During the year, UCC (represented by the Director of CCM, Prof. Denis Aheto) made a presentation at a regional World Bank and Association of African Universities (AAU) African Centres of Excellence (ACE) Impact forum in Morocco. The presentation highlighted Activity efforts and brought attention to the need for regional efforts in supporting women's livelihoods and conserving shellfisheries (Figure 48). In FY24, UCC will continue to pursue more regional institutions and raise awareness in the sub-region.



Figure 48: Prof. Denis Aheto pitching the WSFS Activity at a World Bank-Association of African Universities regional Africa Centers of Excellence Impact forum in Morocco.

3.7 Regional Webinar for Policymakers

This activity is scheduled for FY25, and UCC will commence preparation in FY24.

3.8 Coordination with Projects in the Sector

In FY23, the Women Shellfishers and Food Security Activity established a quarterly meeting with the FAO Shellfish Project, FISH4ACP—implemented in Senegal and The Gambia—for mutually beneficial project updates and coordination of activities between the two projects.

3.9 Document Linkages to Global Context

This report is anticipated for FY24 as planned.

3.10 Objective 2 Challenges and Lessons Learned

The bureaucratic process at UCC in procurement of a printing vendor delayed the toolkit extension materials development process.

A significant proportion of the effort to establish the West Africa Shellfish Knowledge and Outreach Hub on a strong and sustainable foundation was internal rather than external in FY23. In early FY24 this should shift to a higher intensity of externally focused activity.

3. EXPECTED OUTCOMES AND INDICATORS OF ACHIEVEMENT

The expected Activity results and output and outcome indicators for FY23 have been achieved as detailed in the table below and the accompanying explanation of indicators.

Table 18: Performance Indicator Tracking Table.

Indicator	Base-line	Year 1 (FY 21)			Year 2 (FY22)			Year 3 (FY23)			Year 4 (FY24)			Year 5 (FY25)			Total LOA			Comments
		Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	
Number of research results documented and available (AFR/SD Custom Indicator STIR-1-UAF: Special Studies (Resources for Missions))	0	1	0	0%	6	18	300%	0			0			0			7	18	257%	1 Regional Assessment 10 Country Assessments 6 Technical Reports 1 Multivariate Report No longer reported
Research hypotheses or alternative findings are validated by research results.	0	0			Tracked	Done	100%	0			0			0			Tracked	Done	100%	7/19 relationships tested validated 1/19 relationships tested had limited validation 11/19 relationships tested not validated No longer reported
<i>Number of hectares of biologically significant areas under improved natural resource management as a result of USG assistance (EG. 10.2-2).</i>								0	N/A	N/A	0			3,600			3,600			Target revised from 7,352 at the end of FY23. Ecosystem category: 100% coastal marine. Conservation law category = illegal logging or IUU fishing.
<i>Number of reports</i>								0	N/A	N/A	0			1			1			<i>Objective 1 Assessment of Site</i>

Indicator	Base -line	Year 1 (FY 21)			Year 2 (FY22)			Year 3 (FY23)			Year 4 (FY24)			Year 5 (FY25)			Total LOA			Comments
		Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	
<i>showcasing results and lessons learned (CUST).</i>																				<i>Based Results Report. URI Milestone 11</i>
Number of shellfish and mangrove stakeholders that: Have increased awareness of the basic TOC concepts, Have tools to design interventions to achieve TOC intended outcomes, Are networked regionally, Some identify plans or resources to pursue opportunities for scale up.	0	0			74	67	91%	0			0			0			74	67	91%	40% of 168 workshop participants from 11 countries No longer reported
Number of people trained in sustainable natural resources management and/or biodiversity conservation as a result of USG assistance (EG.10.2-4)	0	0	22 20 F 2 M		74	168 77 F 91 M	227%	260	391	150%	272			160			882	190 97 F 93 M	28%	<i>Phase II Objective 1 site-based work = 500 Phase II Objective 2 Regional Knowledge and Outreach Hub = 192 Revised LOA target = 190 actual Phase I + 692 Phase II</i>
Number of Toolkits produced	0				1	1	100%	0			0			0			1	1	100%	https://pdf.usaid.gov/pdf_docs/PA00ZH_T6.pdf

