USAID | GHANA
FROM THE AMERICAN PEOPLE

SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

Participatory Rural Appraisal (PRA) Densu Estuary Oyster Harvesting Bortianor/Tsokomey, Ga-South Municipal Assembly, Greater Accra Region, Ghana

FEBRUARY 2017

THE UNIVERSITY OF RHODE ISLAND
GRADUATE SCHOOL OF OCEANOGRAPHY
CRC COASTAL RESOURCES CENTER

UNIVERSITY OF CAPE COAST
VERITAS NOBIS LUMEN

Hɛn Mpoano

TRY
TRY Oyster Women's Association, The Gambia

DEVELOPMENT ACTION ASSOCIATION "NOYAA KPEE"
Development Action Association

This publication is available electronically on the Coastal Resources Center's website at

http://www.crc.uri.edu/projects_page/ghanasfmp/

For more information on the Ghana Sustainable Fisheries Management Project, contact:

USAID/Ghana Sustainable Fisheries Management Project
Coastal Resources Center
Graduate School of Oceanography
University of Rhode Island
220 South Ferry Rd.
Narragansett, RI 02882 USA
Tel: 401-874-6224 Fax: 401-874-6920 Email: info@crc.uri.edu

Citation: Janha, F., Ashcroft, M., & Mensah, J. (2017) Participatory Rural Appraisal (PRA) of the Densu Estuary Oyster Harvesting, Bortianor/Tsokomey, Ga- South Municipal Assembly, Greater Accra Region, Ghana. TRY Oyster Women's Association, Development Action Association and Hen Mpoano. Coastal Resources Center, University of Rhode Island. GH2014_ACT148_DAA. 35 pp.

Authority/Disclaimer:

Prepared for USAID/Ghana under Cooperative Agreement (AID-641-A-15-00001) awarded on October 22, 2014 to the University of Rhode Island and entitled; the USAID/Ghana Sustainable Fisheries Management Project (SFMP).

Cover Photos: Photo 1: Oyster shells from the Densu Estuary (*Crassostrea gasar* also known as *tulipa)*. Photo 2: Women harvesting oysters in the Densu Estuary with brush parks (*Acadjas*) to attract fish in the background.

Photo Credit: Mariama Ashcroft, TRY Oyster Women's Association

Detailed Partner Contact Information:
USAID/Ghana Sustainable Fisheries Management Project (SFMP)
10 Obodai St., Mempeasem, East Legon, Accra, Ghana
Telephone: +233 0302 542497 Fax: +233 0302 542498

Brian Crawford	Chief of Party brian@crc.uri.edu
Najih Lazar	Senior Fisheries Advisor nlazar@crc.uri.edu
Patricia Mensah	Communications Officer patricia.sfmp@crcuri.org
Bakari Nyari	Monitoring and Evaluation Specialist hardinyari.sfmp@crcuri.org
Don Robadue, Jr.	Project Manager, CRC don@crc.uri.edu
Justice Odoi	USAID Administrative Officer Representative Jodoi@usaid.gov

Kofi.Agbogah
kagbogah@henmpoano.org
Stephen Kankam
skankam@henmpoano.org
Hen Mpoano
38 J. Cross Cole St. Windy Ridge
Takoradi, Ghana
233 312 020 701

Andre de Jager
adejager@snvworld.org
SNV Netherlands Development Oganization
#161, 10 Maseru Road,
E. Legon, Accra, Ghana
233 30 701 2440

Donkris Mevuta
Kyei Yamoah
info@fonghana.org
Friends of the Nation
Parks and Gardens
Adiembra-Sekondi, Ghana
233 312 046 180

Peter Owusu Donkor
Spatial Solutions
powusu-donkor@spatialdimension.net
#3 Third Nautical Close,
Nungua, Accra, Ghana
233 020 463 4488

Thomas Buck
tom@ssg-advisors.com
SSG Advisors
182 Main Street
Burlington, VT 05401
(802) 735-1162

Victoria C. Koomson
cewefia@gmail.com
CEWEFIA
B342 Bronyibima Estate
Elmina, Ghana
233 024 427 8377

Lydia Sasu
daawomen@daawomen.org
DAA
Darkuman Junction, Kaneshie Odokor Highway
Accra, Ghana
233 302 315894

Gifty Asmah
giftyasmah@Daasgift.org
Daasgift Quality Foundation
Headmaster residence, Sekondi College
Sekondi, Western Region, Ghana
233 243 326 178

For additional information on partner activities:

CRC/URI:	http://www.crc.uri.edu
CEWEFIA:	http://cewefia.weebly.com/
DAA:	http://womenthrive.org/development-action-association-daa
Daasgift:	https://www.facebook.com/pages/Daasgift-Quality-Foundation-FNGO/135372649846101
Friends of the Nation:	http://www.fonghana.org
Hen Mpoano:	http://www.henmpoano.org
SNV:	http://www.snvworld.org/en/countries/ghana
SSG Advisors:	http://ssg-advisors.com/
Spatial Solutions:	http://www.spatialsolutions.co/id1.html

ACRONYMS

CRC	Coastal Resources Center
DAA	Development Action Association
PRA	Participatory Rural Appraisal
SFMP	Sustainable Fisheries Management Project
TRY	TRY Oyster Women's Association, The Gambia
URI	The University of Rhode Island
USAID	United States Agency for International Development

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

This report is a synthesis of the results of a Participatory Rural Appraisal (PRA) commissioned by the Sustainable Fisheries Management Project (SFMP), in partnership with Development Action Association (DAA) and the women fisher folk at Tsokomey in the Bortianor municipality of the Greater Accra Region. The purpose of the PRA was to assess prospects for development of a community based management plan for oyster harvesting as a sustainable livelihood and food security venture in the Densu River estuary. The Densu Delta was designated as a RAMSAR site in 1992, recognizing it as a protected wetland of international importance under the International Convention on Wetlands. A management plan for the Delta was developed in 1999, but did not make reference to oyster harvesting activities.

More than 100 fisher folk and traditional leaders from the community, 90 percent of whom were women, participated in the two-day appraisal from January 30th to 31st, 2017. During the appraisal, they assessed the ecological and socioeconomic status of the areas. They shared local knowledge of the history of oyster fishery in the Densu Estuary, identified significant sites, shared their experiences with using the river resources, and identified the opportunities and challenges in sustainable oyster harvesting and conservation management.

The information collected from the PRA will be applied to the development of a Community-based Management and Conservation Plan that will contribute to sustainable economic benefits for women and men oyster harvesters in Bortianor and a healthy estuary and ecosystem. The management plan will be developed by the women and men oyster harvesters in a participatory process with other stakeholders and facilitated by DAA. It will include vision, objectives, actions, and institutional framework to empower the women and men oyster harvesters to be the stewards, managers and rights holders of the oyster fishery resources in the Densu Estuary.

ORGANIZATION OF THE PRA STUDY

Prior to conducting the PRA, the facilitation team, staff of DAA, and a number of women harvesters visited one of the oyster harvesting sites to witness how oyster harvesting is done in this area. This was an eye opener for the Gambian team because of the vast difference in collection practice in The Gambia. Led by DAA Executive Director Mrs. Lydia Sasu, the team also paid a courtesy call to the Tsokomey Chief Fisherman and the Bortianor River Priest. The purpose of the visit was to officially inform them about the plan for a PRA study in the village and request their participation. During the course of the visits the team learned of a misunderstanding in the community about the reason for conducting a PRA and were able to address the situation. There were fears that outsiders were coming to buy the river or that the local priest would close the river to resource users. The realization that the PRA team was facilitated by leaders from a civil society women's oyster harvesting association from a neighboring West African country was a welcome and reassuring factor.

Participants in the study were mainly villagers from the Ewe tribe and a few from the Ga traditional land owners. Officials from the Fishery Commission and the District Department of Agriculture also participated. The program was launched with remarks from Ga and Ewe community leaders (Chief Fishermen and representatives of the river priest). Plenary and small group sessions were organized to share knowledge and information guided by a series of questions, each group facilitated by DAA staff (see Appendix 2 for the PRA Guide and Appendix 3 for the timetable). The groups presented the results of their discussions in plenary and received feedback from other participants. Individual interviews were conducted with

leaders to get a deeper understanding of the dynamics in relationships between the Ewe and Ga.

RESULTS OF THE PRA STUDY

Principal Economic Activities in Bortianor/Tsokomey

Most of the population living in the Bortianor/Tsokomey area are fisher folk or engaged in activities along the fishery value chain. River fishing and fish processing are the most common sources of income for families.

The women who represent the target group for the DAA/SFMP sustainable livelihoods initiative mostly engage in low value-added activities such as fish cleaning and carrying loads of fish on their heads from the landing site (fish porter).

