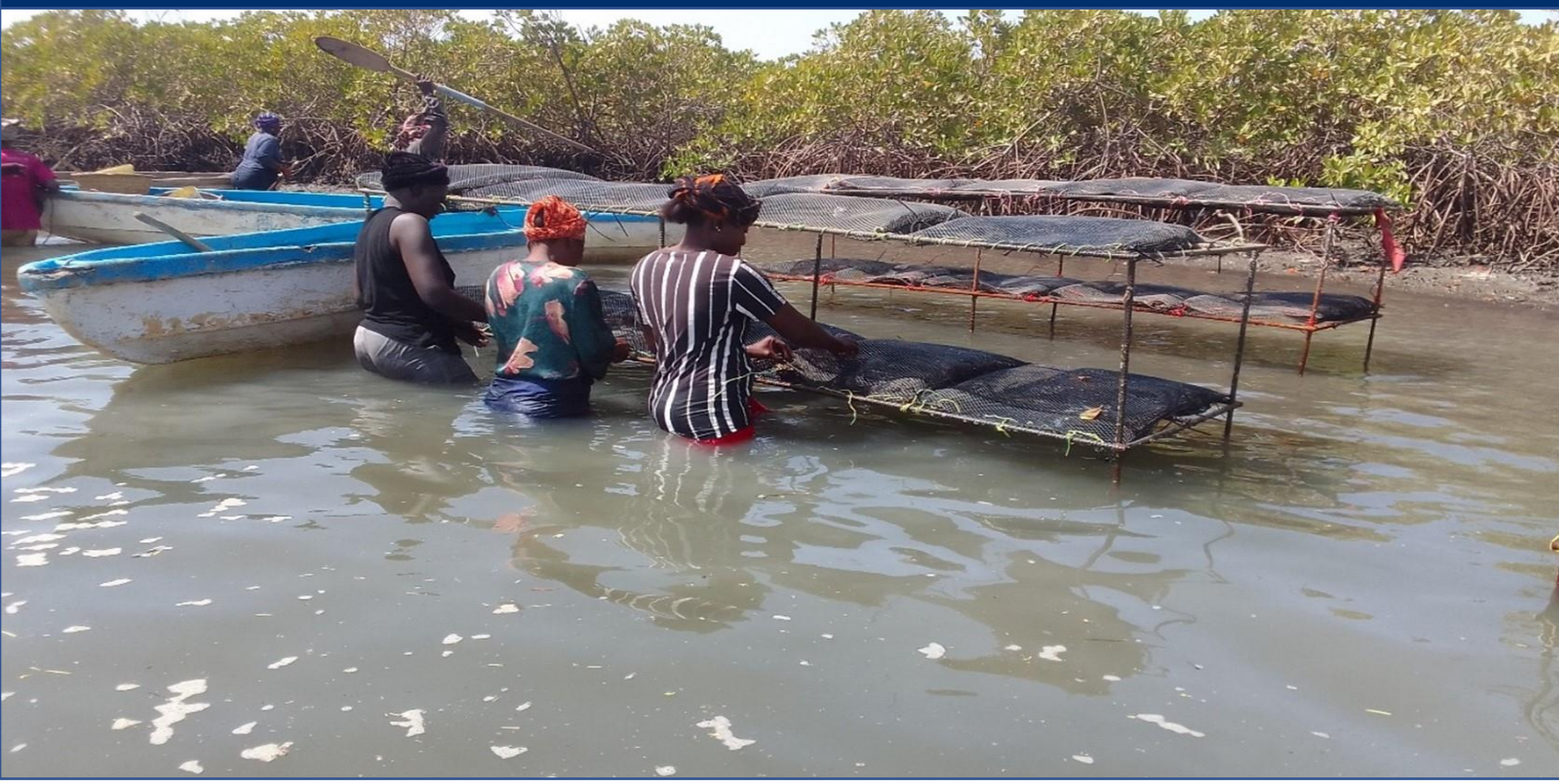
WOMEN SHELLFISHERS AND FOOD SECURITY

Report on Establishment of Oyster Aquaculture in Lamin

(TRY Extension Milestone #7)



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Cover photo: Washing of oyster aquaculture farms by beneficiaries.