Indicator	Base-line	Year 1 (FY 21)			Year 2 (FY22)			Year 3 (FY23)			Year 4 (FY24)			Year 5 (FY25)			Total LOA			Comments
		Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	Target	Actual	% of target	
Number of Dissemination Activities	0	0			17+	24	141%	0			0			0			17+	24	141%	-2 Virtual Regional workshops -8 conference/ session presentations -3 peer reviewed journal papers. -10 on-line platforms. -1 set of 170 Toolkit hard copies No longer reported.
Number of institutions receiving capacity development support (AFR/SD Custom Indicator CBLD-9-UAF).	0	0			37	64	173%	0	2	>100 %	5			5			47	64	136%	Phase I 10 Resource user 19 Government 23 Academic/ research 12 NGO/other <i>Phase II = 10 (Objective 1 = 4; Objective 2 = 6)</i>
Number of host country higher education institutions receiving capacity development support with USG assistance (AFR/SD Custom Indicator ES.2-1)	0	0			11	14	127%	1	1	100%	1			1			11	14	127%	From 9 of the 11 West Africa countries. <i>Phase II = UCC (not cumulative)</i>

Note: The five indicators not shaded are those to be reported in Phase II (Years 3-5).

Explanation of Indicators

Number of hectares of biologically significant areas under improved natural resource management as a result of USG assistance (EG. 10.2-2).

The Activity did not plan to and is not reporting on achievements under this indicator in FY23. As planned, the Activity team reviewed and revised the anticipated target for FY25 and LOA following community consultation and assessments in the field. Estimated target hectares are as follows:

Table 19: FY25 and LOA Targets for USAID Standard Indicator EG.10.2-2.

Site Name	Country	Total hectares Target for FY25 and LOA	Ecosystem category: -Terrestrial-freshwater - Coastal-marine	Conservation law compliance category -Wildlife trafficking -Illegal logging and associated trade -IUU fishing	Rationale for “biological significance” of the area
Densu	Ghana	500	Coastal Marine	50 = Illegal logging and associated trade 500 = IUU fishing	Ramsar site
Narkwa	Ghana	400	Coastal Marine	400 = IUU fishing	Coastal Lagoon and mangrove wetland part of the Guinea Current Large Marine Ecosystem (LME)
Lamin	The Gambia	1,300	Coastal Marine	300 = Illegal logging and associated trade 1,300 = IUU fishing	In the Tanbi Wetlands National Park, a RAMSAR site.
Bulock	The Gambia	1,400	Coastal Marine	400 = Illegal logging and associated trade 1,400 = IUU fishing	Gambia River mangrove wetland linked to the Canary Current LME
Total		3,600		750 = Illegal logging and associated trade 3,600 = IUU fishing	

Number of people trained in sustainable natural resources management and/or biodiversity conservation as a result of USG assistance (EG.10.2-4):

The total number of people trained under this indicator for FY23 is shown in Table 20, where it is also disaggregated by sex, conservation law compliance category, and stakeholder group. Per the direction of the PIRS for this indicator, numbers reported in Table 20 exclude duplicate trainees (i.e., individuals who attended multiple trainings in FY23 are only counted once).

Deviation Narrative: The Year 3 (FY23) target for this indicator (EG.10.2-4) was 260 people, while the actual number achieved in FY23 was 150% of this target (391 people). The deviation can be explained by higher than anticipated interest in Activity trainings in general across targeted communities in Ghana and The Gambia, higher than anticipated participation in trainings by local

leadership (Village Development Committee members, Village Chiefs, etc.) in The Gambia, and increased engagement and participation by shellfishers from communities surrounding the Bullock bolong area in The Gambia.

Table 20: Summary for USAID Standard Indicator EG.10.2-4 for FY23, excluding duplicate trainees.

FY23 Annual Summary Number of people trained	Total	391		
	Male: 65	Female: 326		
	Logging: 116	IUU: 151	Other: 124	
	Resource User: 351	Govt.: 8	Academia: 2	Other: 31

Although duplicate trainees are excluded from the annual summary, it is worthwhile – due to the integrated nature of Activity strategic approaches – to note that many people attended multiple Activity trainings in FY23, with 68 people attending four or more training events over the year (Figure 49).