Figure 1 Women carry loads of fish as an important income generating activity

Photo credit: TRY

This group represents the poorest in the community, mostly young women in their 20s and 30s. Although oyster harvesting is common among this group, it is not considered a significant source of income. One of the PRA participants summed it up this way "I came to Tsokomey from Volta region specially to carry fish load because I heard that it is a lucrative activity. Here oyster harvesting is not an occupation" (PRA participant Korkor who migrated from Volta Region, 1/30/2017). A community elder also stated that in the past, oysters were eaten only out of necessity when there was no fish. Agbeko Osofo, a 21-year old man engaged in deep water oyster harvesting said that oyster harvesting is his main occupation because he could not find better paying work. He believes that, with the PRA and oyster promotion campaign, the activity will become more profitable. Osofo rents a canoe at 10 cedi a day. He paddles himself, sometimes he is alone or with his brother.

Figure 2 A participant explains that deep water oyster harvesting is his main livelihood

Photo credit: TRY

The fisher folk do not observe any official closed season. However, they cease all activities on the river and its estuary during a six week period between August and October in observance of the Homowo customary rites. Activities cease the last two weeks in August before the annual festival held during the first two weeks of September. During the festival activities recommence. After the festival, activities cease again for four weeks from mid-September to mid-October. Shallow water oyster harvesting is exempted from this holiday in recognition of the hardship status of those engaged in the activity.

A few women indicated that they also engage in deep water oyster harvesting but the activity is dominated by men. It entails diving 12 to 20 feet under water to collect oysters along the deeper sections of the estuary further away from the Tsokomey landing site. Although they collect fewer oysters because they can remain under water for only a few seconds, the oyster sizes in the area are much larger and make up for the smaller quantity picked. The oysters are of a single species, *Crassostrea gasar* also known as *Crassostrea tulipa*.

Oyster harvesting begins "two months after Christmas when the oysters begin to smell like human beings" (elderly Ga woman, 1/30/2017) and ends in August. The shallow oyster harvesting period corresponds with Ghana's major rainy season. Harvesting stops when water is released from the dam due to heavy rain, but the release also brings large fish downstream.

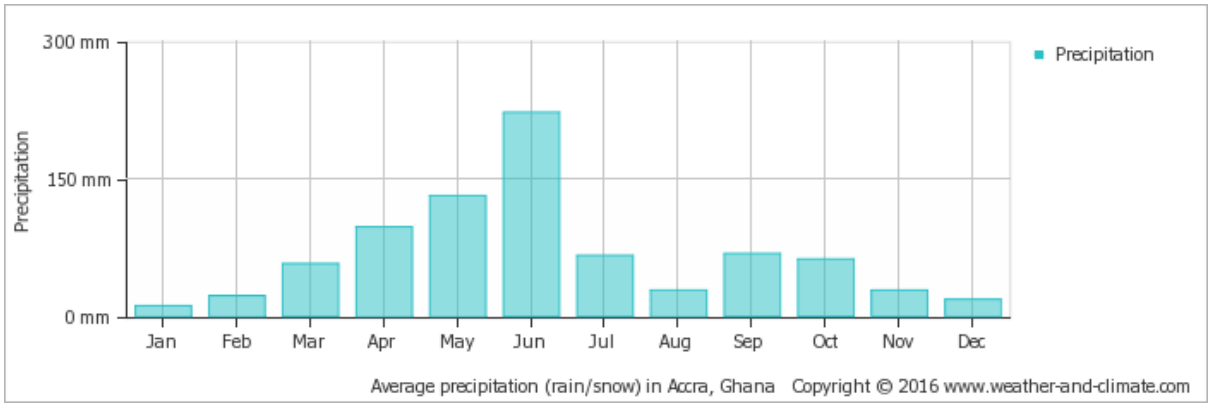

Figure 3 Average Monthly Precipitation

Calendar of Economic Activities

Table 1 Calendar of Economic Activities

Activity	J	F	M	A	M	J	J	A	S	O	N	D
River fishing*	X	X	X	X	X	X	X	X	X	X	X	X
Basket fishing	X	X	X	X	X	X	X	X	X	X	X	X
Shallow water oyster harvesting			X	X	X	X	X	X				
Fish processing	X	X	X	X	X	Peak season				X	X	X
Fresh fish sale	X	X	X	X	X	Peak season				X	X	X
Sale of food (fried fish, porridge, corn dough)	X	X	X	X	X	X	X	X	X	X	X	X
Deep river oyster harvesting*	X	X	X	X	X	X	X	X	X	X	X	X
Fish cleaning at landing site	X	X	X	X	X	X	X	X	X	X	X	X
Fish porter	X	X	X	X	X	X	X	X	X	X	X	X
Paid labor for coastal and community cleaning	X	X	X	X	X	X	X	X	X	X	X	X
River transport (paddle canoe)*	X	X	X	X	X	X	X	X	X	X	X	X

(*asterisk) denotes activities that are dominated by men

Mapping of Oyster Harvesting and Mangrove Areas

The group identified surrounding settlements, outlined their collection areas, site names, identified tributaries, key species, habitats, historical sites, etc. The group assessed the vegetation status; identified key sites for aquatic species such as fishes, crabs, etc.

Five main Oyster Collection sites were identified (Figure 1). These are *Nayo, Kpovoduvo, Kele, Hoga Nukaji* and The *Bortianor*/*Tsokomey* Estuary. Three of the sites are currently active. *Hoga Nukaji* and the estuary have been abandoned due to depleted stock. The sites have varying characteristics which determine not only the level of exploitation, but also the gender dynamics in the oyster fishery.

NAYO

This is the area east of Bojo Beach Resort. The name of the site is derived from the name of the 2 tributaries in the area- *Nayo Bibioo* (small) and *Nayo Agboo* (big). The *Nayo* collection site is relatively shallow and flanked by "stressed" mangrove stands. The size, extent and density of oysters at this site have declined significantly over the past years. This women dominated site is also noted for other activities like fishing with brush parks (*ategya*) and crab harvesting.

KPOVODUVO

This area is also dominated by women oyster harvesters. It is the shallow waters near *Faana*- a fishing community situated on the sandbar. Oyster gathering is concentrated at the eastern part of the site, where the water is relatively deeper. The mangroves that covered the banks of

the river have all been cut for fuel or brush parks, exposing the water and the oysters to direct heat from the sun.

KELE

Kele is the home of big oysters. The water is deep reaching up to about 16 feet in depth. Though some brave women harvesters work at this site, more men are involved in oyster picking than women at this site. Due to the depth of the water, one is required to dive and stay in the water long enough to pick a handful of very big oysters. The risk involved in this method deters many women from harvesting oysters at this site.

Figure 4 A PRA community participant drawing on the Densu estuary map

Photo credit: TRY

.

