

**Kenya Fisheries Service (KeFS) Mombasa,  
The state Department of Fisheries and Blue Economy,  
Ministry of Agriculture, Livestock and Fisheries,  
Republic of Kenya**

**Marine Fisheries Promotion Advisor for Blue  
Economy Development  
Final Report**

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**Japan International Cooperation Agency  
(JICA)**

**IC Net Limited**

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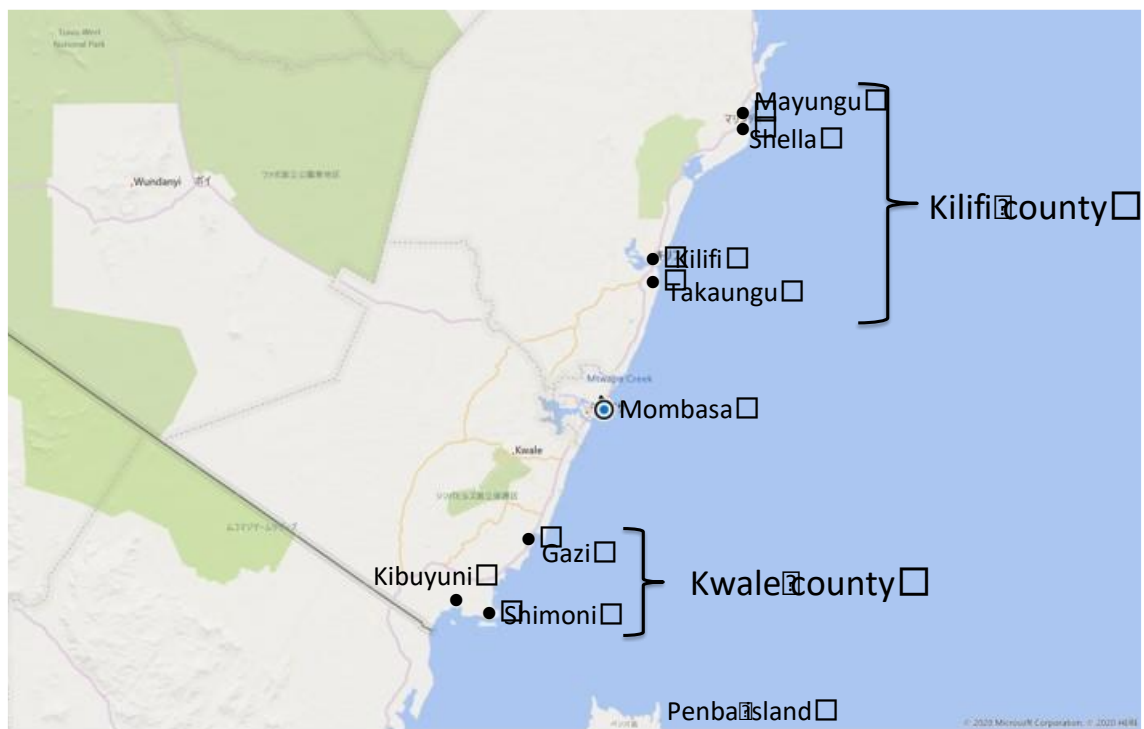
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Map of Proposed Coastal Communities in Kilifi and Kwale Counties, Kenya

### List of Abbreviations

<b>Abbreviation</b>	<b>Term in Full</b>
BMU	Beach Management Unit
CECM	County Executive Committee Member
C/P	Counterpart
FAO	Food and Agriculture Organization of the United Nations
JICA	Japan International Cooperation Agency
KeFS Mombasa	Kenya Fisheries Service, Marine and Coastal Regional Office, Mombasa
KEMFSED	Kenya Marine Fisheries and Socio-Economic Development Project
KES	Kenyan Shilling
Kisefa	Kibuyuni Seaweed Farmers Co-operative Society Limited
KMA	Kenya Maritime Authority
KMFRI	Kenya Marine and Fisheries Research Institute
OJT	On the Job Training
PCM	Project Cycle Management
PDM	Project Design Matrix
RRA	Rapid Rural Appraisal
SDGs	Sustainable Development Goals
TICAD7	The 7 <sup>th</sup> Tokyo International Conference on African Development
TOT	Training of Trainers

## Photos



FRP boat (23feet type) donated to Takaungu BMU



Hands-on training on how to maintain an outboard engine held in Takaungu, Kilifi County



Data collection on fish landing site at Takaungu, Kilifi County



Hands-on training on how to use boiler type of fishplace at Gazi, Kwale County



Improved dry racks settled on the beach of Gazi, Kwale County



Improved sun-dried dagaa (left) and traditional sun-dried dagaa (right)





Hands-on training on how to maintain soap-making machine at Kibuyuni, Kwale County



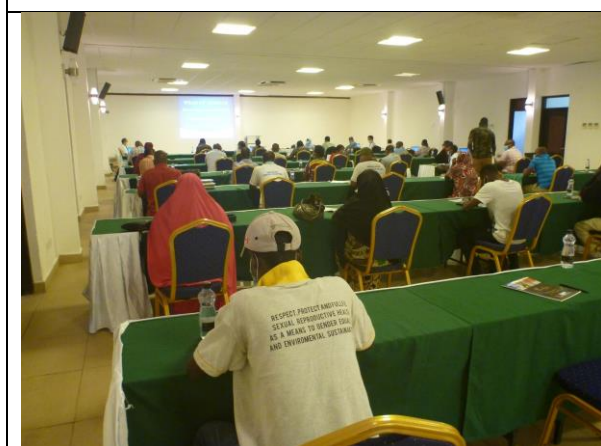
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Newly developed "Seaweed Lavender Soap" by Kibuyuni Seaweed Farmers Co-operative Society Ltd.



Participants of the wrap-up seminar held at Mombasa on December 16, 2021



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Demonstration booths of three pilot activities hosted by members of the BMUs

## Preface

The Kenyan government made a blue economy policy as one of the main policies in the 3<sup>rd</sup> Medium Term Plan of Kenya Vision 2030. In the plan, the enhancement of the marine sector including maritime and marine transportation, marine infrastructure, marine tourism, environmental protection, and fisheries is regarded as an important issue. In 2018, the Japan International Cooperation Agency (JICA) implemented the “Study on Blue Economy in Kenya” to collect data and analyze the development policies of the Kenyan government, and the status and issues on the blue economy policy of the country. The JICA study confirmed that the development of marine coastal fisheries remained behind inland fisheries, and marine coastal fisheries resources were not used well. The action plan acknowledged at the Seventh Tokyo International Conference on African Development (TICAD7), held in 2019, mentions Japanese assistance in the development of blue economy in Africa among other important issues such as diversification of economy, industrialization, and enhancement of competitiveness. The Japanese government has also committed to helping strengthen sustainable use of fishery resources.

Marine coastal fisheries are one of the main issues for blue economy development planned by the Kenyan government; such development requires improvement of the fisheries industry with progress in value addition. Nevertheless, knowledge and experience of authorities in the Republic of Kenya (henceforth Kenya), regarding marine coastal fisheries development, has not been adequate yet. Thus, there is an urgent need to strengthen the related human resources with experts in the field of marine coastal fisheries. The Ministry of Agriculture, Livestock and Fisheries in Kenya has requested the Japanese government to dispatch marine fisheries development advisors in connection with blue economy development.

The assignment (henceforth Assignment) of the Marine Fisheries Promotion Advisor for Blue Economy Development aims at strengthening the knowledge and skills of counterpart (henceforth C/P) personnel and stakeholders, for policy formulation and implementation, by understanding the status of the fisheries industry in Kenya through on-the-job training (OJT) in several pilot activities. The pilot activities were implemented at coastal communities chosen in the counties of Kilifi and Kwale.

The Assignment includes (1) understanding issues in marine coastal fisheries

enhancement through implementation of a marine coastal fisheries survey at target communities (Output 1), (2) planning and implementing pilot activities to resolve the issues (Output 2), (3) the C/P personnel obtaining specific knowledge to solve issues for sustainable marine coastal fisheries enhancement through implementation of the pilot activities (Output 3), and (4) strengthening knowledge and skills of C/P personnel and stakeholders through OJT and related training sessions in the activities (Output 4).

The Assignment, started in February 2020, was suspended for approximately 1.5 years owing to the COVID-19 pandemic. It was restarted in July 2021, and is scheduled to be completed in February 2022.



## 1. Identification of Development Approaches for Marine Coastal Communities

### 1.1 Marine Coastal Survey

#### 1.1.1 Objectives

The marine coastal fisheries survey consists of a fact-finding survey, a fisheries management survey, and a survey on projects funded by other donors in target marine coastal communities in Kenya. It aims to obtain necessary information to determine development approaches through analysis of barriers and potential for development.

Based on results of the marine coastal fisheries survey, a Project Cycle Management (PCM) Workshop identifies development approaches from analysis of priority issues along marine coastal communities in Kenya.

#### 1.1.2 Methods

The fact-finding survey clarifies the status of marine coastal fisheries about (1) their techniques and infrastructure, (2) the dynamics of fishers' activities such as their annual fisheries schedule, (3) fish processing and distribution, and (4) fishers' organizations such as beach management unit (BMU). Thus, the survey identifies relevant issues as well as the development potential. In addition to the technical status of fisheries infrastructure, fishing gear and boats, the survey specifies fishers' strategies, obstacles, and potential across dynamic marine coastal fisheries under natural, social, and economic environments. To obtain related information, we adopted the Rapid Rural Appraisal (RRA) method that involves annual operation schedules and maps of fishing grounds.

The fisheries management survey, which was conducted at sites proposed for the pilot activities, covered the registered number of fishers and fishing boats to determine the scale of beneficiaries and their position in fisheries management. It also aimed to understand the status of fisheries laws and regulations and marine protected areas to identify any discrepancy with proposed pilot activities and to identify opportunities for cooperation with the current management activities.