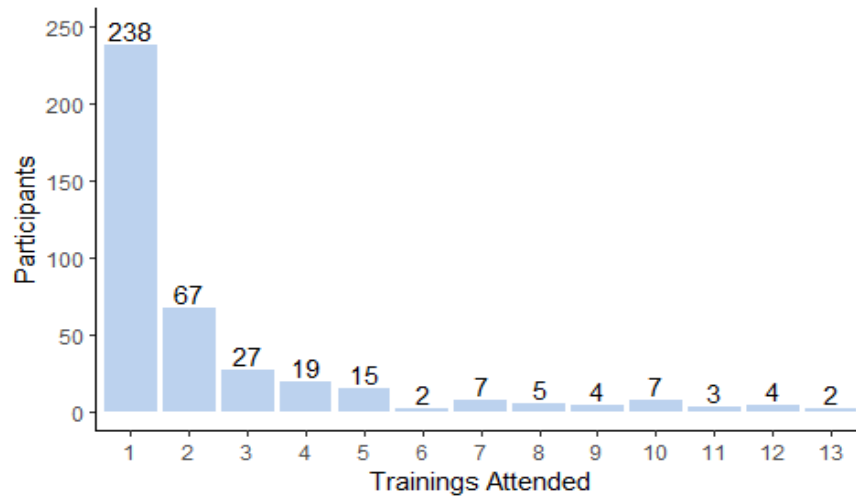


Figure 49: The number of participants attending multiple Activity trainings in FY23, broken down by the number of trainings attended (e.g., 238 participants attended only one training, while two participants attended 13 of the 26 total trainings conducted in FY23).

Table 21: Complete list of training events conducted under the Activity in FY23, including total participants attending, broken down by implementing Partner host, and disaggregated by sex.

	Subject	Dates	Location	No.	M	F
ICRAF						
1	Community Action Plan Development in Bulock	January 17 & August 8, 2023	Bulock The Gambia	45	11	34
2	Community Action Plan Development in Lamin	January 18 & August 19, 2023	Lamin, The Gambia	22	5	17
3	Community Action Plan Development in Densu	January 23, 2023	DFTC, Kokobrite-Accra, Ghana	24	5	19
4	Community Action Plan Development in Narkwa	January 24, 2023	Ekumfi, Narkwa, Ghana	28	2	26
5	Stakeholder Training on Adoption & Dissemination of Food & Non-food Portfolios	March 20-24, 2023	Ekumfi, Narkwa- Ghana	25	5	20
6	Best Practices for Mangrove Restoration	May 8-9, 2023	DFTC, Kokrobite-Accra, Ghana	41	15	26
7	Practical Training on Tree Planting Using Zai Pit Technique	September 16, 2023	Bulock, The Gambia	21	7	14
UCC						
8	NOHA Oyster Ecology & Leadership Training	August 16-18, 2023	DFTC, Kokobrite-Accra, Ghana	71	62	9
9	Shellfish Biology and Ecology	September 21, 2023	Bulock, The Gambia	28	27	1
DAA						
10	Training on Mangrove Establishment	February 9, 2023	Tsokomey	30	6	24
11	Leadership & Advocacy Training	March 7, 2023	DAA Fisheries Training Centre, Kokrobite	30	6	24
12	Training of Trainers for Literacy & Numeracy Facilitators	March 27-30, 2023	DAA Fisheries Training Centre, Kokrobite	7	3	4
13	Literacy and Numeracy	May-September, 2023	Bortianor, Tsokomey & Tetegu	58	2	56