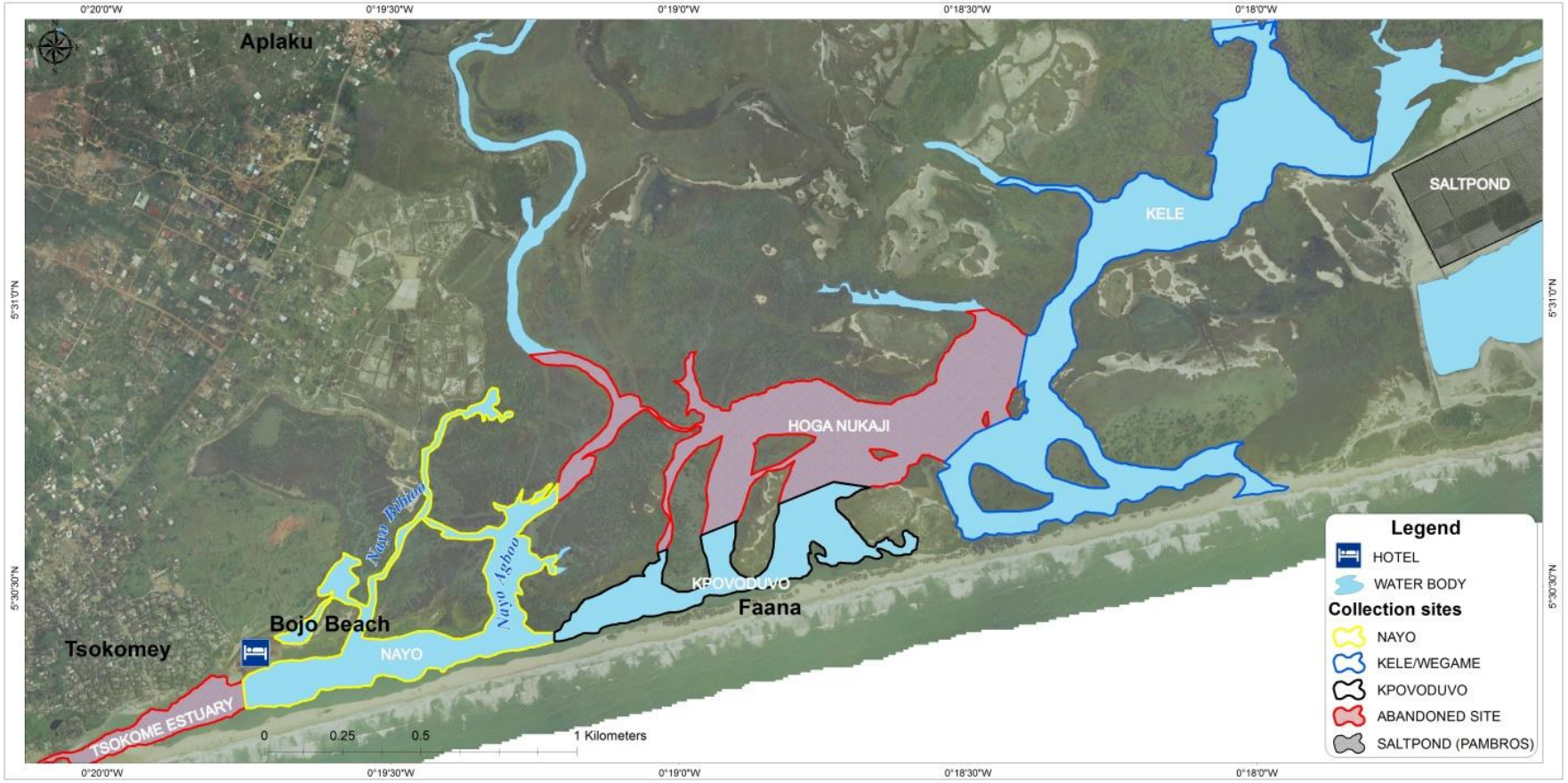

Figure 5 Map of the Densu Estuary showing oyster harvesting areas. Credit: Justice Mensah, Hen Mpoano.

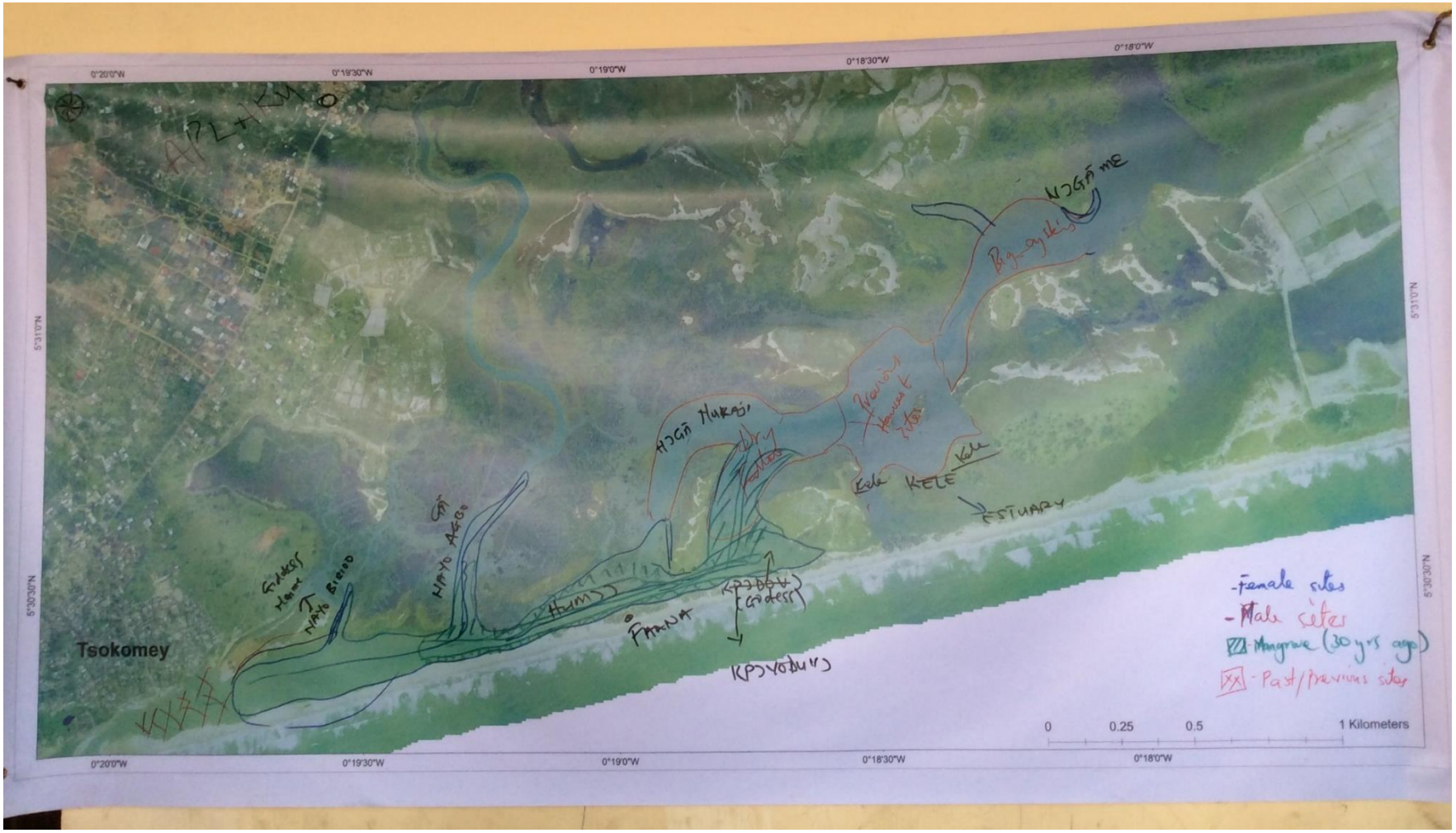

Figure 6 Flexi-banner with Google site image with locations of oyster harvesting and mangrove areas and names drawn by harvesters

Table 2 Characteristics, ecological and social functions, use rights, trends and constraints

Site Name	Characteristics	Ecological Function	Social Functions	User Rights	Trends and Constraints
NAYO (Big and Small)	• Shallow • Few mangroves with fish traps	• Fish • Mangroves providing habitat for fish • Birds • Crabs	• Tourism • Customary rites during the *Homowo* festival- No picking is done for six weeks-2 weeks before the festival and 4 weeks after	• Open Access • Restricted access by the management of Bojo beach along the inlet of *Nayo Bibio*o	Difficult access to oyster sites due to mangrove degradation • Longer distance • Deeper water
HUMOO	• Shallow-deeper on the eastern side • Very scanty mangroves • Fish traps-bush parks • Located between the sandbar and the vast wetland	• Birds • Fish	• Tourism • Customary rites	Open access	Intrusion of fresh water from the *Weija* Dam leads to the death of oysters
HOGA NUKAJI	• Shallow- due to accumulated sediments from the *Weija* dam inflows • Mangroves have been left to rejuvenate naturally after extensive cutting	Fish (tilapia)	• Tourism • Customary rites	Open access	Previous site for big oysters. Site used to be very deep, but has accumulated sediments from the load carried by the water from the *Weija* dam
VUGAME	• Deep	Habitat for big oysters Habitat for wide varieties of fishes (mudfish, shrimps, anchovies, crabs)	• Tourism • Customary rites	Open Access	Insect/parasites Water can be very cold making diving and staying in the water difficult

Chain of Activities in Oyster Harvesting and Processing

In Tsokomey, oysters are picked from the river bed in mostly shallow water and the entire chain of activities, from picking to marketing and selling, is carried out on the same day. In The Gambia and Senegal on the other hand, the activities last three to five days and oysters grow on the aerial roots of mangroves where they are harvested by removing them with an axe to protect the roots. In Ghana in the Densu River estuary, oysters grow on the substrate at the bottom of the estuary. The oyster species are the same (*Crassostrea gasar* also known as *tulipa*).

Figure 7 Gambia oysters grow on aerial mangrove roots in the Tanbi Wetlands National Park.

Figure 8 In Ghana in the Densu River estuary oysters grow on the substrate at the bottom of the estuary

Photo Credit: TRY

Walking to Nayo and Kpovodu tributaries

Most of the women walk along the river's edge to get to their collection sites, taking around 30 minutes from the landing site. It used to be a shorter walk before the Bojo Beach Hotel was built and installed an electric fence around its perimeter, blocking the short way to the tributary where the women pick oysters. Canoe rides are a faster option but cost concerns limit their use to transporting oysters after picking and sometimes women share the cost. Canoes are used for harvesting on sites further upstream, such as Vugame.

Picking

The women pick as individuals and spend 2 to 3 hours. They stand in the water which reaches about 1 foot up their leg. They wear improvised socks and gloves made of old clothing. They use metal bowls to collect the oysters. At left, women demonstrate harvesting oysters during the PRA. Normally they would have individual basins. Brush parks (ed *Acadjas* in Ga or *Atidza* in Ewe*)* are in the background. They attract fish and create spawning habitat and are often made of mangrove sticks.

Figure 9 women demonstrate harvesting oysters during the PRA in Densu.

Figure 10 Harvested oysters

Photo credit TRY

They collect 2 to 3 baskets full of oysters at the end of a day's work. They have noticed that the quantity of oysters is declining and the individual sizes are getting smaller. Often, they find tiny 1 inch sized tilapia fingerlings hiding in the shell of the oysters which the women also collect for cooking. Life vests are not used because the water is shallow.