The survey on projects funded by other donors provided details of past outputs as well as ongoing and planned projects funded by them to avoid duplication of activities and

identify possible opportunities for cooperation. The survey team, composed of staff of Kenya Fisheries Service and JICA consultants (henceforth, the Team), familiarized themselves with the Kenya Marine Fisheries and Socio-Economic Development Project (KEMFSED) funded by the World Bank to understand what kind of cooperation was possible, and consulted with the counterpart agencies, the JICA headquarters, and the JICA Kenya Office.

### 1.1.3 Selection of Proposed Sites

Japanese consultants explained the purpose, outputs, and activities of the marine coastal fisheries survey to counterpart agencies of the State Department of Fisheries and Blue Economy as well as the Kenya Fisheries Service, Marine and Coastal Regional Office in Mombasa (henceforth KeFS Mombasa). The three parties then discussed the selection of proposed sites for the survey. They selected Mayungu, Shella, and Takaungu in Kilifi County, and Gazi, Shimoni, and Kibuyuni in Kwale County.

### 1.1.4 Results

#### (1) Outline of Coastal Communities in Kilifi County

Table 1 presents an outline of marine coastal communities in Kilifi County.

Table 1: Outline of Marine Coastal Communities in Kilifi County

Community Subject	Takaungu community	Shella community	Mayungu community
No. of fishers	290	388	348
Registered crafts*	D: 5, DC: 16, H: 9, Ma: 4, FF: 101	D: 30, DC: 2, H: 19, Ma: 22, FF: 58	D: 28, DC: 8, H: 34, Ma: 3, Mt: 1, N: 5, FF: 11
No. of fishing gear	Cast net: 8, Handline: 39, Harpoon: 2, Spear gun: 32, Monofilament: 56.	Basket trap: 84, Beach seine: 3, Gill net: 160, Handline: 136, Long line: 24, Monofilament: 34, Pointed stick: 18	Basket trap: 398, Handline: 108, Hook stick: 6, Monofilament: 9, Ring net: 1, Spear gun: 19, Scoop net: 16.
Infrastructure	In 2015, the EU donated an 18-tonne cold storage facility, but it has not been operated since 2017. The BMU office building is located beside it.	The county government is constructing a shipyard and cold storage. An ice making machine and a 5-tonne cold storage facility owned by the County Fisheries Service are managed by a BMU member in cooperation with a Chinese enterprise.	A BMU office and a fish landing site/fish market.
Fishers' annual operation	Fishers use hand lines and gill nets and dive in	Fishers operate gill net fishing (drift net or bottom	Fishers adopt the same fishing technique

	accordance with seasons, earning KES 22,000/month from December to April and KES 5,000/month from May to July. The main fishing ground is around a reef about 1 sea mile off the coast.	set gill net) or hand line fishing and earn KES 10,000/day/boat from October to March. Fishing, except coastal basket trap fishing, is difficult from April to September due to rough weather.	throughout the year, e.g., basket trap fishers only use this technique and earn KES 5,000/day from September to December. Diver fishers catch lobster, octopus, and aquarium fish throughout the year.
Fish processing	Nearly half the BMU members are women known as <i>mama karanga</i> , who process and sell fried fish.	7 ship builders, 10 fishing gear suppliers, and 4 food suppliers among BMU members.	250 BMU members are women known as <i>mama karanga</i> , who process and sell fried fish.
Fish distribution	3 members of BMU are male fish dealers who sell fresh fish to retailers or consumers.	143 BMU members are fresh fish dealers with 7 female and 136 male members who sell fish to hotels and markets in Mombasa and Nairobi.	20 BMU male members deal fresh fish.
Fishers' organization	Registered members: 142 Activities: (1) Beach cleaning, (2) Legal guidance to foreign fishers, (3) Preparation of fish landing sites, (4) Dealing fish, (5) Members' registration, (6) Surveillance.	Registered members: 467 Activities: (1) Members' registration, (2) Surveillance in collaboration with the County Fisheries Service, (3) Rescue, (4) Collecting fish levy.	Registered members: 423 Activities: (1) Compiling statistics, (2) Members' registration, (3) Beach cleaning, (4) Surveillance to address illegal fishing and for conflict resolution.
Fisheries management	(1) Fishers' registration, (2) Tax collection from foreign vessels, (3) Surveillance for illegal fishing, e.g., sea turtle and juvenile capture.	(1) Fishers' registration for fishing license, (2) Ring net ban under bylaw of the Shella BMU, (3) No fishing on Friday.	(1) Fishers' registration for fishing license, (2) Ring net regulation (two boats for a day, 8 months a year), (3) No fishing on Friday.
Projects funded by other donors	A cold storage (10 tons cap.) donated by the Takaungu Cold Storage Project under an EU community development fund.	(1) Construction of a shipyard and a cold storage facility by the county government, (2) Shrimp trawl fishing agreement with 9 BMUs located at Malindi and the north.	None
Issues for BMUs	(1) Insufficient fish data, (2) Accidents occur at the entrance to the creek, (3) Fish catch decreases during the ring net off-season.	(1) Some members refuse the fish levy, (2) Difficulty regarding data collection, (3) No boat for rescue, (4) Ring net boats violating Shella waters and decrease of fish price due to ring net fishing.	(1) Difficult to preserve fish caught by ring nets, (2) No patrol boat, (3) Difficult to return to beach at night due to lack of lighthouse, (4) No life jackets.

\*Types of fishing craft: Dugout canoes (DC), Hori (H), Ngala (N), Dau (D), Mashua (Ma), Mtori (Mt), Surfboard (S), Fishing Raft (R), Foot fisher (FF).

## (2) Outline of Coastal Communities in Kwale County

Table 2 presents an outline of marine coastal communities in Kwale County.

Table 2: Outline of Marine Coastal Communities at Kwale County

Community Subject	Gazi community	Shimoni community	Kibuyuni community
Registered fishers	160	545	160
Fishing crafts*	Ma: 9, D: 4, FB: 5, Mtu: 20, FF: 5	Ma: 27, FB: 6, H: 3, N: 11, DC: 43, FF: 26	Ma: 3, FB: 2, N: 6, DC: 36, FF: 84
Fishing gear	Ring net: 4, Gill net: 3, Hand line: 9, Spear gun: 8, Basket trap: 4	Gill net: 10, Hand line: 60, Ring net: 2, Pointed stick: 80	Drift net: 10, Hand line: 40, Reef net: 12, Basket trap: 50, Spear gun: 7, Fence trap: 1
Infrastructure	A house of fish landing site/fish market has been constructed and is awaiting electrical wiring. A dry seaweed warehouse is being constructed in February 2020. Ice making facilities will be equipped in 2021.	A house of fish landing site/fish market, ice making machine (5 ton/day), generator, and a jetty for fishing/merchant boats.	Two deep freezers (each with 300 l capacity), a house of fish landing site/fish market, seaweed drying racks, a dry seaweed warehouse, and a machine for producing seaweed soap and shampoo. Another seaweed warehouse was being constructed in February 2020.
Fishers' household annual operation	Two of the five ring net boats that operate during the day come from Pemba Island, and return during the rough season from May to August. All five drift net boats come from Pemba Island during the fishing season. This community has deep ties with Pemba Island.	Basket trap, drift net, and reef net fishing are the main fisheries. The basket trap fishers operate throughout the year, with the peak season from March to April, catching about 70 kg of rabbit fish, goat fish, and parrot fish per boat per day. Drift net fishers operate from January to July with the peak season from March to April.	Many fishers operate basket trap and hand line fishing. The basket trap fishers catch rabbit fish and goat fish with 7–9 baskets per dugout canoe. Hand line fishers catch rabbit fish, snapper, and squid in shallow waters around the coral reef from June to October.
Fish processing	10–20 women boil and dry <i>dagaa</i> (small fish) for local sale. The quality is insufficient.	Most of the 85 female members are <i>mama karanga</i> , 2 male members are agents of fish processing companies.	Most of female BMU members are <i>mama karanga</i> .
Fish distribution	30 female BMU members are <i>mama karanga</i> , 12 are engaged in dealing fresh fish. 31 male members are fish retailers and 10 are intermediaries.	35–38 male BMU members are fish dealers.	Fish stored in the two deep freezers is distributed to Mombasa and Nairobi the following day. Most of the squid landed is delivered to Nairobi. Some female merchants sell fish at hotels nearby.

Fishers' organization	Gazi BMU Registered members: 261 Activities: (1) legal guidance to member fishers, (2) training on fish resources conservation, (3) beach cleaning, (4) seaweed farming.	Shimoni BMU Registered members: 670 Activities: (1) providing training on fish capture and post-harvest stage, (2) providing fishing means through donor assistance, (3) collection of fish levy, (4) ice sales, (5) surveillance, (6) hygiene guidance, (7) surveillance to address illegal fishing and for conflict resolution.	Kibuyuni BMU Registered members: 227 Activities: (1) fish resources conservation, (2) mangrove plantation, (3) seaweed farming, (4) collection of fish levy, (5) sea safety guidance.
Fisheries management laws and regulations	(1) Establishment of mangrove conservation area, (2) 2 km of boardwalk in mangrove forests for eco-tourists.	Establishment of community conservation area.	Establishment of community conservation area.
Project of other donors	UNDP, FAO, and KMFRI introduced eco-tourism to protect mangrove forests. In 2017, FAO donated a drying rack for fish and smoking fireplace.	Wildlife Conservation Society (WCS) agreed community-based resources conservation area for fish conservation.	Along with the county government, FAO and other donors donated a seaweed drying house, warehouse, and processing equipment to turn seaweed to soap, shampoo, and juice together with technical training.
Issues of BMU	(1) Difficulty in maintaining freshness of fish landed, (2) catch decreases during rough seasons, underdevelopment of offshore fishing ground, (3) seaweed mortality, (4) value addition of dried seaweed	(1) Lack of fishing means, (2) lack of training on technique.	(1) Violation of marine protected area by neighboring fishers, (2) violations of fishing operation by neighboring fishers, (3) no boat for rescue and surveillance, (4) motorization of boat needed.