	Subject	Dates	Location	No.	M	F
14	Village Savings and Loan Associations	July, 2023	Bortianor, Tsokomey & Tetegu	74	1	73
TRY						
15	Community Entry and Social Mobilization in Bulock	November 20, 2022	Bulock, The Gambia	32	2	30
16	Community Entry and Social Mobilization in Lamin	November 21, 2022	Lamin, The Gambia	22	0	22
17	Bulock Co-Management Planning: guiding principles	December 17, 2022	Bulock, The Gambia	36	16	20
18	Bulock Co-Management Planning: defining plan boundaries	January 15, 2023	Bulock, The Gambia	29	1	28
19	Bulock Co-Management Planning: situation analysis	February 12, 2023	Bulock, The Gambia	32	3	29
20	Bulock Co-Management Planning: institutional arrangements	March 19, 2023	Bulock, The Gambia	31	1	30
21	Bulock Co-Management Planning: vision and objectives	April 23, 2023	Bulock, The Gambia	30	1	29
22	Bulock Co-Management Planning: management measures, penalties, and sanctions	May 21, 2023	Bulock, The Gambia	30	1	29
23	Bulock Co-Management Planning: implementation and monitoring	June 19, 2023	Bulock, The Gambia	33	2	31
24	Bulock Study Tour to Lamin	July 29, 2023	Independence, Bakau, The Gambia	37	1	36
25	Leadership Training in Lamin	August 11, 2023	TRY Office, Old Jeshwang, The Gambia	29	0	29
26	Leadership Training in Bulock	August 13 and September 3, 2023	Bulock, The Gambia	30	1	29

Number of institutions receiving capacity development support (AFR/SD Custom Indicator CBLD-9-UAF).

The FY 23 target for this indicator was zero. However, each of the two organizations listed in Table 22 received an Activity vehicle that was determined to be a priority for the institution to have the capacity to execute its leadership role in support of shellfisheries co-management on the Activity and in West Africa effectively and sustainably. Both are continuing as organizations already counted in FY22 but receiving new capacity development support this year.

Table 22: Organizations receiving capacity development support.

No.	Name of Organization	Type of organization*	
		Tier 1	Tier 2
1	University of Cape Coast, Center for Coastal Management	Academia	Ghana
2.	TRY Oyster Women's Association	Resource User	The Gambia

* Type of organization:

Tier 1. Resource user; Academia; Government; NGO

Tier 2. National [enter country name]; WA Regional; International

Number of host country higher education institutions receiving capacity development support with USG assistance (AFR/SD Custom Indicator ES.2-1)

In FY23 The University of Cape Coast, Center for Coastal Management was the recipient of an Activity vehicle that was determined to be a priority for the institution to have the capacity to execute its leadership role in support of shellfisheries co-management on the Activity and in West Africa effectively and sustainably. UCC is continuing as an organization already counted in FY22 but receiving new capacity development support this year..

Table 23: Universities reported in FY23.

No.	Name of Organization	Country	Type of organization*	
			Public	Private
1.	University of Cape Coast, Center for Coastal Management	Ghana	X	

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APPENDIX 1: Land cover classification crucial to the shellfishing activities in Narkwa and Densu Activity sites in Ghana