Transporting to the landing site

They rent a paddle canoe at 15 cedis per trip, with the canoe owner paddling. Two to three women use the canoe together and share the cost. The trip takes 15 to 20 minutes from the collection site to the landing site. From the landing site, they carry the loads of oysters on their head to their homes.

Washing oysters

Oysters are washed at the women's homes using clean water and bare hands to remove the black sand covering them. Washing with bare hands, however, is likely not thorough enough to completely remove the sand.

Broiling oysters

The oysters are broiled in their shell in a cooking pot for 15 to 20 minutes. They buy firewood at 1 cedi per bundle.

Shucking

The women use knives to shuck the oysters (taking the meat out of the shell). This takes 1 to 2 hours for a day's collection. Some women use gloves to protect their hands during this activity.

Rinsing

The shucked oyster meat is rinsed in clean water with salt and left to drip in a basket. This takes 10 minutes.

Marketing/selling

Oysters are arranged in heaps and placed on a tray to be sold. Children sometimes walk around the community to sell. The oysters sell out as soon as the community is aware they are available. They are a cheap source of food in the community, selling at 1 cedi for 40 average-sized pieces.

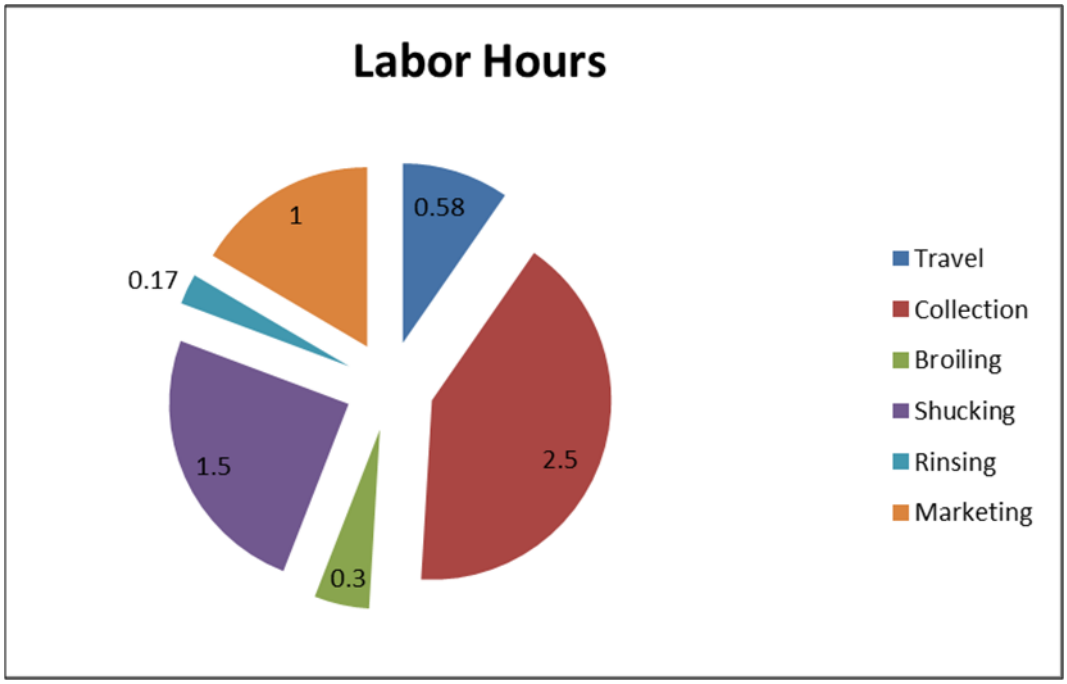

Figure 11 Labor Hours for Chain of Activities in Oyster Harvesting and Processing

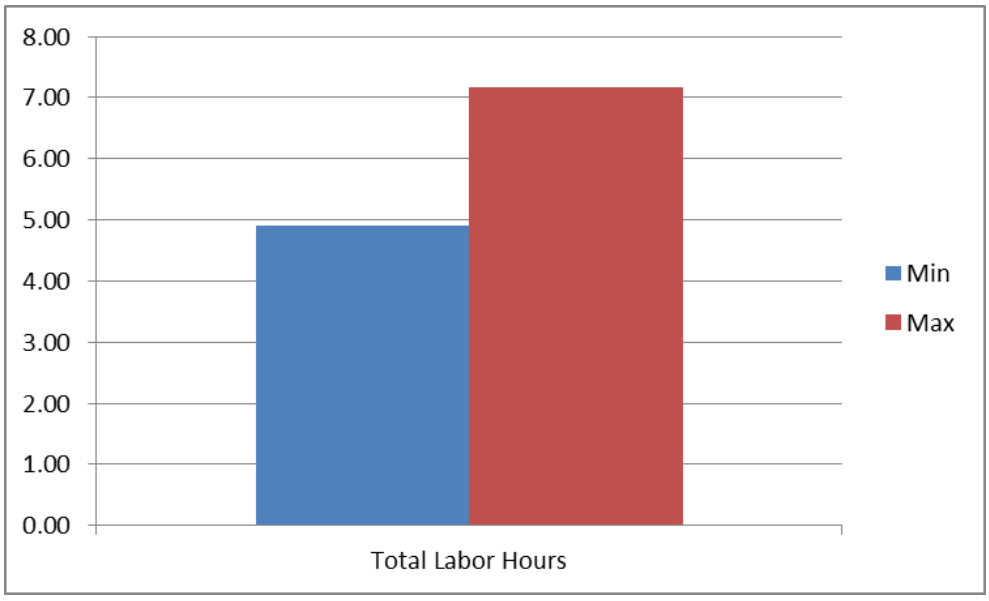

Figure 12 Total Labor Hours for Oyster Harvesting and Processing

Constraints and Solutions Along the Value Chain

Table 3 Constraints and solutions along the value chain

Activity	Constraints	Solutions
1. Oyster Harvesting	• Inadequate protective working gear • Lack of personal boat for harvesting (this mostly applies to women oyster pickers) • Inadequate diving skills which limits access to deep water areas where oysters abound (mostly, this relates to women)	• Provision of proper and adequate oyster working gear • Training in diving skills and health & safety skills in the river
2. Processing	• Inadequate sustainable fire wood for broiling oysters • Extended shucking time (scooping of oyster meat from shells can be time consuming for a large volume of oysters)	• Improve energy efficient cook stoves • Group work and more hired labor
3. Marketing	• Low price of fresh oyster meat • No access to external markets. Oysters are only sold within the local community • No value addition of the fresh oysters (processing into other finished products)	• Training in oyster value addition • Linking harvesters to new markets outside the local community, e.g., hotels • Promotion campaign for consumer awareness on the nutritional and commercial value of oysters

Assessment of Historical Trends in Resources and Users

Number of people

The study shows that there has been increasing pressure on the oyster resources in the past 30 years, with more people engaged in the activity in recent years. The local perception is that the number of harvesters has increased from 150 people 30 years ago to 400 presently. The number of people involved in oyster fisheries has increased despite the large number of injuries sustained by users.

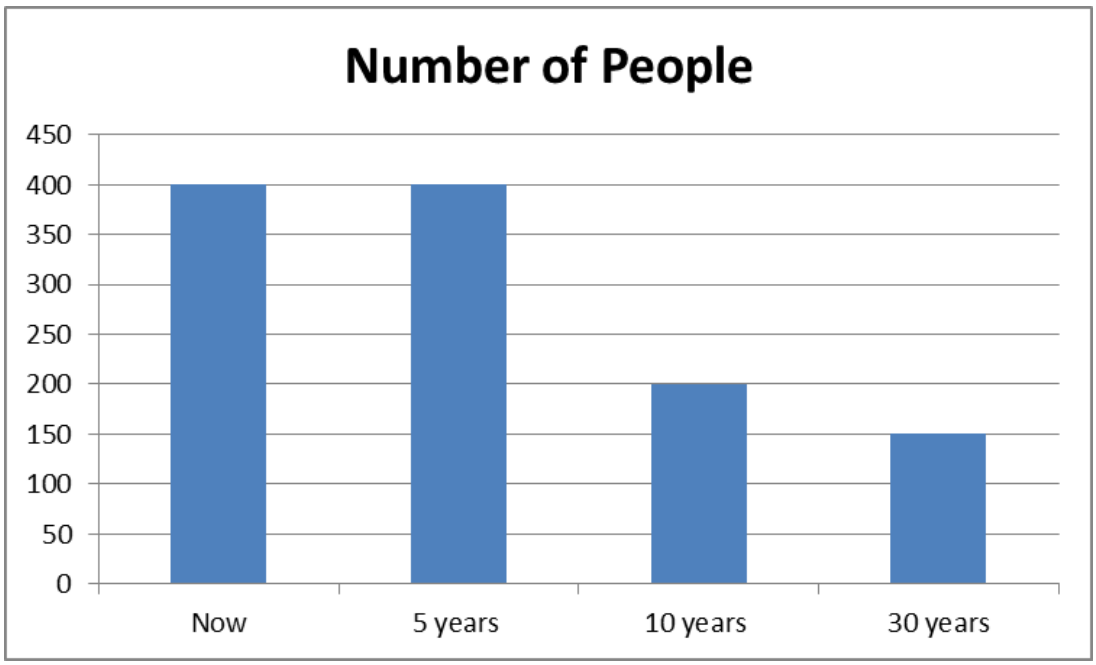

Figure 13 Number of People Harvesting

Number of boats

Fewer boats were used 30 years ago because the harvesting sites were closer to the edge of the river estuary. This number increased to 20 in the past 10 years due to more people harvesting and the erosion of the river pushing the sites further away from the edge. Men own and paddle the canoes, and charge a fee when the women use it to transport their oysters. Only one woman in the PRA group owns a canoe.