Photo credit: TRY Oyster Women's Association

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Introduction

This report is part of the USAID Women Shellfishers and Food Security project support for oyster harvesters in Lamin, The Gambia. The Women Shellfishers and Food Security project (hereafter referred to as "the project") 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 project is currently in a three-year Phase II, which began in September 2022. The aquaculture activity detailed in this report was implemented in 2024.

Historically, oyster harvesting was an integral part of life of oyster harvesters in Lamin. Both resident communities and tourists provide a demand for oysters. According to harvesters, initially oysters were used for personal consumption, but later they became a marketable commodity.

Oyster harvesting in Lamin has conventionally been carried out by extracting the oysters from mangroves roots using knives, cutlass, and more recently small axes. These methods have mainly been used in times with relatively fewer active harvesters, making it a sustainable practice. This has recently shifted as the present generation has become more aware of the opportunity of oyster harvesting.

Presently, due to the many harvesters engaged in the industry, increasing pressure on the resource has resulted in overharvesting and mangrove degradation. The ecosystem is also subject to climate change impacts. These impacts imply the need for regeneration conservation notions such as area/seasonal closures and oyster aquaculture to ensure oyster stock and harvesting sustainability.

It is on the basis of the impacts highlighted above that the project intervened with facilitation by the TRY Oyster Women's Association (TRY) to support Lamin oyster harvesters in oyster aquaculture to better understand the contribution that aquaculture can make to livelihoods for women shellfishers who are also responsibly managing the wild harvest.

TRY piloted oyster aquaculture technologies under past projects, including the USAID/BaNafaa project (2011-2014) and with British High Commission support in subsequent years. These included: floating mesh bags; bamboo racks with suspended strings using empty shells as substrate; and floating bamboo rafts with suspended strings of oyster shells. For this initiative, TRY decided to use a technology that is more durable even though it requires a much more substantial capital investment in materials that are imported. This decision was also based on the deployment of this technology at other sites in The Gambia by the FAO FISH4ACP project and the opportunity for TRY and the Department of Fisheries to develop an understanding and provide technical support for this technology and learning across multiple sites. The technology consists of fixed frames made of iron bars with two levels of plastic mesh bags (top and bottom) attached in a removable manner to the iron frame.

Twenty (20) women beneficiary members of TRY are engaged in this activity. Each woman was trained and provided with five plastic mesh bags for oyster grow-out in individually managed aquaculture farms, totaling 100 plastic mesh bags.

For management of farms, meetings were held with beneficiaries prior to aquaculture system installations which resulted in an agreed bi-weekly cleaning schedule for individual farms, replacement of mortalities, and reporting on other relevant observations. Monitoring was agreed as a responsibility of TRY on a monthly basis, including oyster morphometric data collection, farm washing, and relocation of farms to suitable sites/mud-free contact areas as needed. As has been previously experienced with other projects, the growth period is estimated be estimated at one year, at which point big oysters will be separated from small oysters and harvested. Additional plastic mesh bags will be needed to accommodate separation process.

Construction of plastic mesh bangs (culture material)

Figure 1 below depicts construction of plastic mesh bags with beneficiaries. Prior to commencement of aquaculture farm installation, TRY was requested to identify 20 beneficiaries for participation in the initiative and selection was based on consensus reached by all association members. Following recruitment of the beneficiaries, a participatory training on measurement, cutting, and constructing of the mesh grow-out bags was held in Lamin. The names of participating beneficiaries are listed in Annex 1.