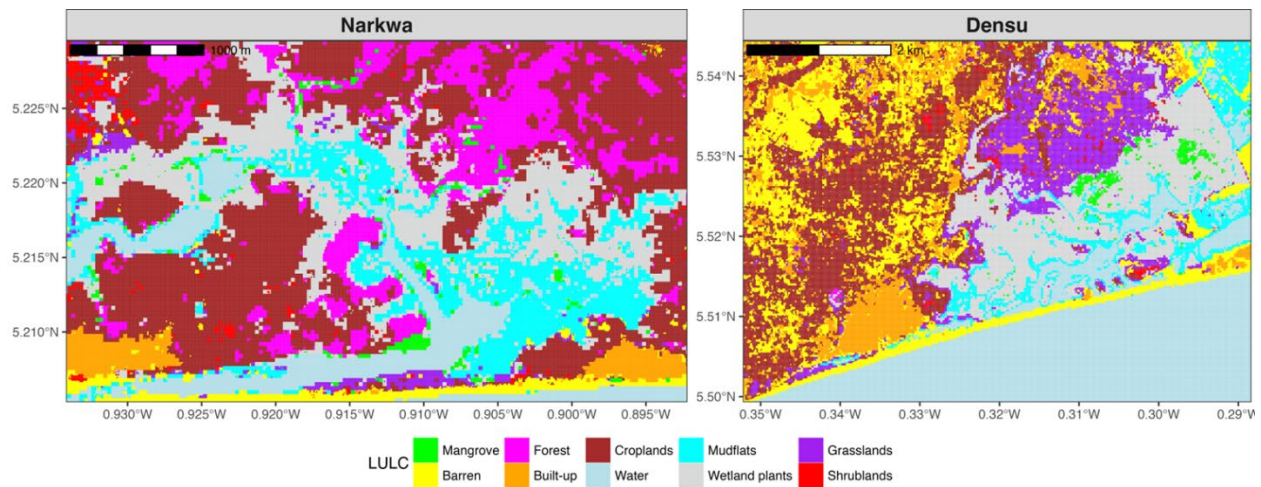


Figure 50: LULC classifications in Narkwa and Densu in Ghana.

Table 24: Hectarage of different land cover classes in Narkwa and Densu.

LULC Class	Narkwa (ha)	Densu (ha)	Both Sites (ha)
Wetland plants	200.33	444.23	644.56
Grasslands	17.48	132.53	150.01
Mudflats	137.11	104.02	241.13
Water	70.56	88.21	158.78
Barren	10.23	78.48	88.70
Croplands	104.55	41.00	145.55
Mangrove	15.65	27.57	43.22
Shrublands	2.47	6.98	9.45
Built-up	0.50	6.08	6.58
Forest	91.80	0.18	91.97
Site size (ha)	650.68	929.26	1579.95

APPENDIX 2: Land cover classification crucial to the shellfishing activities in Lamin and Bullock Activity sites in The Gambia.

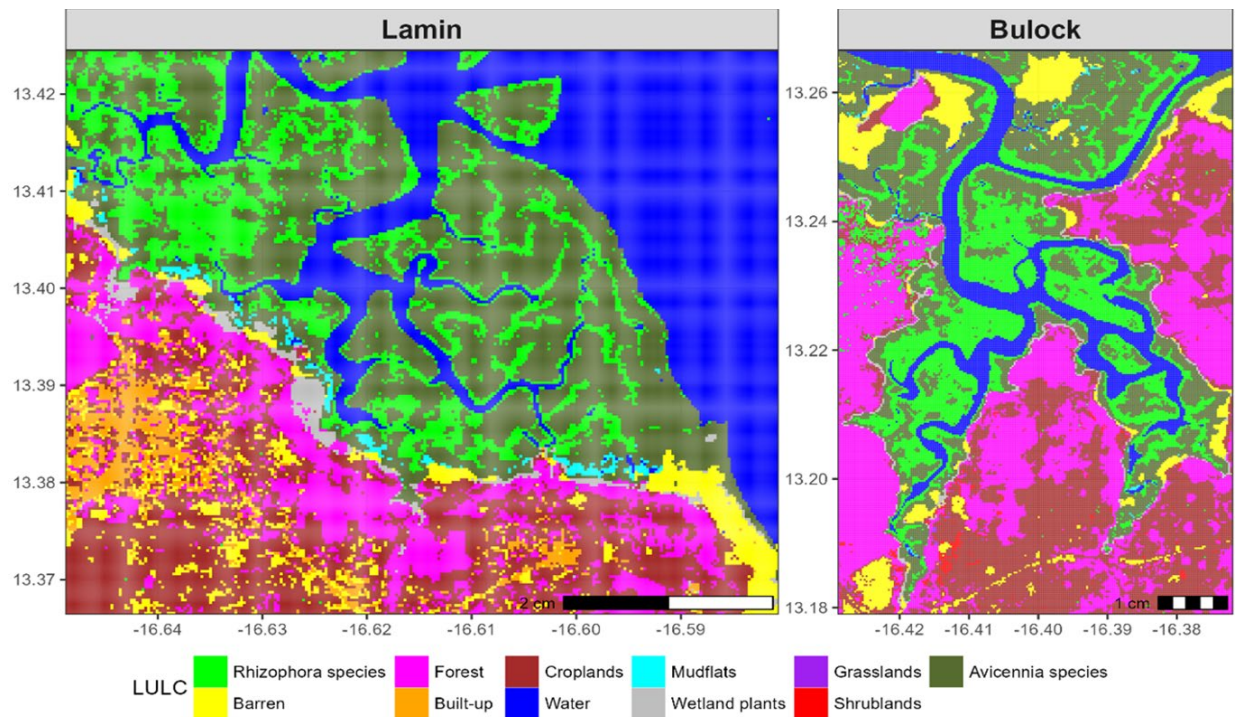


Figure 51: LULC classifications in Lamin and Bullock in The Gambia.