\*Types of fishing craft: Dugout canoes (DC), Hori (H), Ngalawa (N), Dau (D), Mashua (Ma), Mtori (Mt), Mtumbwi (Mtu), Fiber boat (FB), Foot fisher (FF).

### (3) Fisheries Outline of Target Area

#### Fisheries

Fishing activities of small-scale fishers along marine coastal communities in the target areas, that is, Kilifi County and Kwale County, are restricted by condition of monsoon. Specifically, during the southwest monsoon period between May and September, called *kusi*, many coastal fishers can hardly go out for fishing with small canoes owing to the rough weather. Frequent sea accidents, caused by irregular current and sunken rock, occur during *kusi*. Therefore, the fishers depend on angling from shore and face



difficulty in sustaining their livelihood during this season.

### Organization at marine coastal communities

Each BMU has a wide range of roles including fishers' registration, management of fish landing sites, improvement of fishery products, sea rescue, and patrolling against illegal fishing boats. Funds for their activities relies on 2% of duties imposed on fish landing by member fishers as well as fish landing tax imposed on foreign vessels such as ring net fishing boats from Pemba Island, Tanzania. However, fishing activities of the member fishers decline during rough weather, and the foreign vessels return to their home countries during off-season. Consequently, the BMU's activities would be sluggish owing to lack of funding for their activities.

### Fish processing and distribution

Small-scale fishers do not take ice to their fishing operation because the period of their operation lasts only for several hours to one day in the sea. Owing to the short duration of the fishing trip, fishes tend to keep their freshness at the landing sites. However, fishes sold at consumers' markets, such as consumers' fish market at Mombasa, are stale. There must be hindrances in cold chain between fish landing sites and fish retailers, although many fish retailers hold several freezers for fish storage at Mombasa.

Fried fish processing and sales, handled by women, are common in the target counties. These women, called *mama karanga*, buy fresh fish at fish landing sites, cook the fish at their home, and sell it near the market or along the streets. This, however, is a petty business with individual management.

### Women's activities

Women's activities are more prevalent in Kwale County among others along the marine coastal areas. Most women who deal with fishery products in the target area are *mama karanga*, and some women in Kwale County work at seaweed farming and small fish called *dagaa* processing in addition to the activity as *mama karanga*. Details of the activities, that is, seaweed farming and *dagaa* processing, are as follows.

### 1) Seaweed farming

Seaweed farming business has already been established at several coastal communities in southern Kenya with constant dealing of dried seaweed with a company in Tanzania. However, many women who work in seaweed farming complain about the low price of the product, which is 25 Kenyan shilling (KES) per kg. Therefore, it is necessary to develop value added products made of the seaweed produced by the women.

Under such circumstances, Kibuyuni Seaweed Farmers' Co-operative Society Limited (henceforth Kisefa), with technical and financial assistance of the Food and Agriculture Organization of the United Nations (FAO), has produced and sold soap, shampoo, and juice made of seaweed. This activity has attracted mass attention, and nearly 3,500 soaps were produced and sold at several exhibitions and other business channels as of July 2021. Nevertheless, whether Kisefa would be able to continue selling the products thereafter remains uncertain.

### 2) Dried small fish (*dagaa*) processing

Women in Kwale County process *dagaa* into sun-dried fish and sell it on kilogram basis at local markets. The *dagaa*, caught at coastal waters of southern Kenya, is processed not only by women in Kenya but also by women along coastal areas and islets of other countries in east Africa, and the products are distributed widely to inland Africa. With respect to the *dagaa* processing at several coastal communities in Kwale County, we observe several issues that remain to be addressed. They are (1) overconsumption of firewood, (2) low quality and post-harvest-loss caused by too much boiling, (3) problem of low hygiene, (4) low profitability owing to products being sold on kilogram basis at the local market, and others.

## 1.2 PCM Workshop

### 1.2.1 Identification of Issues

After the marine coastal fisheries survey in the counties of Kilifi and Kwale, a PCM workshop was conducted from February 24 to 26, 2020 at KeFS Mombasa. The event saw the participation of county fisheries officers from both counties, and the staff of KeFS Mombasa and Kenya Marine and Fisheries Research Institute (KMFRI).

The participants conducted a problem analysis for six target coastal communities, namely Takaungu, Shella, and Mayungu in Kilifi County, and Gazi, Shimoni, and Kibuyuni in Kwale County; subsequently, they conducted an objective analysis. Looking the results of the objective trees, the participants selected the following eight development approaches:

- (1) Value addition approach for *dagaa* (Gazi)
- (2) Capacity building approach of the BMU (Gazi)
- (3) Enhanced fish production approach (Kibuyuni)
- (4) Enhancing seaweed production and value addition approach (Kibuyuni)
- (5) Improved fish production approach (Shimoni)
- (6) BMU capacity building approach (Takaungu)
- (7) BMU capacity building approach (Shella)
- (8) Fish marketing approach (Mayungu)

### 1.2.2 Identification of development approaches

The participants discussed the effect of each approach on the core objective based on five criteria: effect on core objective, cost, feasibility, social confliction, and sustainability and assessed them with a score from 1 (low) to 4 (high). Table 3 shows the scores of eight development approaches identified from the objective analysis and the top three development approaches selected for the Assignment, that is, (1) value addition approach for *dagaa* at Gazi, (2) enhancing seaweed production and value addition approach at Kibuyuni, and (3) BMU capacity building approach at Takaungu.

Table 3: Score of eight development approaches

	Effect on Core Objective	Cost	Feasibility	Social confliction	Sustainability	Score
Value addition Approach for <i>Dagaa</i> (Gazi)	4	M	3	3	4	3.5
Capacity building Approach of BMU (Gazi)	3	L	4	3	3	3.25
Enhanced fish production Approach (Kibuyuni)	3	H	3	3	3	3
Enhancing seaweed production and value addition Approach (Kibuyuni)	4	L	4	3	4	3.75
Improved fish production Approach (Shimoni)	3	H	3	3	3	3
BMU capacity building Approach (Takaungu)	4	M	4	2	4	3.5
BMU capacity building Approach (Shella)	3	M	3	1	3	2.25
Fish marketing Approach (Mayungu)	3	M	2	2	2	2.25

### 1.3 Three Development Approaches

The three selected development approaches and the problem trees at Takaungu (Kilifi County), Gazi and Kibuyuni (both Kwale County) are shown as follows.

#### 1.3.1 BMU capacity building approach at Takaungu

BMUs function as bodies for main social organizations at marine coastal communities in Kenya where most people are engaged in fisheries and fisheries-related industries. Funds for the Takaungu BMU's activities rely on two percent of dues imposed on fish landing by member fishers as well as fish landing tax imposed on foreign vessels. The amount of dues and tax decrease during southwest monsoon because fishers can hardly go out fishing owing to the rough weather, thereby retarding the BMU's activities. Under these circumstances, functions of the Takaungu BMU should be strengthened through enhancement of coastal fisheries and improvement of their skills for sea rescue through pilot activities, aiming at institutional strengthening of marine coastal communities.

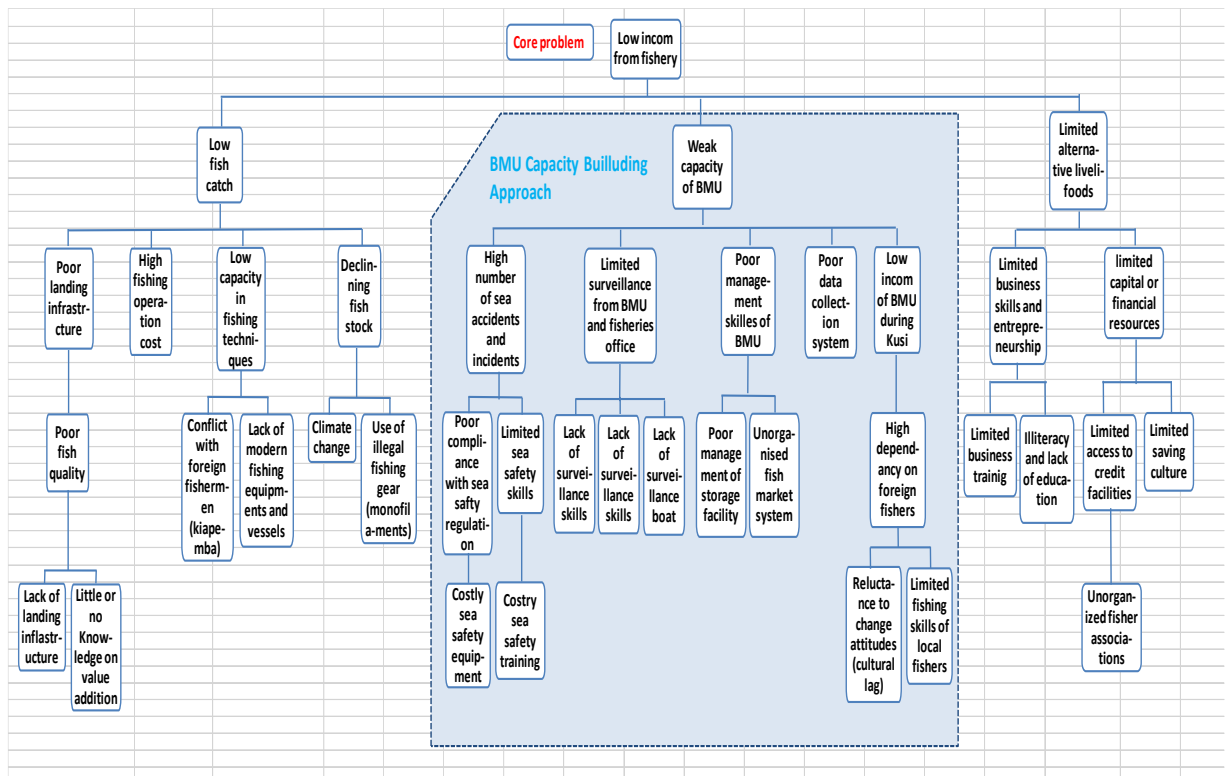


Figure 1: Problem Tree on Takaungu, Kilifi County

### 1.3.2 Value addition approach for *dagaa* at Gazi

The present dried *dagaa* processing, conducted by women at Gazi in Kwale County, hold the following issues in sustainable use of marine resources.