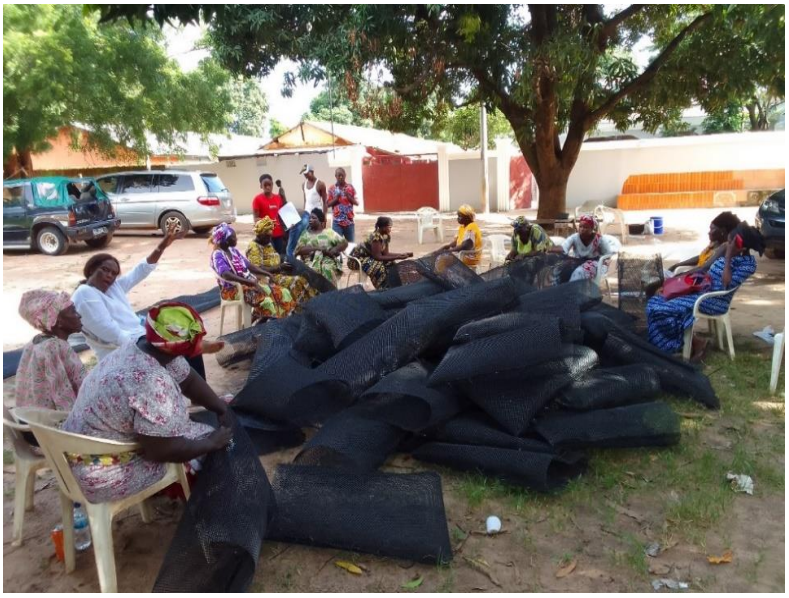


Figure 1. Construction of plastic mesh bangs (culture material).

Deployment/Installation of Oyster Farm Platforms

Figure 2 below shows participatory deployment of the constructed oyster farm platforms, which are made up of 12 mm diameter iron rods. Ten platforms were constructed with each shellfisher occupying either the top or bottom level. Each platform accommodates five grow-out bags each for the two beneficiaries.

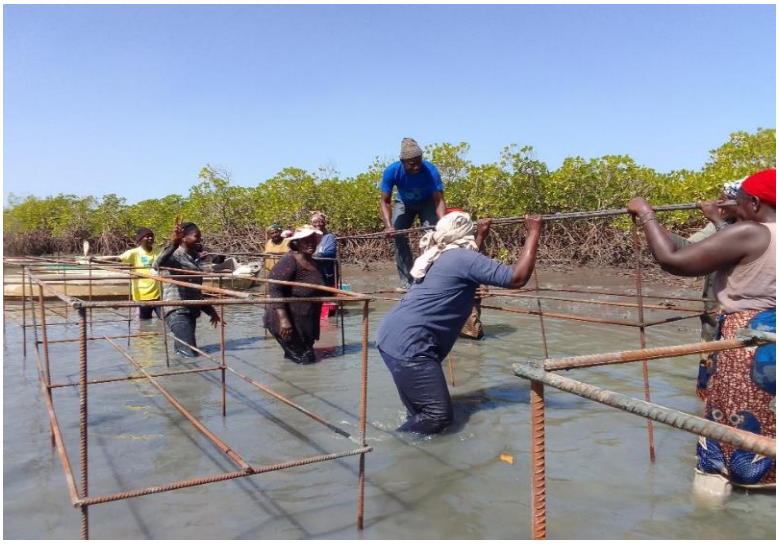


Figure 2. Deployment of farm platforms made of iron rods.

Cost of Farm Establishment and Source of Materials

The materials for the construction farms were sourced from Senegal and Gambia and include plastic mesh rolls, mesh cutters, hard nylon straps for mesh bag weaving, iron rods, angle iron, wire for tying on iron frames and closure of mesh bag openings (see Annex 3). The total cost of materials including training, deployment of platforms/frames and workmanship is totaled at 213,500 Gambian dalasi (GMD). Twenty-four participated in the construction of the 100 mesh bags out of which 4 were TRY staff.

The construction of the bags took 2 days. Day one was focused on cutting of mesh rolls and day two on construction of mesh bags. The plastic mesh bags are non-biodegradable and expected to last for more than 20 years. As for the iron rods they could last in water for more than five years, according to FISH4ACP's aquaculture consultant.

Monitoring Trip

Monitoring by beneficiaries was agreed to be conducted on a bi-weekly basis, while TRY would conduct additional monitoring monthly. Beneficiaries agreed on a bi-weekly individual monitoring. Only two monitoring trips were conducted (February and April), due to conflicts with the oyster open season harvest activity. Specifically, individual monitoring activities include washing/cleaning of dirt (see Figure 3), sorting and replacement of dead oysters and repositioning of mesh bags on platforms. Handheld brushes are used for the washing.

Additional monitoring by TRY was agreed on monthly basis and co-conducted with beneficiaries. Activities undertaken include oyster morphometric data collection and mortality. For morphometric data collection (see Figure 4), a random selection of two oysters from each bag were taken. Length and height measurements were taken and entered into digital spreadsheets. See Annex 2 for results of the morphometric data thus far.