Table 25: Hectarage of different land cover class in Bullock and Lamin.

LULC Class	Bullock (ha)	Lamin (ha)	Both Sites (ha)
Rhizophora species	824.86	497.08	1,321.94
Avicennia species	744.16	1,016.62	1,760.78
Water	504.56	239.95	744.51
Forest	218.66	109.16	327.82
Croplands	112.03	53.25	165.28
Barren	86.87	83.67	170.55
Wetland plants	66.48	58.81	125.29
Shrublands	15.74	NM	15.74
Mudflats	5.98	32.29	38.27
Grasslands	3.52	NM	3.52
Built-up	NM	1.15	1.15
Site Size (ha)	2,582.87	2,091.98	4,674.84

NM = LULC type not mapped or detected

APPENDIX 3: Mangrove and shellfish restoration activities as part of community action plan for Narkwa and Densu Activity sites.

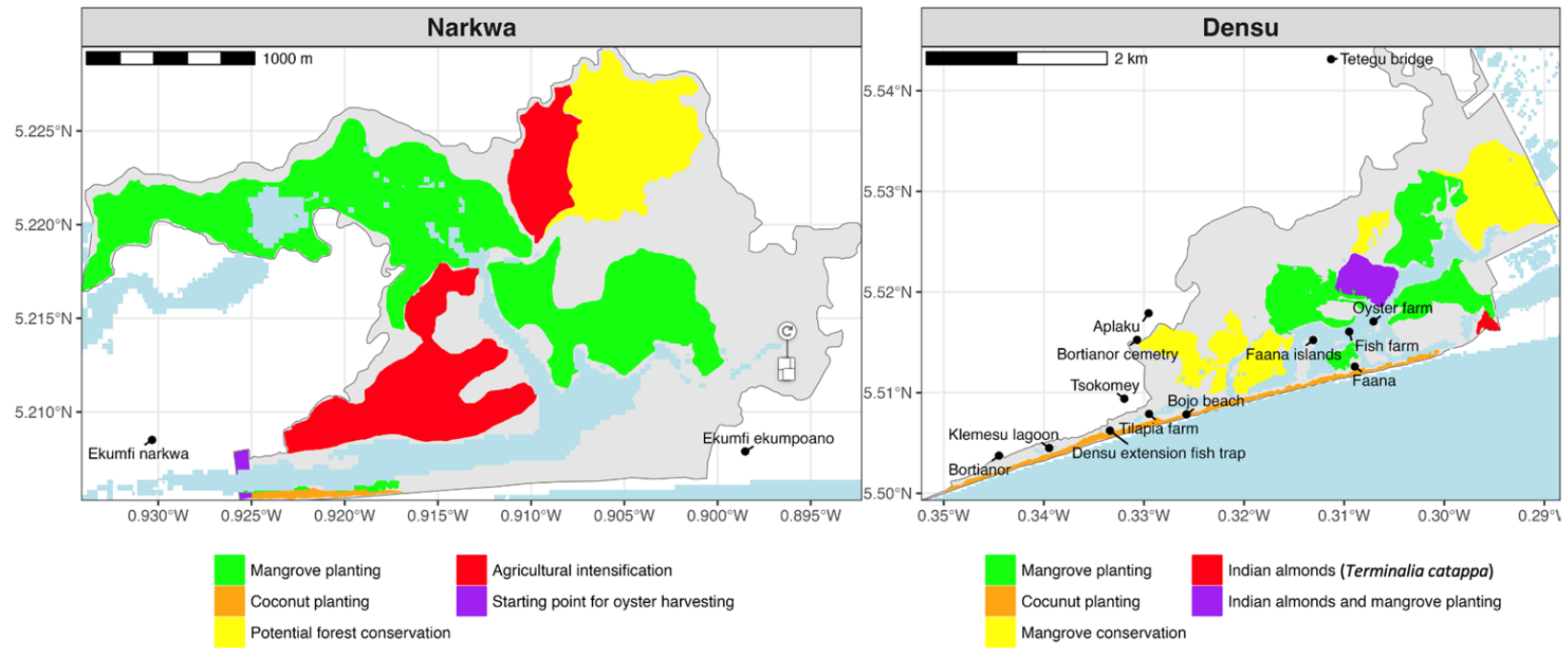


Figure 52: Mangrove and shellfish restoration activities as part of CAPs for Narkwa and Densu Activity sites.

APPENDIX 4: Mangrove and shellfish restoration activities as part of community action plan for Lamin and Bullock Activity sites