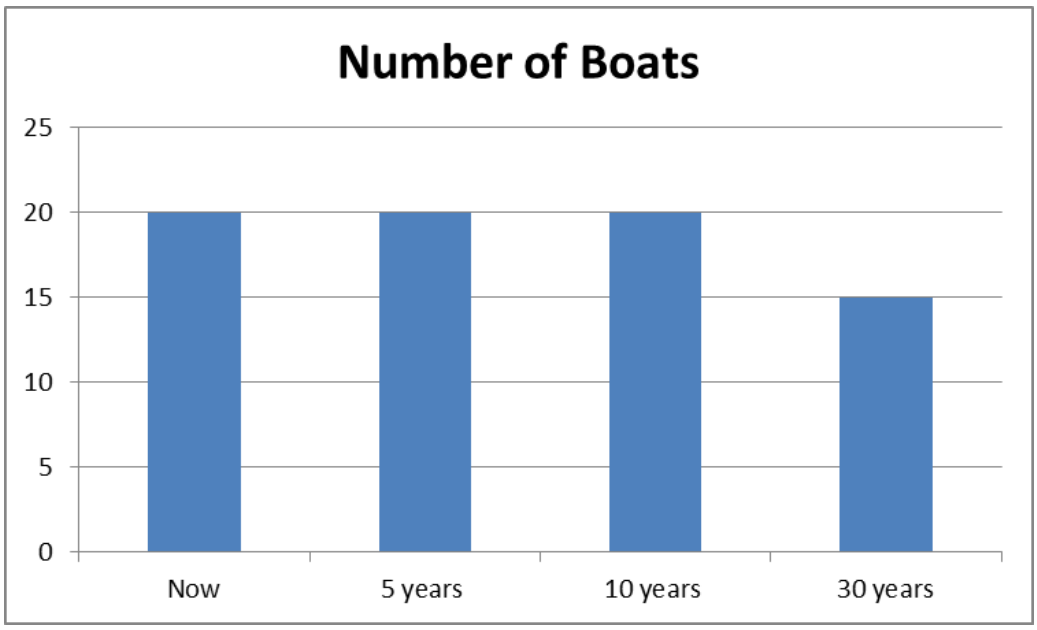

Figure 14 Number of Boats Harvesting

Description of practices

Thirty years ago, mangroves had oysters which users harvested by scraping with a knife. They were also picked from the river bed. The day's collection was transported in canoes to

the landing site. Participants reported that picking solely from the river bed started about10 years ago, following the depletion of mangroves caused by destructive collection practices and the impact of the Weija Dam. Now, the women walk or hire canoes depending on the distance to the site. They test for the presence of oysters by hitting the river bed with the paddle. They cover their feet with improvised socks made out of old clothing.

Extent of oyster sites

The extent of the sites where oysters are located has been declining over the past 30 years, some sites experiencing a more aggressive decline than others. The rate of reduction at Kele/Wegame, which is more distant, has been slower than others. The sites close to the Bojo Beach Hotel are undergoing a more rapid reduction in area and have suffered a more aggressive cutting of mangroves over the past 30 years.

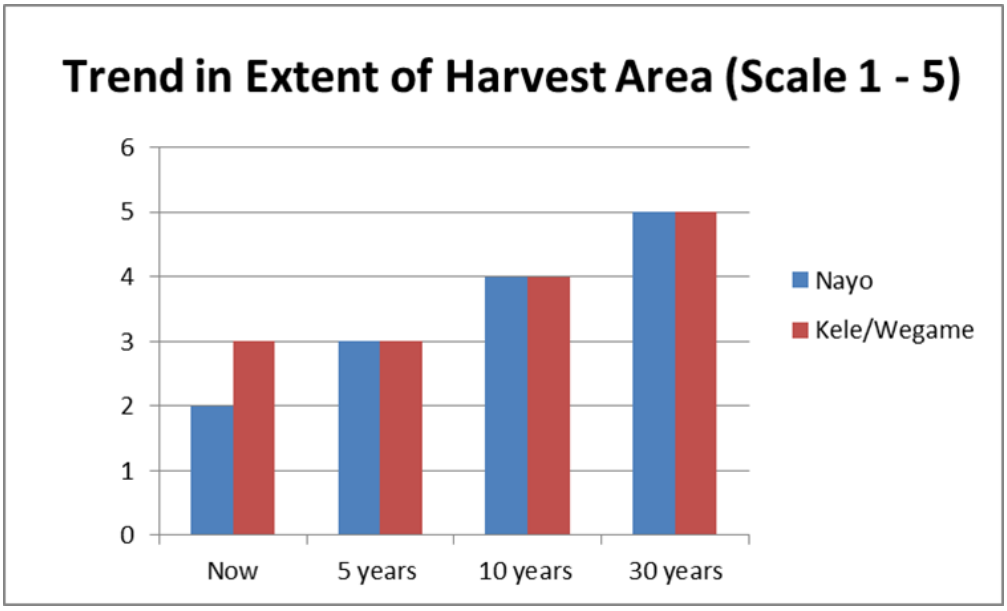

Figure 15 Trend in Extent of Harvest Area

Density of oyster population

Density in Kele/Wegame has remained unchanged over the past 30 years. This area is primarily used for deep under water harvesting and remains undisturbed for periods of time. Nayo, on the other hand, is depleting rapidly and Kpovodudo less so. The reduction in density is associated with sedimentation and erosion caused by periodic fresh water inflows from the Weija Dam.

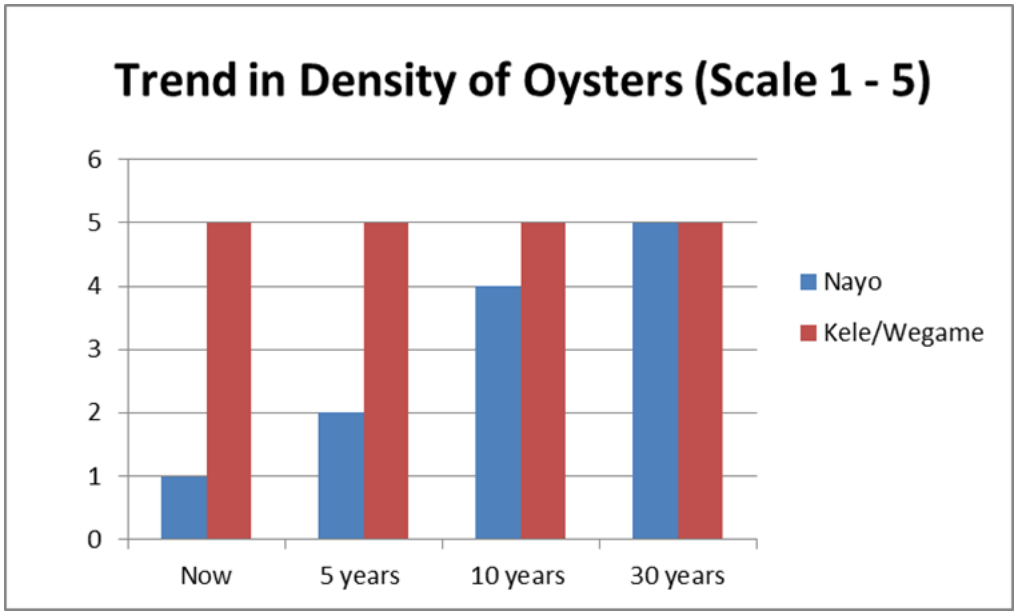

Figure 16 Trend in Density of Oysters

Size of oysters

All the sites have witnessed a decrease in the size of individual oysters, some more than others. Oysters in Kele/Wegame have seen a small rate of decrease, from a 5 rating 30 years ago to a 4 in the past 10 years. Kpovoduvo has seen the highest rate in size reduction, from a 5 rating 30 years ago to a 1 presently. The primary reason for size reduction is overexploitation.