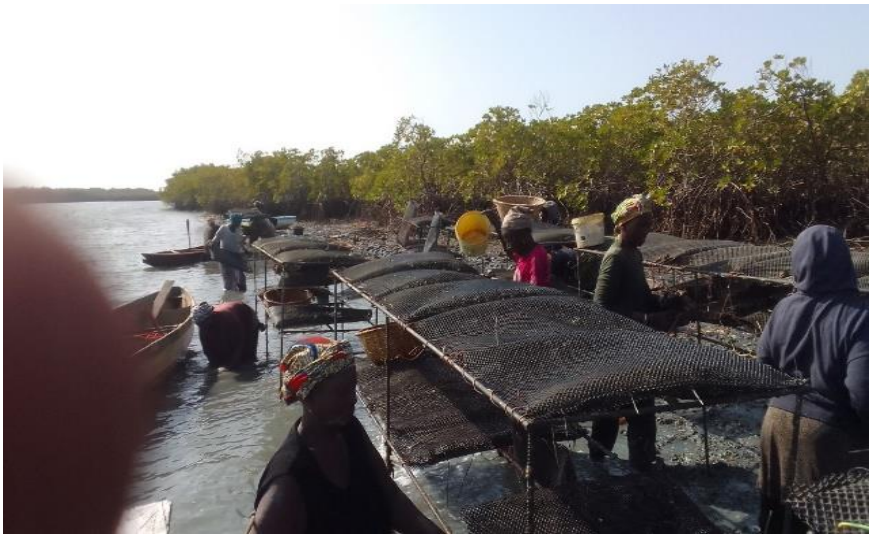
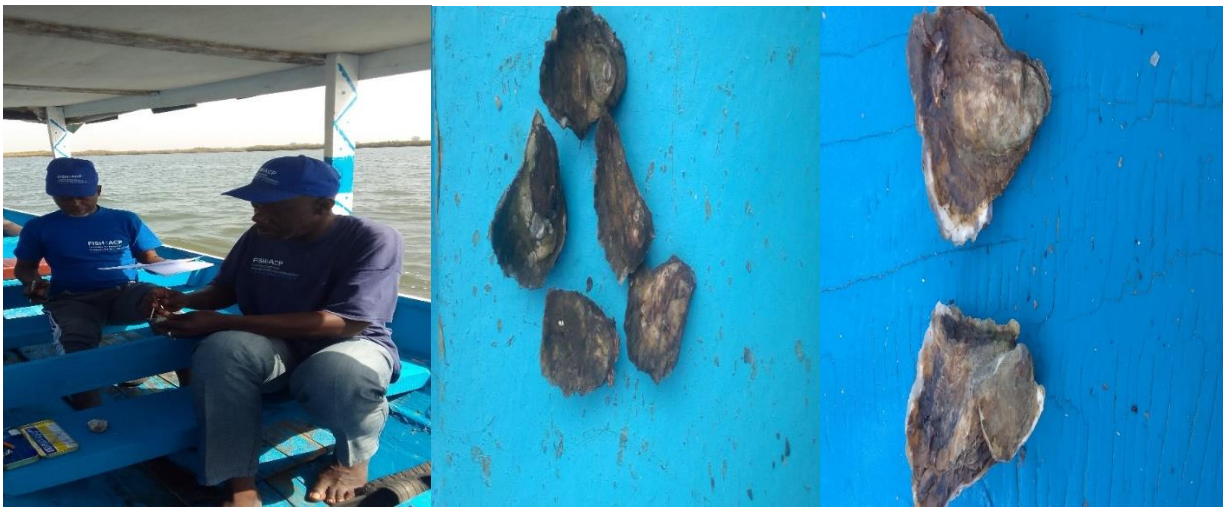


Figure 3. Beneficiaries washing farms during monitoring trip.



a) Data collection b) Samples on day 1 c) Samples after 4 months

Figure 4. Oyster morphometric data collection.

Results and Observations during Monitoring

Following construction and deployment oyster culture mesh bags, two monitoring trips were held, one in February and the second in May 2024. Activities conducted for February monitoring trip includes washing and removal and replacement of oyster mortalities, including relocation of some platforms/farms due to mud contact of lower section/underwater mesh bags. May monitoring activities were focused on washing, removal, replacement of dead oysters and oyster morphometric data collection.

Mortality rates are classified into top and bottom level (see Annex 4). This data was collected in May. A total of 124 and 271 mortalities were found on the top and bottom levels on the platforms respectively, out of a total of 2000 oysters.