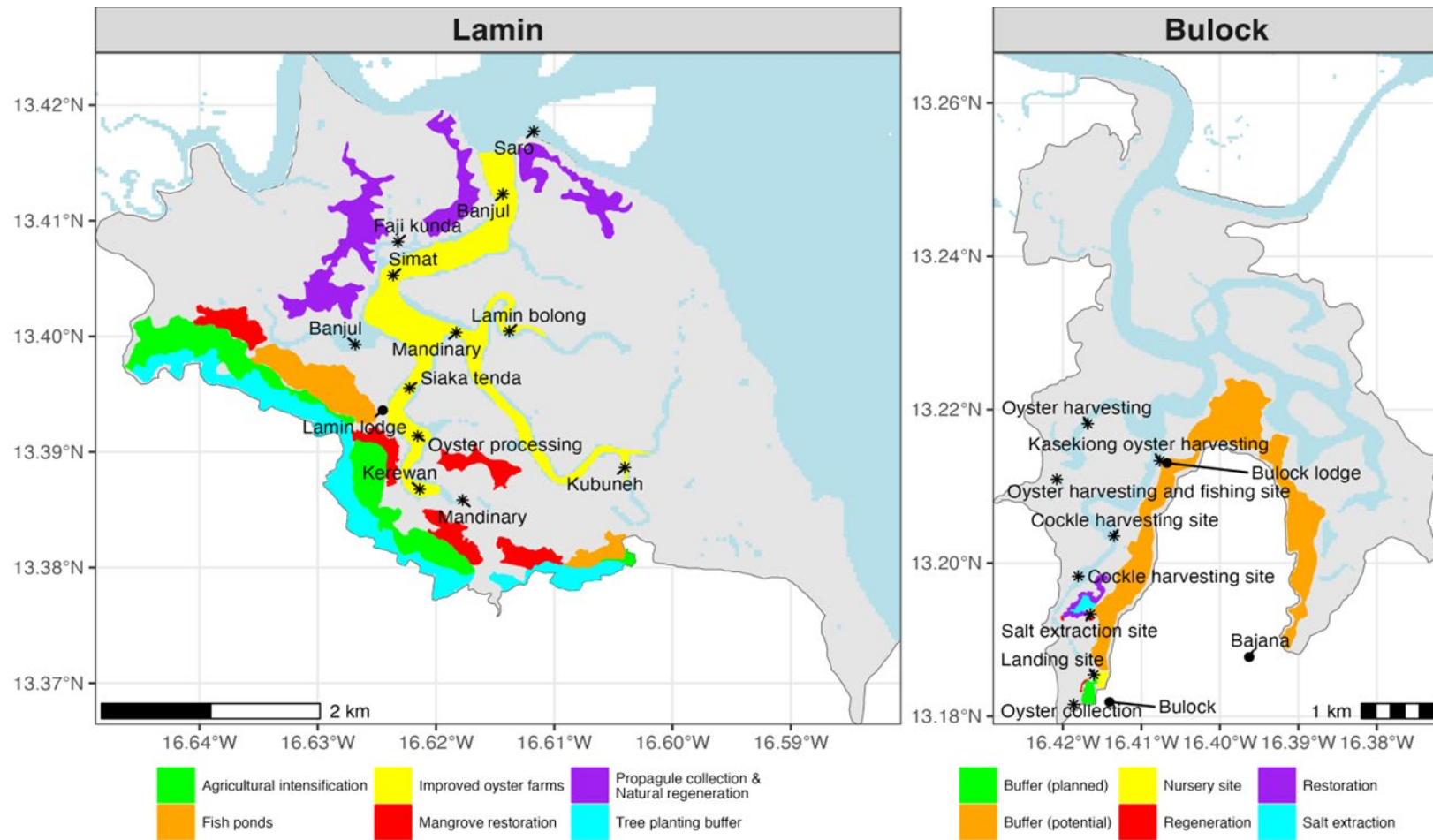


Figure 53: Mangrove and shellfish restoration activities as part of CAPs for Lamin and Bullock Activity sites

APPENDIX 5: Narkwa Community Action Plan: Group Work.

Table 26: Narkwa CAP Group Work.

Area	Activities	Timeframe	Expected Output/ Outcome	Responsible	Resources needed	Key Stakeholders/ Collaborators
Shellfisheries	<ol style="list-style-type: none"> 1. Plant mangroves – training, regulation on protection, planting materials 2. Closed and open season for shellfish 3. Alternative livelihood during closed season 	<p>June - closed season for sea fishing No canoe movement</p> <p>Aug-Sept (1st of oyster available is low)</p>	<p>Mangrove planted</p> <p>Oyster production increases</p> <p>Regulations are effective</p> <p>Closed and open seasons implemented</p>	<p>Oyster Collectors – planting</p> <p>Chiefs & Elders – Registration</p> <p>Oyster Association to be formed to enact regulation together with Chiefs</p>	<p>Knowledge for establishment & management of mangroves</p> <p>Seed/ Seedlings</p> <p>Equipment – tools, boots, gloves</p> <p>Labour</p>	<p>Chiefs & Elders</p> <p>Technical Service Providers</p> <p>NGOs – DAA</p>
Food Production	<p>Coconut</p> <p>Cassava</p> <p>Maize</p> <p>Pepper</p> <p>Tomato</p> <p>Okra</p>	June-July	<p>Area planted</p> <p>Food harvested</p>	<p>Oyster collectors' groups</p> <p>Chiefs & elders to parcel the land</p>	<p>Farm inputs - seeds, chemicals, improved seedlings, early yielding varieties</p> <p>Labor</p>	<p>Chief & Elders for use of idle communal land for food production (the chief will have to share parcels)</p> <p>Ministry of Agriculture, extension officers to assist with use of inputs</p> <p>Input providers at least at the start of activity (all inputs at the moment are externally required)</p>