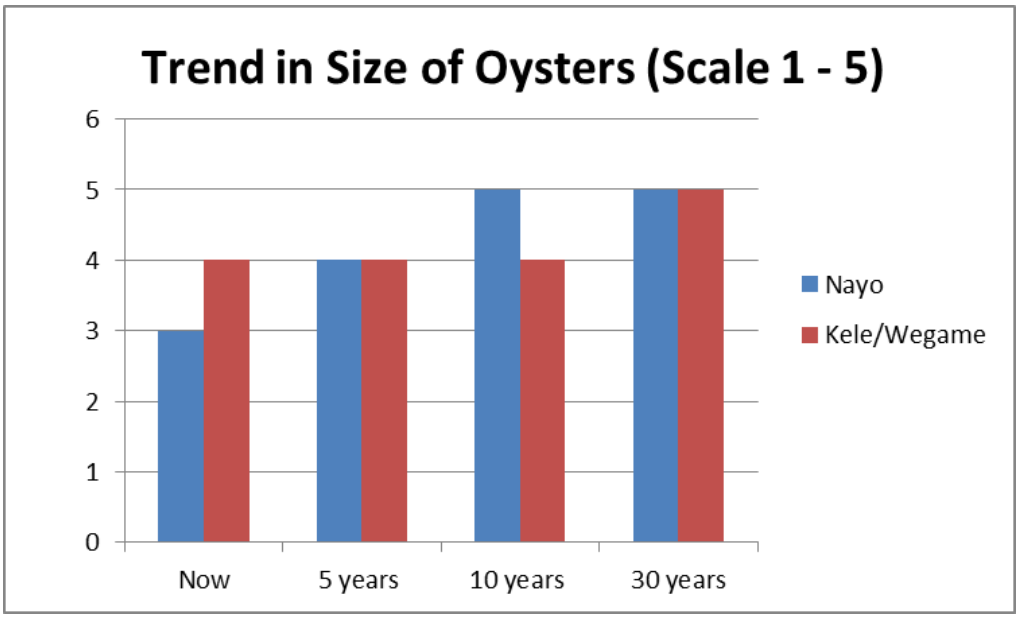

Figure 17 Trend in Size of Oysters

Fuelwood

In the past mangroves were cut for fuelwood and construction. Most of the mangroves have been cut over the past 30 years. Now fishers cut mangroves to use as brush park (ategya) to trap fish. One of the PRA participants, when informed that mangrove cutting is bad practice, exclaimed "what do we do if we do not cut the mangroves?" Some of the degraded mangroves in the brush parks rejuvenate and sprout new roots and stems. This could be a source of seedlings for rehabilitation.

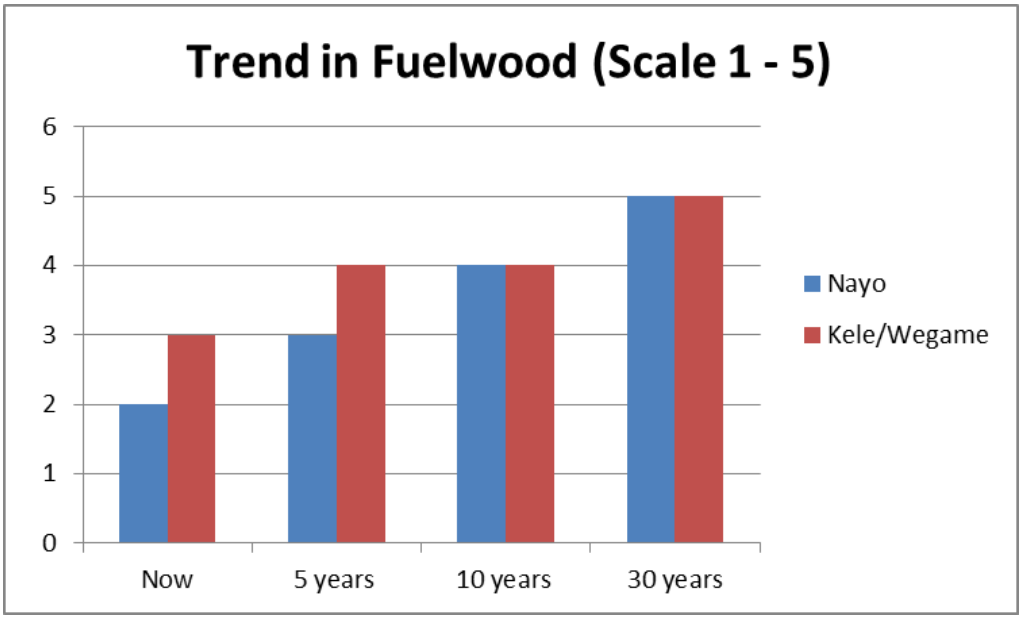

Figure 18 Trend in Fuelwood Availability

Collection Effort

Duration

Until five years ago, oyster collection along the Densu estuary could be done close to the edge of the river, thus not requiring canoe transportation. Travel from the village to the collection site took 5 minutes. The shore line was thick with mangroves where oysters grew. Participants claim that until 10 years ago, deposits of sand were observed where mangroves with oysters grew, and that the opening of the Weija Dam destroyed the domes along with the mangroves. As collection was primarily for food and not commercial, family members collected just enough for the day's consumption. Now it takes at least 1 hour on foot and 30 minutes by canoe to get to the nearest collection site.

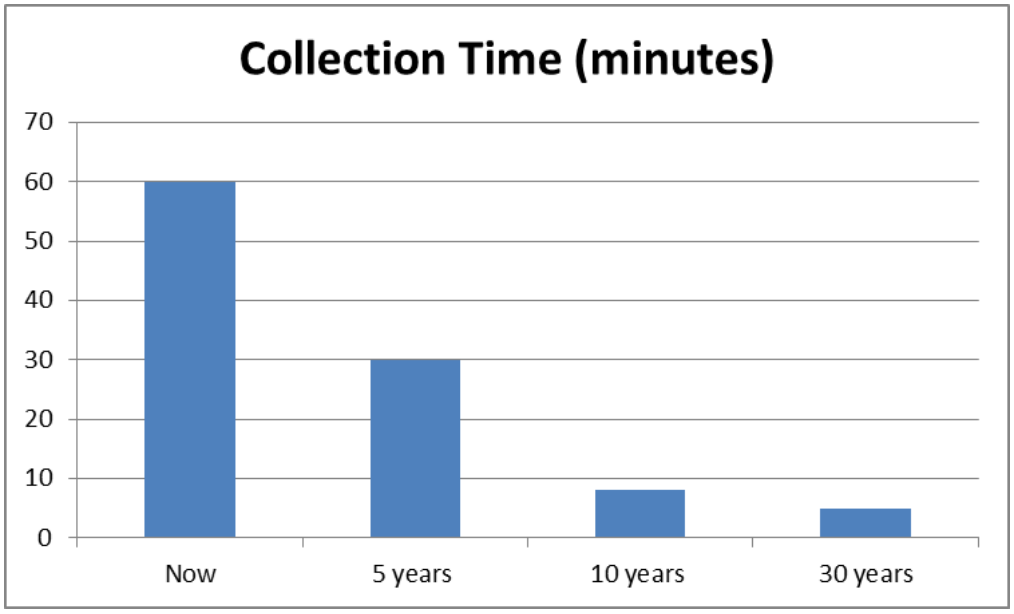

Figure 19 Average Time Taken to Collect Oysters

Distance

With the shoreline of the estuary hosting oysters, the community did not have to travel far to the collection sites and did not travel beyond the location where Bojo Beach Hotel is presently located. Thirty years ago, they travelled less than 0.5 kilometer to collect, whereas now they travel at least 6 kilometers.

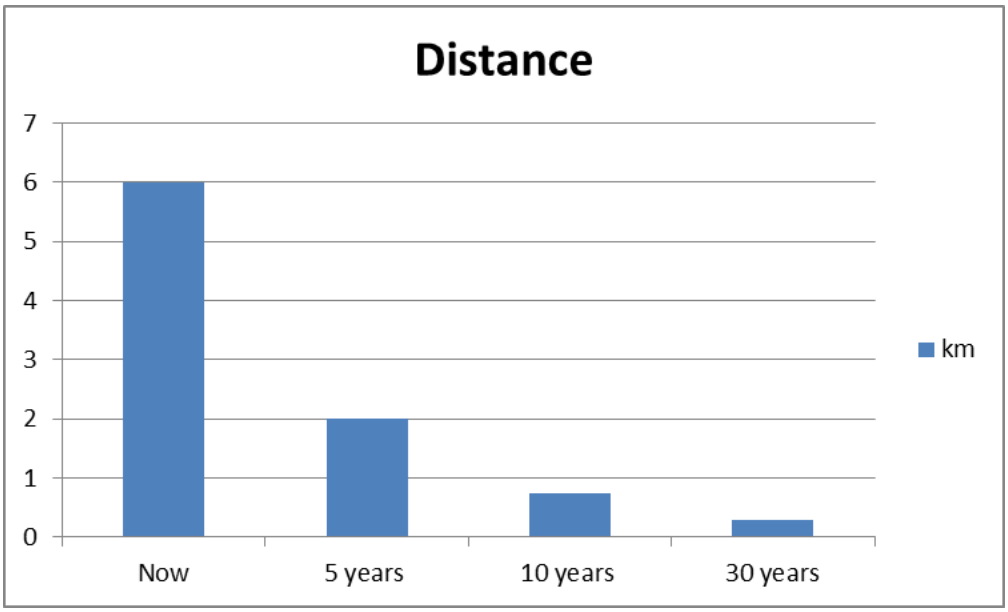

Figure 20 Average Distance Traveled to Collect Oysters (km)

Quantity harvested

Thirty years ago, as earlier mentioned, harvesting was only for family consumption. Because of the close proximity of collection sites, families could collect several times a day to meet the quantities required for the family needs. Ten years ago, as oysters started to have economic value, collectors picked up to 5 harvesting baskets per trip. This quantity has since reduced to 3 baskets.