- (a) Overconsumption of mangrove firewood,
- (b) Poor quality and post-harvest loss caused by too much boiling,
- (c) Problem of low hygiene,
- (d) Low profitability owing to products being sold on kilogram basis at the local market.

Mitigation of post-harvest loss is very important for sustainable use of limited marine resources. By resolving these problems through implementation of pilot activities, it is possible to contribute to the mitigation of post-harvest loss of the marine resources, thus to blue economy development.

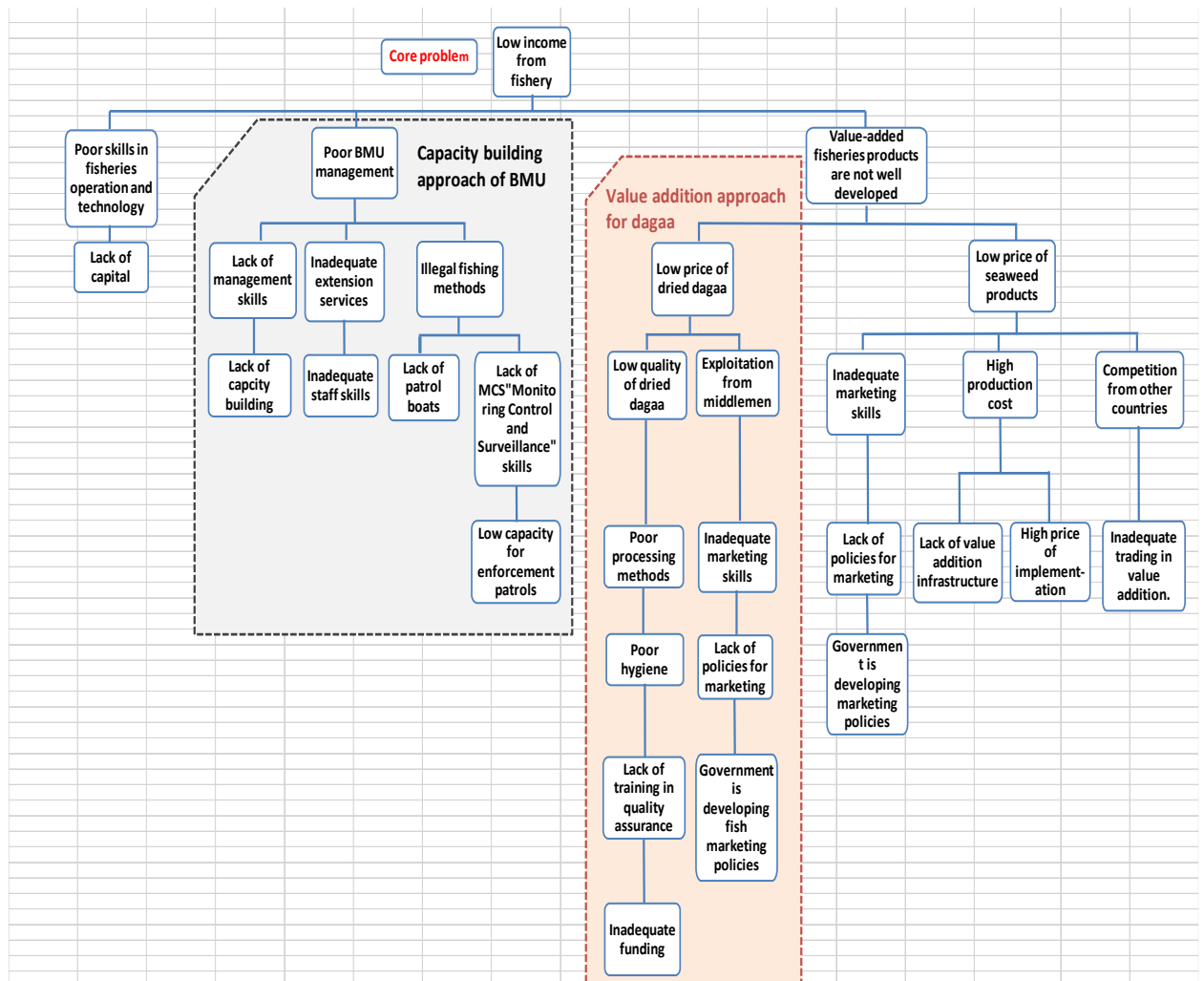




Figure 2: Problem Tree on Gazi, Kwale County

### 1.3.3 Enhancing seaweed production and value addition approach at Kibuyuni

Seaweed farming is among high potential activities to effectively use marine resources which were not used well before, and materialize high economic value if value added products made of seaweed are to be developed. Under these circumstances, Kisefa, with technical and financial assistance of FAO, has produced and sold soap, shampoo, and juice made of seaweed. The present issues for them are making further quality improvements in the products and undertaking sales promotion.

The proposed pilot activity aims to formulate a development approach to facilitate more value addition of the present seaweed soap and sales promotion targeting to Kisefa, Kwale County.

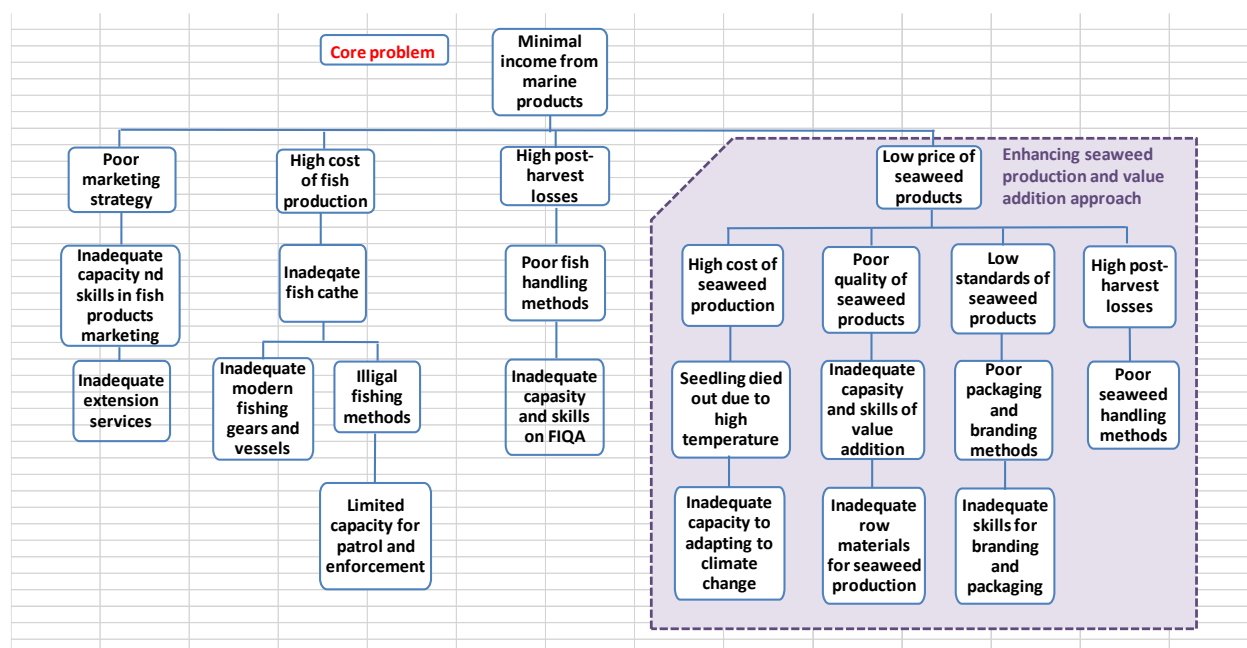


Figure 3: Problem Tree on Kibuyuni, Kilifi County

### 1.4 Path to Blue Economy Development

After identifying development approaches in the PCM workshop with participants of the C/P staff, KMFRI research officers, and County Fisheries Officers, the staff of the County Fisheries Offices presented the background of the identified developmental approaches, their activities, and how those approaches contribute to blue economy development after

discussing these factors with the other participants.

The United Nations promotes marine development in connection with the Sustainable Development Goals (SDGs); above all, SDG14 is directly related to the blue economy, claiming to “conserve and sustainably use the oceans, seas, and marine resources for sustainable development.” The blue economy is interlinked with most of the SDGs in a variety of ways, such as no poverty, gender issues, and responsible production.

The results of the discussion in the PCM workshop regarding this matter are as follows.

#### 1.4.1 BMU capacity building approach and blue economy development

The BMU is a major organization for people living in coastal communities; therefore, fishers, fish processors, and fish distributors can improve their economic activities if the BMU improves its capacity. For instance, fish prices can be hiked through the improvement of fish quality supervised by the BMU, or strengthening of the BMU’s co-management ability further strengthens actors of the blue economy development.

#### 1.4.2 Value addition approach for fish processing and blue economy development

Assistance to female entrepreneurs who process small fish on the beach contributes to addressing gender issues. The improvement of postharvest loss by introducing new processing methods contributes to responsible production (SDG 12), enhancing hygiene in processing contributes to good health and well-being (SDG3).

#### 1.4.3 Enhancing seaweed production, value addition approach, and blue economy development

Women in Kibuyuni produce and sell not only dry seaweed but also processed commodities like soap, shampoo, and juice made of seaweed. This development approach makes their effort more sustainable and enlarges their profitability; therefore, they have been able to make their business successful with the value addition of marine resources, contributing to accomplishing blue economy development.