The specific observations/lessons learned include the following;

- Overall, positive oyster growth
- Few mortalities
- Undamaged platforms and mesh bags
- Need for additional different mesh size bags to accommodate different oyster sizes
- Need for increase in bags from 5 to 10 for each beneficiary, so as to be able to transfer/sort out large oysters to control carrying capacity, thus allowing for more growth.
- Monitoring was not budgeted for, which made it challenging to ensure time, effort, and funds needed to conduct regular monitoring out on the farm site.
- Morphometric data collection should continue to inform growth patterns, including mortality rate and income after harvest

Opportunities

- Overall, oyster aquaculture has the potential to make a positive impact on coastal ecosystems, sustainable seafood production, and local economies.
- Environmental restoration by using or deploying shells to farm locations or as substrates.
- There is a perception that harvesting farms will contribute to income generation, employment creation, and boosting coastal communities.
- Successful aquaculture could help meet the growing demand for nutritious protein while reducing pressure on wild fish stocks.
- Aquaculture trials provide opportunity for in-depth research innovative habitat restoration.
- By embracing responsible and environmentally conscious approaches, oyster aquaculture continues to make a meaningful difference, ensuring a brighter future for both the women harvesters, stakeholders, and the marine ecosystems it relies upon.

Challenges

Listed below are a few challenges earmarked during construction, deployment, and monitoring:

- Purchase and use of only one size plastic mesh bag, making it difficult to separate large and small sizes or accommodate different oyster sizes.
- Limited quantity (5 for each) of mesh bags per person.
- Non-availability of mesh materials in the Gambia, making it costly to obtain.

Recommendations

Below are recommendations for improved learning, research, and community benefits:

- Upscale farms to accommodate additional beneficiaries.

- Include different plastic mesh sizes and/or use available in-country alternate materials such as used fishing trawlers nets.
- Engage the Department of Fisheries to support continuity of the farms, especially data collection on growth, analysis, and dissemination of results.
- Collect data on harvest and sales after one year.
- Conduct after one year a cost-benefit analysis to understand the viability of the farms.
- Conduct experimental habitat restoration by using or deploying oyster shells to serve as bottom substrate in anticipation of maximizing habitat sites.

Annex 1

Names of beneficiaries & number of plastic mesh bags for each.

No	Name	No of bags	Landing Site
1.	Amie Sarr	5	Lamin Lodge
2.	Susan Sambou	5	Lamin Lodge
3.	Musukebba Jammeh	5	Lamin Lodge
4.	Sainabou Angelic Jammeh	5	Lamin Lodge
5.	Saifiatou Fofana	5	Lamin Lodge
6.	Ndey Fatou Jarjue	5	Siaka Tenda
7.	Nyima Jassey	5	Lamin Lodge
8.	Mary Jatta	5	Lamin Lodge
9.	Amie Jatta	5	Lamin Lodge
10.	Lalia Ehemba	5	Siaka Tenda
11.	Sarata Jammeh	5	Siaka Tenda
12.	Elizebeth Jatta	5	Siaka Tenda
13.	Fansainey Demba	5	Lamin Lodge
14.	Musu Jabang	5	Lamin Lodge
15.	Mariama Demba	5	Lamin Lodge
16.	Theresse Jatta	5	Lamin Lodge
17.	Filomen Jammeh	5	Siaka Tenda
18.	Mama Sambou	5	Lamin Lodge
19.	Kumba Jassey	5	Lamin Lodge

20.	Nyima Jassey	5	Lamin Lodge
	Total	100	

Annex 2

Oyster morphometric data. Date of data collection: April 2024.

Names are categorized as 2 beneficiary per platform, meaning 5 mesh bags per beneficiary and 10 mesh bags per platform. Two oysters were randomly selected per bag for measurement (i.e., 10 measurements per 5 bags per individual farm).