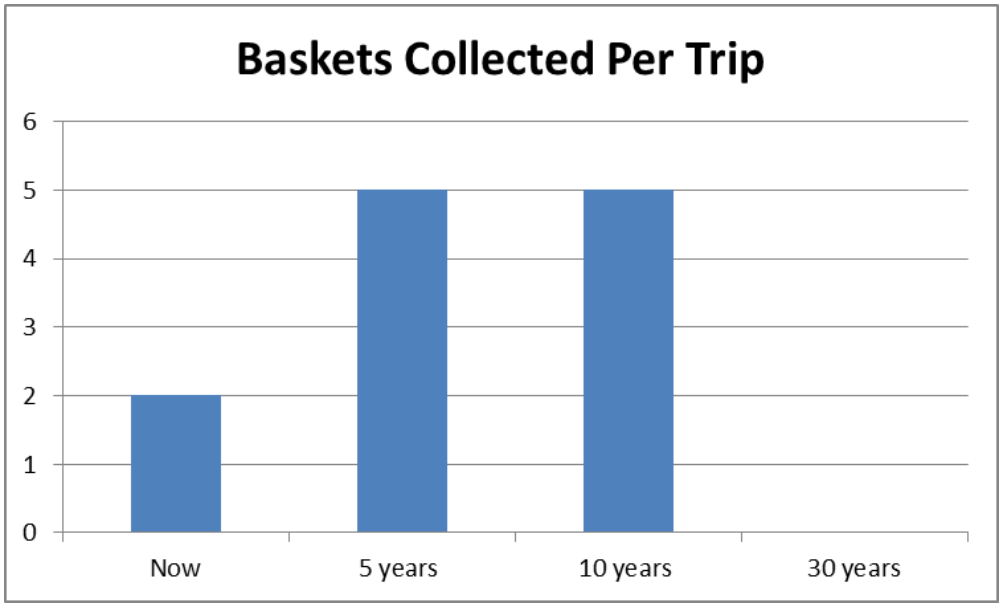

Figure 21 Average Baskets Collected per Trip

Income

Until 10 years ago, oysters were not sold. Since then the income generated per trip has changed from 2 cedis (at the value of the late 1990s), to 20 cedis in the early 2000s and now 10 cedis per trip.

Relationship with other Communities and Users

Oyster harvesters enjoy open access to the resources, without restrictions. For the most part, other users of the resources in the estuary are family members. Oyster pickers may travel on the canoes owned or operated by fishers or encounter them on their way to the collection sites. Other communities that pick from the same location, for example from Tunga, may compete for collection space but this is quickly resolved as they move to other sites.

The likelihood for conflict occurs with fish trappers who set up their brush parks close to sites used by oyster pickers. However, any tension that may arise is resolved before it escalates.

Impact of Oyster Harvesting

Participants agreed that oyster harvesting has both positive and negative impact on individuals, families, the community, and the environment.

Positive impact

- Oysters are a significant food source high in protein and minerals and therefore contribute to food security. They presently exist in abundance and are low cost.
- The sale of oysters helps in diversifying livelihoods, thereby contributing to poverty reduction.

- Oyster shells are used in building construction – as filling for foundations and as an ingredient in paint. Shells are also used to fill mud houses to prevent erosion during heavy rainfall and to fill flooded areas
- Shells are used in the cosmetic industry as an ingredient in face powder.
- They are used in animal husbandry as an ingredient in animal feed and medication for poultry and livestock.
- The leftover liquid in the shell after the meat is removed is used to stop bleeding and the shells are used to treat wounds.
- Mangroves have the potential to host oysters. More sustainable oyster management practices would encourage mangrove protection, regeneration and re-establishment, improving habitat for different animal and plant species that contribute to biodiversity. Mangroves are breeding grounds for fish and they host birds and insects.

Negative impact

- Continuous exposure to river water alters skin color and causes red eyes, especially during diving expeditions. The practice of women carrying heavy loads of oysters and fish on their heads can have damaging effect on their health.
- Unknown pathogens or insects are present in the river and cause skin lesions to oyster pickers and other users.
- Oyster shells have been the cause of serious injury because of poor picking and handling techniques without the use of protective gear. The abrasive nature of the shells causes injury to children when not properly disposed of.
- Fishermen from a neighboring village use glass bottle traps which, when broken, can cause injury to oyster pickers.
- Although the water in the river appears clean, waste management is a problem along the shoreline. The nearby refuse dump serves as a breeding area for mosquitoes and other insects. Some inhabitants use the shore and river as toilet.
- The opening of the Weija Dam carries waste downstream and affects the river. The unfettered cutting of mangroves exacerbates the problem.

Good and Harmful Practices

Table 4 Good and Harmful Practices

Good practices	Harmful practices
When the dam is opened, it helps in good harvest. Fishermen get bigger tilapia and other fish species Uses of shells - Building foundation - Paint - Cosmetics: face powder	1. Picking oysters without the use of protective gear 2. Broken bottles from tilapia harvest are left in the water. Women harvesters are wounded from these broken bottles 3. Fish traps are sometimes destroyed by high tide or from the dam when it is opened for water flow- debris from fish traps harm oyster pickers 4. Empty shells left on the shoreline after processing cut people's feet 5. Mangrove cutting 6. Dark sediment in areas near heavily used or unflushed dead-end areas of the estuary. Perceived as caused by the Dam 7. Dumping of refuse at river banks

Figure 22 Piles of oyster shells adjacent to where women steam and shuck oysters, in the yards of oyster harvesters.

Photo Credit: SFMP

CONCLUSION

The PRA has shown that prospects exist to develop a community based management plan for sustainable oyster harvesting as a livelihood diversification strategy for the women of Tsokomey/Bortianor. Oyster stock is in decline due to over-exploitation and loss of habitat as demonstrated by the trends documented in this PRA. Oyster harvesters go farther and spend longer but collect fewer oysters. Catch per unit effort is in decline. There has been a major loss of mangroves primarily from cutting by local communities. There is a critical need to protect and improve habitat and sustainably manage harvest rates. Opportunity exists for value chain improvements in collection techniques, post-harvest processing and marketing. Market awareness of the economic and nutritional value of oysters is low.

With the support of DAA, the women harvesters have formed groups as a first step in developing the management and governance capacity needed to achieve sustainable economic benefits for the women and men oyster harvesters and a healthy estuary and ecosystem. This will be an ongoing process that is expected to culminate in a community-based co-management and conservation plan.

Figure 23 Executive Committee of the oyster harvesting group formed with support of DAA

RECOMMENDATIONS

1. DAA should follow up with the Government of Ghana and other institutions involved in the management of RAMSAR sites in Ghana and the Densu Delta to understand the status of the December 1999 Densu Delta RAMSAR Site Management Plan and the 2008 National Wetlands Conservation Strategy and Action Plan (2007-2016).

2. DAA should continue to facilitate the process of supporting oyster harvesters to organize in a representative manner as well as the process of establishing an officially recognized legal entity oyster harvester's association.

3. Women and men oyster harvesters should consider management measures to enhance and sustain the resource in the future. They should continue the participatory co-management process and the following process recommendations:
   - Continue mapping and stakeholder analysis.
   - Educate stakeholders (in particular harvesters and DAA) on oyster ecology and biology and on water quality. Continue linkage with the University of Cape Coast for this.
   - DAA and the executive committee should consider if they can themselves collect additional oyster value chain information to inform their management planning.
   - Select management actions and develop a monitoring plan.
   - Consider implementation of early actions that promote good stewardship of the estuary and oyster fishery such as mangrove replanting or oyster reef restoration
   - Consider peer learning study tours to other locations in Ghana where mangrove harvesting and restoration are taking place, and The Gambia and Benin where oyster harvesting and management take place.
   - Focus on capacity building, including training in post-harvest processing

4. Loss of habitat seems to be a significant factor in the reduction in catch per unit effort of oysters over the last 3 decades documented in this PRA. Take actions such as mangrove

planting and restoration. This could include a study tour to Ghana's Western Region to see the mangrove nursery established there.

5. Train women and men oyster harvesters in water quality testing.

6. Raise awareness among leaders and the population in surrounding communities about the importance of protecting the Densu estuary ecosystem and its biodiversity.