## 2. Basic Strategy and Design of Pilot Activities

### 2.1 Basic Strategy of Pilot Activities

In accordance with results of the coastal fisheries survey and the PCM workshop, the following basic strategies are formulated for implementing the pilot activities.

#### 2.1.1 Strengthening functions of BMU for capacity development of marine coastal communities

BMUs, which function as bodies for fishers' registration, managing fish landing sites, improving fishery products, patrolling against illegal fishing boats, and sea rescue, are main social organizations at marine coastal communities in Kenya where most people are engaged in fisheries and fisheries-related industry. Funds for BMUs' activities rely on two percent of dues imposed on fish landing by member fishers as well as fish landing tax imposed on foreign vessels. However, the amount of dues and tax decrease during southwest monsoon because fishers can hardly go out fishing owing to the rough weather, thereby retarding the BMUs' activities. Under these circumstances, functions of BMUs at marine coastal communities should be strengthened through enhancement of coastal fisheries and improvement of their skills for sea rescue through pilot activities, aiming at institutional strengthening of marine coastal communities.

#### 2.1.2 Assisting economic activities initiated by women groups

*Mama karanga* are common in marine coastal communities in Kenya. Such women buy fresh fish from fishers, cook it at their home, and sell it near markets or along streets. It is an individual economic activity and a lucrative business opportunity for women who have limited funds for business. Many women use this opportunity because it is easy to access; thus, the supply is already more than demand at markets. Therefore, it is necessary for women to exploit other fields of economic activities that are similarly easy for them to access. Seaweed farming and dried *dagaa* processing, being worked at by women along marine coastal communities in Kwale County, have a potential for the economic enhancement and improvement of women's livelihood.

#### 2.1.3 Promoting value addition of marine resources

Production means of marine coastal fishers in Kenya are so small in scale that their fishing effort cannot but concentrate only on limited coastal fishing ground. Thus, the

coastal fishery resources face difficulty in sustainability. Therefore, value-addition of marine fishery resources is indispensable. Exploitation of new marine products, which have not been used well so far, is also required to improve the economic value of marine resources. Such exploitation contributes to blue economy development. Seaweed farming is one of the high potential activities to effectively use marine resources, which were not used well before, and materialize high economic value if value-added products made of seaweed are to be developed.

#### 2.1.4 Contributing to mitigation of post-harvest loss

Mitigation of post-harvest loss is also very important for sustainable use of limited marine resources. For instance, the present dried *dagaa* processing being conducted by women at coastal communities in Kwale County has the following issues in sustainable use of marine resources:

- (a) Overconsumption of mangrove firewood;
- (b) Poor quality and post-harvest loss caused by too much boiling;
- (c) Problem of low hygiene; and
- (d) Low profitability owing to products being sold on kilogram basis at the local market.

By resolving these problems through the implementation of pilot activities, it is possible to contribute to the mitigation of post-harvest loss of the marine resources, and thereby to blue economy development.

#### 2.1.5 Assisting promotion of local products

It is very important for blue economy development to promote locally available special products made of marine resources. Pilot activities may assist ongoing economic activities on sites to improve the value of locally available special products. For instance, packaging and labelling would be introduced to the business of dried *dagaa* processing that would enable traceability of the products. Another idea is that it would be possible for the present seaweed soap business to further improve value addition by introducing locally available fragrance with storytelling on sea-originated material and women as producers. These promotion methods would contribute to the sales promotion of these locally available special products with greater value addition.

The pilot activities have been planned in accordance with the aforementioned basic strategies.

## 2.2 Design of Pilot Activities

The following pilot activities have been designed to implement the three development approaches mentioned in section 1.3 in this report.

### 2.2.1 Strengthening multi-function of BMU in Takaungu, Kilifi county

**Period:** August 2021 – December 2021 (5 months)

**Target group:** Takaungu BMU

**Overall Goal:** Strengthening the multifunction of the Takaungu BMU by enhancing their income generation through their fishing operation.

**Purpose of the pilot activity:** the Takaungu BMU will be able to take accurate fish landing data and take appropriate actions when sea accidents occur through the income generated from their fishing operation.

**Expected output:**

- (1) BMU members can conduct fishing activities throughout the year using the powerboat and fishing gear provided.
- (2) BMU members can accurately record fish-landing at the fish landing sites.
- (3) BMU members who can respond immediately to marine accidents are trained on marine safety and security.

**Input:**

**【Japanese side】**

Experts

Chief Advisor/Survey and planning

Expert of pilot activity

Provision of equipment, materials, and facilities

a) An FRP boat with an outboard engine

b) Life jacket

c) Fishing net with accessories

Allocation of other activity costs

**【Kenyan side】**

Allocation of Counterpart

Project Director

Project Manager

Project Coordinator

Technicians of pilot activity



Budget allocation  
Provision of office space

**Activities:**

Activities for Output (1):

- (1)-1. Clarify the status and problems of the BMU.
- (1)-2. Identify strengthening measures for the BMU's functions.
- (1)-3. Procure a powerboat and fishing gear according to the identification of the strengthening measures.
- (1)-4. Formulate boat management plan of the donated fishing equipment and material.
- (1)-5. Implement fishing operation in accordance with the formulated plan.

Activities for Output (2):

- (2)-1. Clarify the status and problems on fish landing record at the fish landing sites.
- (2)-2. Conduct hands-on training for members of the BMU through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office on keeping accurate records of fish landings.
- (2)-3. Develop a technical package on method of accurate record of the fish landed.

Activities for Output (3):

- (3)-1. Conduct training on fisher's safety course to members of the BMU through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office to strengthen their abilities.
- (3)-2. Conduct rescue training to the BMU members through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office.

**Objectively verifiable indicators:** As per the attached PDM (Appendix 1).

2.2.2 Value addition for dry fish production by women entrepreneur group in Gazi, Kwale county

**Period:** August 2021 – December 2021 (5 months)

**Target group:** Women entrepreneurs and members of the Gazi BMU

**Overall Goal:** To improve the livelihood of members of the dry fish processing group in Kwale county through value addition to dry fish production.

**Purpose of the pilot activity:** Improve the quality of dry fish products by introducing a new processing method and establish new distribution and sales promotion methods.

**Expected outputs:**

- (1) Dry fish production technique suitable for the target area is developed.
- (2) Distribution and sales promotion methods suitable for the target area are improved.
- (3) Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.

**Input:**

**【Japanese side】**

Experts

Chief Advisor/Survey and planning

Expert of pilot activity

Provision of equipment, materials, and facilities

a) Construction of improved racks for dry fish

b) *Jikos* and pots

Allocation of other activity costs

**【Kenyan side】**

Allocation of Counterpart

Project Director

Project Manager

Project Coordinator

Technicians of pilot activity

Budget allocation

Provision of office space

**Activities:**

Activities for Output (1):

- (1)-1. Clarify the status and problems of dry fish production including capacity needs assessment and awareness for Gazi women entrepreneurs and BMU members as well as community leaders.
- (1)-2. Clarify possible production methods of dry fish for improvement.
- (1)-3. Construct improved racks for the dried fish production.
- (1)-4. Plan and implement training on new dried fish processing techniques to women entrepreneurs and BMU members.
- (1)-5. Develop an improved technical package on dried fish production suitable and applicable to the target area.

Activities for Output (2):

- (2)-1. Clarify the status and problems of distribution and sales promotion methods of the dried fish business including capacity needs assessment and awareness for Gazi women entrepreneurs and BMU members as well as community leaders.

- (2)-2. Identify distribution and sales promotion methods of the dried fish business, suitable and applicable to the target area.
- (2)-3. Plan and implement training on new distribution and sales promotion methods of dried fish to women entrepreneurs and BMU members.
- (2)-4. Develop an improved technical package of dried fish on distribution and sales promotion methods.

**Activities for Output (3):**

- (3)-1. Identify staff of Kenya Fisheries Service and the County Fisheries Office and clarify the status and problems of their technical and extension capabilities.
- (3)-2. Conduct training of trainers (TOT) for extension teams (especially for extension officers) to train staff of Kenya Fisheries Service and the County Fisheries Office.
- (3)-3. Analyze the results of pilot activities and improve training and extension material.

**Objectively verifiable indicators:** As per the attached PDM (Appendix 2).

**2.2.3 Value addition for seaweed soap production for Kibuyuni Seaweed Farmers' Co-operative Society Limited in Kibuyuni, Kwale County**

**Period:** August 2021 – December 2021 (5 months)

**Target group:** Kibuyuni Seaweed Farmers' Co-operative Society Limited

**Overall Goal:** To improve the livelihoods of seaweed soap producers in Kwale County through value addition to seaweed soap production.

**Purpose of the pilot activity:** Improve the quality of seaweed soap products by introducing a new processing method and establishing new distribution and sales promotion methods.

**Expected outputs:**

- 1. Quality of seaweed soap is improved so that it satisfies consumers' needs.
- 2. Distribution and sales promotion methods are improved.
- 3. Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.

**Input:**

**【Japanese side】**  
Experts

Chief Advisor/Survey and planning  
Expert of pilot activity  
Provision of equipment, materials, and facilities  
a) Overhaul of soap processing machine  
b) Soap box of new design (about 6,000 boxes)  
c) Banners for sales promotion  
d) Natural fragrances and pigments  
Allocation of other activity costs

**【Kenyan side】**

Allocation of Counterpart  
Project Director  
Project Manager  
Project Coordinator  
Technicians of pilot activity  
Budget allocation  
Provision of office space

**Activities:**

Activities for Output (1):

- (1)-1. Clarify the status and problems of production of seaweed soap including capacity needs assessment and awareness in the field for members of Kibuyuni Seaweed Farmers' Co-operative Society Limited as well as the community leaders.
- (1)-2. Identify the quality of seaweed soap that satisfies consumers' needs.
- (1)-3. Identify locally available material (coconut oil, palm oil, etc.) that would be used for the seaweed soap.
- (1)-4. Conduct a verification trial on new production methods of seaweed soap.
- (1)-5. Develop an improved technical package on seaweed soap production that satisfies consumers' needs.