ANGELIQUE		MUSU		Susan		AMIE		NDEY		SAFFIE		MUSUBA		FANSAINEY		LALIA		AMIE	
UP		DOWN		UP		DOWN		DOWN		UP		DOWN		UP		UP		DOWN	
7.1-L		8.6-L		6.2-L		8.6-L		7.1-L		7.2-L		6.4-L		7.3-L		8.7-L		4.8-L	
5.7-H	1	5.9-H	1	4.5-H	1	6.0-H	1	5.5-H	1	4.5-H	1	5.5-H	1	5.6-H	1	5.6-H	1	2.8-H	1
6.6-L		8.2-L		7.0- L		7.2-L		6.5-L		6.3-L		5.2-L		5.6-L		9.1-L		6.7-L	
5.0-H	2	5.0-H	2	5.2-H	2	5.6-H	2	4.6-H	2	4.0-H	2	3.9-H	2	4.4-H	2	5.6-H	2	4.3-H	2
7.1-L		9.3-L		6.3-L		7.8-L		6.9-L		7.2-L		5.6-L		7.7-L		10.0-L		5.7-L	
4.2-H	3	5.8- H	3	4.0-H	3	6.6-H	3	4.4-H	3	4.3-H	3	4.0-H	3	5.6-H	3	5.5-H	3	3.4-H	3
7.4-L		7.1-L		7.4-L		7.5-L		8.1-L		7.1-L		7.6-L		6.1-L		7.5-L		6.6-L	
5.2-H	4	5.5-H	4	4.7-H	4	5.5-H	4	4.0-H	4	5.1-H	4	5.3-H	4	4.3-H	4	4.7-H	4	3.3-H	4
7.7-L		8.6-L		6.9-L		8.3-L		6.0-L		6.9-L		6.7-L		8.3-L		6.7-L		5.0-L	
5.9-H	5	6.2-H	5	4.6-H	5	6.7-H	5	4.0-H	5	4.0-H	5	3.7-H	5	4.7-H	5	5.3-H	5	2.6-H	5
7.3-L		7.8-L		6.0-L		8.4-L		6.2-L		6.8-L		6.4-L		7.1-L		6.3-L		7.4-L	
5.3-H	6	6.3-H	6	5.2-H	6	5.8-H	6	4.1-H	6	4.8-H	6	3.1-H	6	4.6-H	6	3.8-H	6	4.2-H	6
7.0-L		10.5-L		6.7-L		8.1-L		6.1-L		5.3-L		6.1-L		6.6-L		7.3-L		5.4-L	
5.1-H	7	7.0-H	7	4.3-H	7	5.2-H	7	4.4-H	7	2.9-H	7	2.7-H	7	5.2-H	7	4.8-H	7	4.3-H	7
7.0-L		7.5-L		7.0-L		6.2-L		7.4-L		5.7-L		7.3-L		5.8-L		7.8-L		5.9-L	
5.0-H	8	6.3-H	8	4.5-H	8	5.0-H	8	3.2-H	8	3.9-H	8	3.5-H	8	4.9-H	8	44.8-H	8	3.7-H	8
8.0-L		9.7-L		7.5-L		7.8-L		5.8-L		6.8-L		6.1-L		6.9-L		6.2-L		8.2-L	
6.1-H	9	6.7-H	9	4.8-H	9	6.4-H	9	3.6-H	9	3.6-H	9	4.6-H	9	5.0-H	9	3.3-H	9	4.4-H	9
6.7-L		8.5-L		6.6-L		8.5-L		7.4-L		6.8-L		8.1-L		6.8-L		7.9-L		5.3-L	
5.0-H	10	5.4-H	10	3.6-H	10	6.0-H	10	3.5-H	10	4.2-H	10	4.3-H	10	4.1-H	10	6.0-H	10	3.9-H	10