Area	Activities	Timeframe	Expected Output/ Outcome	Responsible	Resources needed	Key Stakeholders/ Collaborators
Mangrove Restoration	1.Prepare land 2.Train to plant 3.Prepare regulation on protection 4.Planting materials	June – closed season	Increased mangrove population	Oyster Collectors Chiefs & Elders	Knowledge Inputs – seeds, tools/ boots/ gloves Labor	Chief & Elders Technical Service Providers Wildlife Division NGO -DAA

APPENDIX 6: Bullock Community Action Plan: Group Work.

Table 27: Bullock CAP Group Work

Area	Activities	Timeframe	Expected Output/ Outcome	Responsible	Resources needed
Mangroves restoration	Mangroves planting	June – July 2023	Increased supply of mangroves seedlings for planting	Bullock community members, TRY Oysters group	Funding
Oyster farming	Demarcation of planting sites, planting and harvesting	August-September	Increased production, diversified livelihood	VDC, Try Oysters group, Alkalo	Funding
Tree planting / restoration	Nursery preparation, procuring tree seedlings and planting	June-December 2023	10,000 trees planted	Bullock community	Seedlings, human power to plant and manage seedlings
Cockle farming	Collection small cockles, replanting	August – September	Increased harvests, diversified food and income source	Women group	Funding
Gardening	Seedlings, fertilizer, water source	Across the year	Sufficient supply of food	Community members	Funding and supply of farm inputs
Capacity building	Training, demonstrations	May	Increased knowledge and practice on trees and mangroves management	Bullock community	Training modules