Activities for Output (2):

- (2)-1. Clarify the status and problems of distribution and sales promotion methods of seaweed soap including capacity needs assessment and awareness in the field for Kibuyuni Seaweed Farmers' Co-operative Society Limited and the members as well as the community leaders.
- (2)-2. Identify distribution and sales promotion methods suitable and applicable to the consumers' needs.
- (2)-3. Develop a soap package that meets the needs of general consumers. The package should be designed for traceability.

- (2)-4. Develop an improved technical package on distribution and sales promotion methods.

Activities for Output (3):

- (3)-1. Identify staff of Kenya Fisheries Service and the County Fisheries Office and clarify the status and problems of their technical and extension capabilities.
- (3)-2. Conduct training of trainers (TOT) for extension teams (especially for extension officers) to train staff of Kenya Fisheries Service and the County Fisheries Office.
- (3)-3. Analyze the results of the pilot activity and improve training and extension materials.

**Objectively verifiable indicators:** As per the attached PDM (Appendix 3).

### 3. Procedure to Set Up the Pilot Activities under the COVID-19 Pandemic

#### 3.1 Procedure to Set Up the Pilot Activities

##### 3.1.1 Suspension of Meetings by Kenyan Government

On July 30, 2021, the Kenyan government announced the suspension of face-to-face meetings at public spaces over the State considering the COVID-19 pandemic situation in the country. On August 1, 2021, the JICA Kenya Office circulated an instruction to not hold face-to-face meetings and business trips principally and to not attend seminars and meetings based on the announcement of the Kenyan government.

JICA consultants talked with KeFS Mombasa and agreed not to hold stakeholders' meetings nor kick-off seminars to set up the pilot activities as originally scheduled. Instead, the Team (composed of JICA consultants and staff of KeFS Mombasa) had to contact the stakeholders individually to explain the purpose and details of the pilot activities to be implemented with careful caution against COVID-19.

##### 3.1.2 Courtesy Call to the County Government

Based on the mentioned implementation policy, the Team made courtesy calls to county governments of Kwale on August 3, and Kilifi on August 4, 2021, and explained the motivations and details of the pilot activities to be implemented at the sites of Kibuyuni, Gazi and Takaungu.

In each site, the Team made courtesy calls to the County Commissioner's Office, and the County Executive Committee Members (CECMs), and then visited the pilot activity sites for the courtesy call to community leaders, BMU leaders and the members.

The Coastal Regional Director of KeFS Mombasa circulated the authorized letters to the County's Offices to notify the purpose and schedule of the mission, which helped the county's authorities understand the mission, thus facilitating the smooth setting-up of the pilot activities at the three sites.

##### 3.1.3 TOT to Government Officers

Japanese consultants provided training to staff members of KeFS Mombasa on purposes, methods, and strategies to obtain successful outputs in implementing the pilot

activities as a training of trainers (TOT). The trained staff members of KeFS Mombasa provided training to the county fisheries officers at a boardroom of KeFS Mombasa by adopting cascade system.

The trained county fisheries officers assumed their responsibility to facilitate the community leaders, the BMU leaders, and members on purposes, activities, and strategies to obtain successful outputs from the pilot activities.

#### **3.1.4 Agreement with the Local Communities**

Kick-off workshops took place on August 11, 2021, in Takaungu, Kilifi County, on August 12 in Gazi, and August 13 in Kibuyuni, both Kwale County for setting-up the pilot activities.

The trained county fisheries officers facilitated people in the three marine coastal communities for implementation of the pilot activities. Several issues were discussed on specifications of equipment and material, and the methodology to be implemented. Nevertheless, all the participants in the communities expressed their willingness to participate and implement the pilot activities as shown in the following meeting minutes.

### **3.2 Minutes of Kick-off Workshop at the Three Sites**

#### **3.2.1 Kick-off Workshop in Takaungu, Kilifi County**

##### **Background**

On August 11, 2021, the Kilifi County fisheries officers organized a sensitization workshop with the staff of KeFS Mombasa and JICA consultants. The purpose of the workshop was sensitization of the relevant stakeholders in Takaungu to enable implementation of the pilot activities. The stakeholders invited were the BMU executive committee members, two administrators, an assistant chief, and the village elder. The venue was a site at Takaungu, Kilifi County.

##### **Objectives of the Meeting**

The main objective of the workshop was to create awareness and obtain agreement from



the local community on the pilot activity to be implemented in Takaungu, Kwale County.

### Summary of the Pilot Activity

The community was informed on the progress of the procedure as follows:

The marine coastal survey identified the activities, issues, and challenges that the BMU members faced. Then, a PCM workshop was held with participants from KeFS Mombasa, the county governments of Kilifi and Kwale, and KMFRI. The PCM workshop identified priority issues and development approaches.

The development approach chosen for Takaungu was a BMU function strengthening approach. The activities of the pilot activity in Takaungu are as follows:

- Enhancing fishing operations by donating a power boat and fishing gear.
- Capacity building on accurate data collection and bookkeeping.
- Training the community on marine safety and rescue.

### Needs of Residents

- It is necessary to provide a cooler box for fish preservation while fishing at sea.
- Residents proposed that, although the Team planned to procure 10-15 drift gill nets, the Team should procure a variety of nets of different mesh size, for instance 4 pieces of 2.5 inches, 4 pieces of 3 inches, 2 pieces of 3.5 inches, and 2 pieces of 4 inches. The Team decided to provide all the materials such as rope and buoyancy to assemble the nets by the residents themselves.

### Way forward

Table 4 presents the action plan after the workshop.

Table 4: Action schedule in Takaungu, Kwale County

Activity	Responsible	Time frame
Form sub-committees/ teams for finance, patrols, data collection etc.	County Fisheries Officers	Middle of August 2021
Formulate a boat	Takaungu BMU executives	Middle of August 2021

management plan		
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### Closing Remarks

Mr. Lemmy Nyale, the chief fisheries officer, thanked the members for attending the meeting. He reminded them that it was crucial for the community to be actively involved in implementing the proposed pilot activities in Takaungu. The village elder commended the Team for introducing the pilot activity to Takaungu. He proposed that, in the future, projects that involve female entrepreneurs in the BMU should be introduced. The BMU's chairman thanked the Team for taking the time to visit Takaungu repeatedly. He assured them that Takaungu community is willing to work hard to achieve the project objectives. He declared the workshop officially closed.

### 3.2.2 Kick-off Workshop in Gazi, Kwale County

#### Background

After paying the courtesy call to the county commissioner, the CECM and county directors office in Kwale County, and the site visit to Gazi and Kibuyuni, the sensitization of the stakeholders in Gazi, Kwale County was done on August 12, 2021. The stakeholders invited to the kick-off workshop in Gazi were the BMU executive committee members, ward administrator, an assistant chief, and the village elder. The venue was on site at Gazi landing site.

#### Objectives of the Workshop

The main objective of the workshop was to create awareness and obtain agreement from the local community on the pilot activity to be implemented in Gazi.

#### Opening Session

Mr. Geoffrey Nyongesa, the assistant fisheries officer, welcomed the participants to the workshop. He highlighted that the purpose of the workshop was to inform the members on the pilot activity related to the JICA blue economy assistance and how it was to be implemented. He urged the participants to actively participate. Mr. Juma, the vice

chairman of the Gazi BMU, welcomed the attendees to the workshop and acknowledged the presence of the Team, local authority, and BMU executives and members. He wished them fruitful deliberations and declared the meeting officially opened.

## Summary of the Project

The community was informed on the progress of the initiative as follows:

- 1) The marine coastal survey, conducted in February 2020, identified the activities, issues, and challenges faced by the BMU members.
- 2) Subsequently, the PCM workshop was held between February 24 and 26, 2020. The participants were drawn from KeFS Mombasa, the county governments of Kilifi and Kwale, and KMFRI.
- 3) From the PCM workshop, priority issues were specified, and development approaches were identified.
- 4) The approach chosen for Gazi initially was a value addition approach for *dagaa* but the people of Gazi have currently widened the scope of dry fish processing in general.
- 5) The activities are as follows:
  - Improving the quality of dry fish processing products.
  - Improving the hygiene conditions in fish handling.
  - Introduction of sales promotion methods such as packaging and branding with labels for traceability.

## Plenary Discussion

Table 5 provides details discussed in the workshop.

Table 5: Plenary discussion during the workshop in Gazi

Issue	Response
Time frame for drying the fish using introduced dry racks compared to the traditional method of drying them on the ground?	It will take less time using the introduced dry racks because the racks are raised to enhance air circulation.

Ownership of the dry racks?	The racks are community owned but are to be used at an individual level.
What is the capacity of the dry racks?	Once the racks are brought to the community, they will be able to analyze this with the help of a KMFRI expert.
Space at the landing site for accommodating the dry racks?	The space is adequate for 20 racks.
The number of women involved in dry fish processing?	Approximately 35 female entrepreneurs

### Needs of Residents

- 1) Provision of holding space for fish before boiling, for instance, a portable table with a wire mesh for draining the water, is required.
- 2) They should be provided with a large pan (*sufurias*) with holders on the side.
- 3) They should be provided with a fireplace type of boiler (*jiko*) instead of the planned type of *jiko*. (The Team committed to finding the boiler type of *jiko* they needed.)

### Way forward

The action plan after the workshop is as per Table 6.

Table 6: Action schedule in Gazi, Kwale County

Activity	Responsible Party	Time frame
Share a sample of the portable table with a wire mesh as a containment space for holding fish before boiling.	KMFRI	Monday, August 16, 2021
Place the order of the 20 dry racks to the contractor	The Team	Monday, August 16, 2021

### Closing Remarks

Mr. Geoffrey Nyongesa, the assistant fisheries officer, thanked the members for attending the workshop. He reminded them that it was crucial for the community to be actively involved in implementing the proposed pilot activities in Gazi. Mr. Iddi Bomani, the village elder, commended the Team for introducing the pilot activity to Gazi. He highlighted that high *dagaa* production is seasonal, and that it will commence in September in normal years. He confirmed that the community would be co-operative in the pilot activity implementation. Mr. Juma Said, the BMU vice chairman, thanked the Team for making time to visit Gazi. He assured them that Gazi community was willing to work hard to achieve the objectives of the pilot activity and declared the workshop officially closed.