NYIMA		KUMBA		NYIMA		MAYAMBA		ELI	MUSU		FILOMEN		MAMA		THERESE		MARIAMA	
UP		DOWN		UP		DOWN		DOWN	DOWN		UP		DOWN		UP		DOWN	
5.6-L		4.8-L		5.2-L		5.3-L			5.5-L		6.3-L		6.4-L		6.5-L		3.7-L	
4.7-H	1	3.3-H	1	4.3-H	1	3.5-H	1		3.5-H	1	4.0-H	1	4.4-H	1	5.4-H	1	3.0-H	1
6.2-L		6.9-L		5.4-L		4.8-L			6.8-L		7.2-L		7.6-L		7.4-L		6.4-L	
4.6-H	2	4.2-H	2	3.6-H	2	4.0-H	2		3.5-H	2	5.1-H	2	3.7-H	2	5.0-H	2	4.3-H	2
8.4 -L		6.1-L		6.4-L		7.2-L			6.3-L		7.4-L		4.2-L		6.7-L		6.6-L	
4.9-H	3	4.4-H	3	3.7-H	3	5.1-H	3		4.0-H	3	4.4-H	3	6.3-H	3	4.4-H	3	4.1-H	3
6.5-L		5.8-L		6.1-L		5.5-L			6.8-L		7.4-L		6.4-L		7.5-L		6.6-L	
4.8-H	4	3.6-H	4	3.4-H	4	4.2-H	4		4.3-H	4	4.6-H	4	5.9-H	4	4.0-H	4	4.0-H	4
9.3-L		5.2-L		3.6-L		5.4-L			6.0-L		7.4-L		4.8-L		7.2-L		6.0-L	
5.5-H	5	4.0-H	5	2.3-H	5	4.3-H	5		4.8-H	5	3.8-H	5	3.0-H	5	4.8-H	5	3.0-H	5
8.9-L		5.1-L		4.3-L		6.0-L			7.3-L		6.0-L		7.3-L		7.7-L		6.8-L	
6.5-H	6	4.3-H	6	3.4-H	6	4.3-H	6		4.4-H	6	4.2-H	6	4.2-H	6	5.4-H	6	4.3-H	6
7.9-L		6.3-L		7.1-L		7.2-L			7.3-L		8.8-L		7.1-L		7.4-L		7.2-L	
5.5-H	7	3.9-H	7	4.9-H	7	4.4-H	7		4.3-H	7	4.8-H	7	4.9-H	7	5.7-H	7	4.6-H	7
6.2-L		7.1-L		5.5-L		5.4-L			7.8-L		5.9-L		6.6-L		6.6-L		8.3-L	
3.7-H	8	3.5-H	8	4.2-H	8	4.2-H	8		4.9-H	8	4.2-H	8	3.8-H	8	4.6-H	8	5.0-H	8
5.2-L		5.9-L		5.4-L		4.2-L			6.9-L		6.4-L		6.8-L		5.4-L		4.4-L	
3.8-H	9	4.1-H	9	3.7-H	9	2.8-H	9		4.8-H	9	4.6-H	9	4.6-H	9	3.8-H	9	2.1-H	9
5.1-L		5.3-L		4.7-L		5.2-L			7.3-L		7.8-L		6.6-L		7.0-L		5.5-L	
4.3-H	10	3.9-H	10	3.0-H	10	2.9-H	10		5.1-H	10	4.8-H	10	3.4-H	10	4.4-H	10	3.7-H	10

Table Legend:

UP: mesh bags on top on platform

DOWN: mesh bags on bottom platform

L: length

H: height

Annex 3

Cost of Farm Establishment and Source of Materials.

No	Description/Item	Qty	Unit Price (CFA)	Unit Price (GMD)	Total (CFA)	Total (GMD)	Source of material
1.	Plastic mesh rolls	6	175,000		1,050,000	105,000	Senegal
2.	Mesh cutter	2	4, 000		8, 000	800	Senegal
3.	Purchase of hard nylon straps	1000	45		45 000	4,500	Senegal
4.	Purchase of wire	6		2,500		15,000	The Gambia
5.	Mesh bags construction training	22		1000		22000	
6.	Purchase of iron rods	32		1335		42700	The Gambia
7.	Purchase of angle iron	1		500		500	The Gambia
8.	Construction of platforms	10		2000		20, 000	
9.	Deployment of platforms	1		3000		3000	
	Grand total					213,500	

Note: 5000 CFA = 500 GMD = 7 USD

Annex 4

Oyster mortality table.

Beneficiaries Name	Top mortality	Bottom mortality	No of oysters in each bag
Sainabou Angelic Jammeh	10		100
Musukebba Jammeh		22	100
Susan Sambou	15		100
Amie Sarr		35	100
Ndey Fatou Jarjue	10		100
Safiatou Fofana		32	100
Musuba Jammeh	17		100
Fansainey Demba		33	100
Lalia Ehemba	16		100
Amie Jatta		27	100
Nyima Jassey	11		100
Kumba Jassey		28	100
Nyima Jassey (Snr)	12		100
Mayamba Jatta		23	100
Elizebeth Jatta	13		100
Musu Jabang		21	100
Filomen Jammeh	12		100
Mama Sambou		30	100
Theresse Jatta	8		100
Mariama Demba		20	100
Total Mortality	124	271	2000