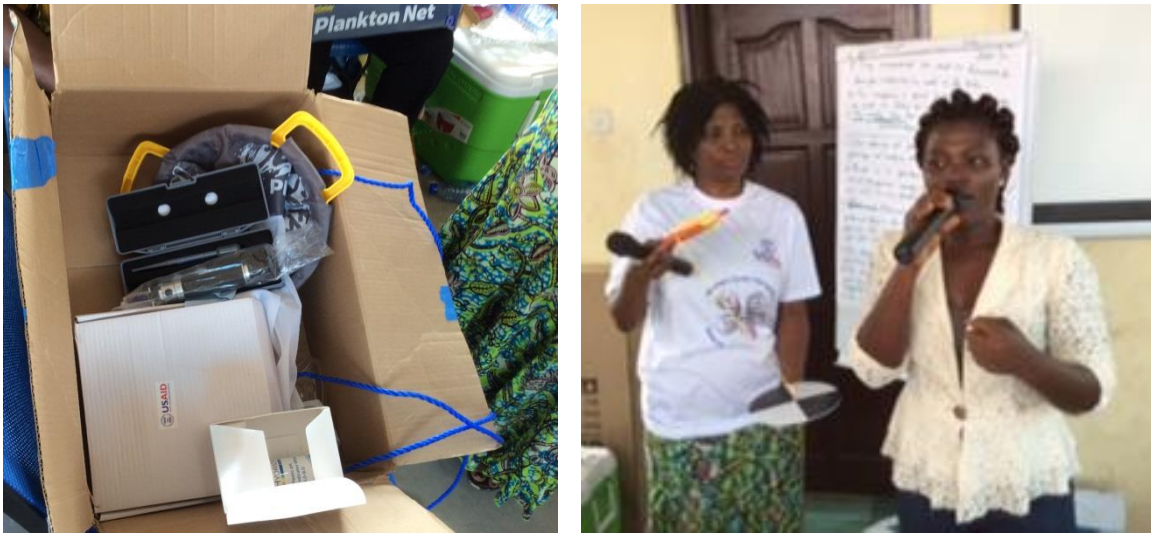

Figure 24 Water quality testing equipment provided by SFMP for training oyster harvesters in water quality testing and monitoring

Photo credit: TRY

APPENDIX 1: TRADITIONAL KNOWLEDGE AND PRACTICES, OYSTER HARVESTING, BORTIANOR/TSOKOMEY

Traditional knowledge, attitudes, myths, beliefs, and practices

1. Oyster harvesting is not a full time occupation or livelihood or a major commercial activity. "I came to Tsokomey from Volta region specially to carry fish load because I heard that it is a lucrative activity. Here oyster harvesting is not an occupation" (PRA participant Korkor who migrated from Volta Region, 1/30/2017).
2. Oysters are picked primarily to feed the family, not to sell. “Traditionally oysters served as alternative to fish. When the fish catch is low, oysters were harvested for the meal. During rainy season, something happened to the oysters because they died. Also when the dam overflows, the oysters die” (Community elder, 1/30/2017). Note that scientific knowledge documents that lack of salinity (i.e., if the estuary stays fresh for very long periods) is a cause of oyster mortality.
3. Oyster harvesting begins when oysters begin to smell like human beings (traditional Ga myth)
4. All river fishing is halted for 6 weeks between August and October during the Homowo customary rites presided by the river priest
5. Oyster harvesters travel in search of oysters because oysters “travel” (move from one location to another. Note that scientific knowledge indicates that oysters do not move. Perhaps the perception is due to changing habitat and changing oyster abundance in certain locations.
6. Oysters used to grow on mangroves about 30 years ago. They adapted to the change in environment as the mangroves were depleting.
7. Basket fishers tie plastic bottles on the baskets to allow them to float. Fish are unable to jump back into the water once they get into the basket

Figure 25 Floating baskets used by fishers

Interview with Peter Oblitey Amui, representative of Sakumo Family in Bortianor

The Ewe settled in Tsokomey, land owned by the Sakumo family. The forefathers allocated Tsokomey because Ewe are traditionally river fishers whereas Ga are sea fishers. Peter has seen an agreement from his grandfather giving land to Ewe to settle. In the past Ewe paid levy to Ga owners; Peter believes this practice should be restored because the Ewe youth do not respect the traditional ownership and historical relationship; do not pay homage to the traditional Ga leaders and do not believe in the river god. The Sakumo family leased land to Bojo Beach Hotel owners. There is no tension or conflict between Ewe and Ga in Bortianor. Customary Ga rites require the river to be closed for 2 weeks from last week of August and first week of October. Some Ewe find it hard to comply with the closing because of poverty. Culprits are asked to pay a fine, and pressure is used to ensure payments.

APPENDIX 2: DAA PRA GUIDE FOR OYSTER FISHERY MANAGEMENT IN TSOKOMEY VILLAGE, GREATER ACCRA REGION, GHANA, JANUARY 30 – 31, 2017

INTRODUCTION

Development Action Association (DAA) is planning to develop and implement a Community-based Management and Conservation Plan. The goal of the Plan is to ensure sustainable economic benefits for women oyster harvesters in Bortianor and maintain a healthy estuary and ecosystem in which oysters thrive. The management plan will be developed by the women oyster harvesters and include vision, objectives, actions, and institutional framework to empower the women to be the stewards, managers and rights holders of the oyster fishery resources in the Densu Estuary.

This Participatory Rural Appraisal (PRA) is the first step in the development of the Community-based Management and Conservation Plan. The communities will assess the ecological and socioeconomic status of the surrounding area. They will share the history of oyster fishery in the Densu Estuary, highlight their experiences, and identify the opportunities and challenges in oyster harvesting and conservation management.

SESSION 1: SOCIO-ECONOMIC ACTIVITIES

1. What kind of work do you do to earn a living? Is this the only activity you work on? Let's list the different activities you do during the year.

Calendar of economic activities

Activity	J	F	M	A	M	J	J	A	S	O	N	D

2. Let's look at your oyster harvesting activity in more detail. How does it work? List different things you do as part of oyster harvesting, how long each step takes, and the resources you use

Chain of activities for oyster harvesting

Activity	Site	Time estimate	Resources used	Trend	Observation

3. Site Mapping: Using the GPS map provided, the group will identify surrounding settlements, outline their collection site boundaries, identify local names of sites, identify tributaries, key species habitats, historical sites, etc. Assess the vegetation status, identify key sites for aquatic species such as fishes, crabs, etc

Site Name	Characteristics	Ecological function	Social functions	User rights	Trends and Constraints

4. Estimate the number of persons engaged in oyster harvesting in this location over the past 30 years

Activity	Now	5 years ago	10 years ago	30 years ago	Observations
Number of people					
Number of boats					
Description of practices					

5. How much effort does it normally take for collection?

Activity	Now	5 years ago	10 years ago	30 years ago	Observations
Duration					
Distance					
Quantity harvested					
Income					

6. What type of relationship exists with neighboring communities and other users?

Community/User type	Type of relationship	Frequency of interaction	Type of Conflict, if any	How is the conflict resolved?

7. What is the impact that different activities have on the environment and wellbeing of families and the communities?

	Positive impact	Negative impact
Your own activity		
Other activities in the location		

SESSION II. ASSESSMENT OF RESOURCES

8. Using a scale of 1 to 5 to represent declining and increasing status, assess the state of the resources in the river. Use a new chart to assess different sites where applicable.

Status of Oysters	Now	5 years ago	10 years ago	30 years ago	Observations
Extent					
Density					

Size of oysters					
Fuel wood					

9. Do you own or rent the boat you use for collection? If you rent, tell us the amount and frequency of payment.

10. What are some practices that are good or harmful for the river?

Good practices	Harmful practices

11. For each activity in the value chain, what are the constraints and recommended solutions?

Activity	Constraints	Solutions

APPENDIX 3: DAA PRA TIMETABLE, BORTIANOR/TSOKOMEY, GREATER ACCRA, GHANA, JANUARY 30TH AND 31ST 2017

SETTING UP THE PRA VENUE

a. Assign participants from same community or same stakeholder group to the same table. Each group shall have between 8 and 10 persons. Everyone will have a name tag with group number and name of village/community or type of stakeholder
b. Appoint two facilitators for each group, one to record on the flipchart and the other to facilitate the discussion
c. Provide a flip chart pad and markers for each group
d. Facilitators will draw blank charts on flipchart to record participants' responses (see PRA questionnaire for examples of charts)

Timetable

Time	Monday 01/30/2017	Tuesday 01/31/2017
09:00 – 09:30	**PRA Introduction** • Opening prayers • Opening by officials (SFMP, DAA, Community Leader) • Experience sharing by TRY-Gambia	**Plenary Session** Recap and validate Day 1 results
09:30 – 11:30	**Plenary Session** • Overview of PRA Methodology and tools • Type and calendar of economic activities • Site Mapping exercise by Justice Mensah, Hen Mpoano • Oyster value chain analysis	**Group Session (Ques 7, 8, 9)** • Impact of activities • Assessment of resources
11:30 – 1:30	**Group Session** Historical trends in resource availability and effort (Ques. 4 & 5)	**Group Session (Ques 10 & 11)** • Good and harmful practices • Constraints and recommended solutions
1:30 – 2:30	**Lunch Break**	**Lunch Break**
2:30 – 4:00	**Group Session** Assessment of relationship quality among communities and users	**Plenary** • Discussion of summary PRA results • Next steps: Training in Oyster ecology and biology by Sheila Fynn-Korsah, UCC • Closing and group photograph