### 3.2.3 Kick-off Workshop in Kibuyuni, Kwale County

#### Background

After paying the courtesy call to the county commissioner, the CECM, county directors office, and the site visit to Kibuyuni, the sensitization of the local community in Kibuyuni was conducted on August 13, 2021. The invited stakeholders to the workshop were the BMU executive committee members, members of the Kibuyuni Seaweed Farmers' Co-operative Society Limited (Kisefa), the ward administrator, an assistant chief and village elders. The venue was the Kibuyuni landing site.

#### Objectives of the workshop

The main objective of the workshop was to create awareness and obtain agreement from the local community on the pilot activity to be implemented in Kibuyuni, Kwale County.

#### Opening Session

Mr. Ishmael Ong'era, the assistant fisheries officer, welcomed the participants to the workshop. He highlighted that the purpose of the meeting was to create awareness and reach agreement on implementing the pilot activity related to JICA assistance in the field of the blue economy development. He urged the participants to be active in participation.

Mr. Abdallah Suleiman, the Kibuyuni BMU chairman, welcomed the attendees to the workshop and acknowledged the presence of the Team, the local authority, the BMU executives and members. He wished them fruitful deliberations and declared the meeting officially opened.

### Summary of the Project

The community was informed on the procedure as follows:

- 1) The marine coastal survey, conducted in February 2020, identified the activities, issues, and challenges faced by the society members.
- 2) Subsequently, the PCM workshop was held between February 24 and 26, 2020, where participants were drawn from KeFS Mombasa, County Government of Kilifi and Kwale, and KMFRI.
- 3) The PCM workshop identified priority issues and development approaches.
- 4) The development approach chosen for Kibuyuni is to enhance seaweed production and value addition.
- 5) Details of the pilot activities are as follows:
  - Learning how to make high-quality hand-made soap.
  - Improving the quality of seaweed soap.
  - Introduction of sales promotion methods such as packaging and branding with labelling to enhance traceability.

### Plenary Discussion

- 1) It was discussed that a technician would be dispatched to Kibuyuni to handle the maintenance of the soap-making machine.
- 2) First, the JICA consultants and the community will conduct trials on improving the quality of hand-made soap. Once the best quality of the soap is achieved, then they can upscale their production using the machine. All the materials for hand-made soap such as coconut oil, palm oil, olive oil, and other essential ingredients shall be provided.
- 3) Other issues discussed are shown in Table 7.

Table 7: Other issues discussed in Kibuyuni, Kwale County

Issue	Response
Advertisement platform for their products?	The top priority is to improve the quality of the product. We can focus on advertisement later.
Is the pilot activity improving the quality of liquid or solid soap?	Solid soap.
How many people should participate in the training?	About 20 people.

The community consented to welcome the pilot activity and actively participate in it.

### Needs of Residents

- There should be a sieving machine to obtain the finest particles of the seaweed powder for making the soap because the soap's texture is currently rough.
- There should be diversification in terms of soap sizes by incorporating different molds.
- Advertisement should incorporate introduction of a website for effective marketing of their products.

### Way forward

Table 8 shows the action plan after the workshop.

Table 8: Action plan after the workshop in Kibuyuni, Kwale County

Activity	Responsible Party	Time frame
Share details on the size of mesh for the sieving machine.	KMFRI	Friday, August 20, 2021
Organize the team to participate in the training	County Fisheries Officer BMU Executives	Monday, August 16, 2021
Dispatch a technician to Kibuyuni on maintenance of the soap-making machine.	JICA consultants	Wednesday, August 18, 2021



Demonstration on hand-made soap.	JICA consultants	Wednesday, August 18, 2021
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### Closing Remarks

The county director of fisheries office thanked the community for availing themselves to the workshop. He emphasized that Kisefa is an able group and that they should work with the Team to ensure the successful implementation of the pilot activity.

Mr. Moses Githaiga, the senior fisheries officer, thanked the members for their attendance at the workshop. He highlighted that, for the activities to be implemented successfully, commitment and dedication were necessary. Mr. Ishmael Ong'era, the assistant fisheries officer, thanked the members for attending the workshop. He reminded them that it was crucial for the community to be actively involved in implementing the proposed pilot activities in Kibuyuni to ensure that the objectives were achieved. He declared the workshop officially closed.

## 4. Implementation of the Pilot Activities and Their Outputs

The progress of the pilot activities at the three sites is shown hereunder together with assessment of the outputs of them in accordance with the related PDM.

### 4.1 Progress of the Pilot Activities

#### 4.1.1 Strengthening multi-function of BMU in Takaungu, Kilifi county

##### (1) Procurement of equipment and materials

**Fishing net material:** The Team procured fishing net material required for the pilot activity and delivered it to Takaungu on August 27, 2021, when the ceremony took place, and the Coastal Regional Director of KeFS Mombasa addressed the significance of the pilot activity assisted by JICA. After the ceremony, hands-on training was provided to the BMU members on how to assemble the fishing net by means of the material delivered.

**FRP boat and outboard engine:** The Team procured a FRP boat (23 feet) and an outboard engine (25 hp.) required for the pilot activity, and delivered them to Takaungu on August 31, 2021, when the ceremony took place, and the Coastal Regional Director of KeFS Mombasa addressed the significance of the pilot activities in connection with the blue economy development. Before and after the ceremony, two kinds of hands-on training were provided to the BMU members on how to maintain the outboard engine, and how to assemble a bottom set gill netting using the equipment and material delivered.

##### (2) Implementation of hands-on training

From the beginning of the pilot activity at Takaungu in August 2021, several sessions of hand-on training were implemented with the cooperation of KeFS Mombasa, the Kilifi County Fisheries Office, the Kenya Maritime Authority, and a private company. Table 9 shows training topics and lecturers implemented during the pilot activity. “The Team” indicated in the table refers to the team composed of JICA consultants and staff of KeFS Mombasa.

While the Japanese consultants were absent in Kenya in September 2021, the staff of KeFS took responsibility to organize hands-on training on BMU management with

fishery officers of Kilifi County as lecturers for three days from September 21 to 23, 2021.

The Coastal Regional Director of KeFS Mombasa invited an officer of the Kenya Maritime Authority (KMA) as a lecturer of hands-on training on marine safety and security, which was acknowledged by KMA, and sessions on hands-on training were conducted on October 11 and 12, 2021.

Table 9: Hands-on Training implemented at Takaungu, Kilifi County

Venue	Date	Topic	Lecturer
Takaungu	August 27, 2021	How to assemble netting (1)	The Team
Takaungu	August 31, 2021	Maintenance of outboard engine	Technician of Cap. Andy
Takaungu	August 31, 2021	How to assemble netting (2)	The Team
Takaungu	September 21, 2021	BMU management (1)	County fisheries officer
Takaungu	September 22, 2021	BMU management (2)	County fisheries officer
Takaungu	September 22, 2021	BMU management (3)	County fisheries officer
Takaungu	October 11, 2021	Maritime safety (1)	Officer of Kenya Maritime Authority
Takaungu	October 12, 2021	Maritime safety (2)	Officer of Kenya Maritime Authority

### (3) The fishing operation, record keeping, and rescue actions

The Takaungu BMU has organized several teams for pilot activities such as fishing operation team, fish landing management team, and rescue team. The fishing operation team has assembled gill netting supplied by the Team. The BMU formulated the boat management plan (Appendix 4) for their orderly actions, including several clauses such as formation and roles of boat management committee, guidelines for profit sharing from their fishing operation, and marine safety measures.

South-west monsoon (*kusi*) is strong by September, and it is fishing off-season; the calm weather starts from October and the fishing season eventually resumes. The Takaungu

BMU held an election for their executives to organize their new assembly in the second half of October 2021. After the new BMU assembly acknowledged the boat management plan, their fishing operation was initiated on November 5, 2021, to strengthen the multi-functions of the BMU under the pilot activity.

A new type of fishing operation log was introduced to record fishing ground, fishing gear and method, and fish catch volume/amount by species in every fishing operation. Since the launch of their powerboat, the BMU experienced rescue actions twice in 20 days from November 5 to 24, 2021. They were able to take appropriate actions during those incidents in accordance with what they learnt in the hands-on training. Further details are explained in section 4.2.1.

#### 4.1.2 Value addition for dry fish production by women entrepreneur group in Gazi, Kwale county

##### (1) Procurement of equipment & material

**Dry racks:** On August 16, 2021, the Team ordered 20 dry racks for fish. Among them, the construction of the first 10 sets was completed on the beach at Gazi, Kwale County, and the Team inspected them in the beginning of October 2021. After discussing modifications of the rack with the women in Gazi, the construction of the remaining 10 sets of the dry rack started, which was completed by the end of October 2021.

**Fireplace (*jiko*) and accessories:** The Team discussed regarding the suitable *jiko* and accessories with the population in Gazi, and finally found the supplier of the suitable ones. The supplier prepared them by the end of October 2021.

##### (2) Implementation of hands-on training

When the Team visited Gazi on October 15, 2021, some women were processing a small volume of *dagaa* and the Team observed their processing method and their product. According to the Team's observations, the processed fish needed to improve in many points such as water quality and salinity used for it, temperature of boiled water, and duration of boiling (heating). Training was required to improve the quality of the product.

Based on the observations above, on October 27 and 28, 2021, the Team held hands-on training, which is presented in Table 10, to improve the fish processing with a research officer of KMFRI as a lecturer of the training.

Table 10: Hands-on Training held in Gazi, Kwale County

Venue	Date	Topic	Lecturer
Gazi	October 27, 2021	Value addition for fish processing (1)	Research officer of KMFRI
Gazi	October 28, 2021	Value addition for fish processing (2)	Research officer of KMFRI

### (3) Improvement of fish processing

At the end of November 2021, no major school of small fish (*dagaa*) had migrated to the coastal water of Gazi; thus, the fishing season had not started yet. The fish migration was delayed from the season in normal years.<sup>1</sup> This made it hard to practice the activities for improving the fish processing in the limited period of the pilot activity in Gazi.

On December 6, 2021, three tonnes of *dagaa* were landed on the beach of Gazi, which was the first major catch in the current fish season. The people of Gazi practiced what they had learnt for improvement of the fish processing. Finally, they succeeded in improving the quality of their fish processing. The details are explained in section 4.2.

### (4) Sales promotion of the processed fish

The Team discussed ways to promote sales of the processed fish with women entrepreneurs and member of Gazi BMU, and organized hands-on training for them. The idea was to sell the processed small fish packed in a plastic container with a branded label. The Team supplied the necessary materials for it such as plastic containers, labels, and weighing equipment.

As the fishing season of *dagaa* was delayed in 2021, it was difficult to practice the sales

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<sup>1</sup> In normal years, the small fish (*dagaa*) season starts in September.

promotion of the processed fish. Nevertheless, the sales promotion was done during the wrap-up seminar held in Nyali Sun Africa Beach Hotel, Mombasa, on December 16, 2021. The Team expects the women entrepreneurs with the Gazi BMU to continue the sales promotion with the assistance of KeFS Mombasa, the County Fisheries Office, and KMFRI.

#### 4.1.3 Value addition to seaweed soap production for Kibuyuni Seaweed

Farmers' Co-operative Society Limited in Kibuyuni, Kwale County

##### (1) Maintenance of soap making machine

On August 18, 2021, a technician from D. K. Engineering, the soap-making machine company, visited a factory at Kisefa to assess the status of the machine, and verified the necessary spare parts to be replaced. He visited the factory again from October 6 to 8, 2021 for overhauling the machine together with renewing the spare parts required.

In particular, the machine to make seaweed powder is composed of a hammer mill and a sieving machine, which must be maintained in good condition for improving the quality of seaweed soap. The machines have been successfully brought to good condition by the beginning of December 2021.

##### (2) Quality improvement of seaweed soap

**Practice of hand-made soap:** On August 18 and 26, 2021, the Team implemented hands-on training on how to make hand-made soap to the members of Kisefa, the staff of KeFS Mombasa and the Kwale County Fisheries Office. First, the trainees watched a video on how to make hand-made soap, and then practiced it by themselves. Eventually, they succeeded in making five types of hand-made seaweed soap. These hand-made soaps are ready to use after preserving in a dry condition for one month.

Practicing hand-made soap making is an important technical transfer to develop a new type of improved soap without incurring much development expenses. The members of Kisefa can adopt the same technique whenever they come up with an idea to develop their products.

**Assessment of the best type of soap:** When the Team visited Kibuyuni in October

2021, all the stakeholders got together and assessed five types of hand-made soap, and chose the best type of soap among them. The production of these soaps will be expanded with the tuned-up machine.

**Improvement plan:** The formulated plans for the improvement are to (1) mix the finer seaweed powder to the soap, (2) add fragrant essential oil of lavender, and (3) select oil composition of coconut oil (40%), palm oil (40%) and olive oil (20%).

### (3) Implementation of hands-on training

Table 11 shows training topics implemented during the pilot activity and the respective lecturers. As it was difficult to find lecturers for hand-made soap making at the site, JICA consultants collected relevant information, and transferred it to the staff of KeFS Mombasa who provided the hands-on training to other stakeholders in Kibuyuni with a cascade system.

Hands-on training on maintenance of the soap-making machine was conducted when the technician of D.K. Engineering visited Kibuyuni to overhaul the machine. The technician provided hands-on training to several mechanics of Kisefa on the final day of his visit.

The Team compiled the “Guidelines for Improvement of Seaweed Soap Business in Kibuyuni, Kwale County” (Appendix 5) based on experiences in the pilot activity. The Team invited a research officer of KMFRI as a lecturer of hands-on training on value addition of seaweed soap business on October 21, 2021. He provided the lecture to the stakeholders in Kibuyuni in accordance with the idea mentioned in the guidelines such as process to improve the quality of the soap, methodology, important points, cost of production, and strategy of sales promotion.

Table 11: Hands-on Training implemented in Kibuyuni, Kwale County

Venue	Date	Topics	Lecturer
Kibuyuni	August 18, 2021	Hand-made soap (1)	The Team
Kibuyuni	August 26, 2021	Hand-made soap (2)	The Team

Kibuyuni	October 6, 2021	Seaweed Soap business	The Team
Kibuyuni	October 8, 2021	Maintenance of the machine	Technician from D. K. Engineering
Kibuyuni	October 21, 2021	Value addition of seaweed soap	Research officer, KMFRI

#### (4) Sales promotion of the business

The new type of seaweed soap, named “Seaweed Lavender Soap,” was completed at the end of October 2021. Kisefa succeeded in producing the new product with finer seaweed powder and lavender fragrance. The Team discussed a package for Seaweed Lavender Soap with stakeholders of Kisefa, staff of the County Fisheries Office, and KeFS Mombasa, and reached a consensus on the package design with them. Thus, the new package for Seaweed Lavender Soap was launched.

In accordance with production cost estimates, Kisefa set the selling price of the Seaweed Lavender Soap as KES 200/pc. The Team discussed ways of sales promotion through various events and development of a new sales channel for distribution. However, it could not be practiced well owing to the limited period of the pilot activity. Nevertheless, sales promotion of the soap was done during the wrap-up seminar in Nyali Sun Africa Beach Hotel, Mombasa on December 16, 2021.

## 4.2 Outputs of the Pilot Activities

### 4.2.1 Strengthening multi-functions of BMU in Takaungu, Kilifi County

The purpose of the pilot activity here was to enable the Takaungu BMU to take accurate fish landing data and appropriate actions when sea accidents occur through the income generated from their fishing operation. The outputs to attain this purpose are as follows:

- (1) BMU members can conduct fishing activities throughout the year using the powerboat and fishing gear provided;
- (2) BMU members can accurately record fish-landing at the fish landing sites; and
- (3) The BMU members who can respond immediately to marine accidents are trained on marine safety and security.

Each output is assessed hereunder.



(1) BMU members can conduct fishing activities throughout the year using the powerboat and fishing gear provided.

The activities to achieve Output (1) are as follows.

- 1) Clarify the status and problems of the BMU;
- 2) Identify the measures to strengthen BMU's function;
- 3) Procure a powerboat and fishing gear as per the strengthening measures; and
- 4) Formulate a boat management plan for the donated fishing equipment and material; and
- 5) Implement fishing operation in accordance with the formulated plan.

The Team implemented the marine coastal survey with cooperation of the County Fisheries Officers to clarify the status and issues of BMUs in target areas including the Takaungu BMU. Thereafter, the Team specified strengthening measures for the BMU's function in the PCM workshop. The measures include improving the ability for income generation, improvement of management skill at fish landing sites, and knowledge of marine safety. To put them into practice, the Team procured a powerboat (23 feet/25 hp.) and fishing net material in August 2021 with hands-on training for maintenance of outboard engine on August 31 and assembling the fishing net on August 27 and 31, 2021.

The Takaungu BMU held a fishing operation team that completed the assembly of the fishing net for bottom gill net fishing in October 2021. The BMU formulated the boat management plan including boat management guidelines such as formation and roles of a boat management committee, profit sharing from their fishing operation, and marine safety guidelines.

South-west monsoon (*kusi*) is strong by September, and it is fishing off-season; the calm weather starts from October and the fishing season eventually resumes. Takaungu BMU conducted an election for their executives to organize their new assembly in the second half of October 2021. The new BMU assembly acknowledged the formulated boat management plan, and their fishing operation has started with the purpose of strengthening multi-functions of the BMU under the pilot activity from November 4, 2021.

As indicated in Table 12, the fishing operation team conducted their operation 12 times in 19 days from November 5 to 23, 2021 with the total catch volume of 441.1 kg valued at KES 81,857.

Table 12: Fishing operation record by Takaungu BMU

No.	Date	Catch volume (kg)	Catch amount (KES)	Unit price (KES/kg)
1	November 5, 2021	30.0	4,500	150
2	November 6, 2021	67.0	11,370	170
3	November 7, 2021	28.5	5,115	179
4	November 12, 2021	10.5	2,395	228
5	November 13, 2021	19.5	4,330	222
6	November 14, 2021	11.0	2,970	270
7	November 16, 2021	35.2	6,732	191
8	November 17, 2021	37.0	7,500	203
9	November 18, 2021	79.0	14,200	180
10	November 20, 2021	28.9	5,655	196
11	November 22, 2021	68.0	12,570	185
12	November 23, 2021	26.8	4,520	169
Total		441.4kg	KES 81,857	
Average		36.8kg	KES 6,821	KES 185/kg

Based on these facts, it is fair to say that Output (1) has been partially achieved; however, we must observe their fishing operations over the year.

(2) BMU members can accurately record fish-landing at the fish landing sites.

The activities to achieve Output (2) are as follows.

- 1) Clarify the status and problems in recording fish landing at the fish landing site;
- 2) Conduct hands-on training for members of the BMU through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office on keeping accurate records of fish landings;
- 3) Develop a technical package on methods of accurate record keeping for the fish-

landing.

The Takaungu BMU has recognized that the present data collection has problems and is willing to improve it. They practice fish landing management by measuring fish weight at fish landing sites managed by the BMU. However, not all the BMU members land their catch at the fish landing sites. One of the reasons behind this is that the fish landing sites managed by the BMU are far from their boat mooring site during the ebb tide.

Although it is hard to mitigate this natural condition of big tidal gap, understanding and cooperation of members to the BMU's function would be one of the solutions for improving the BMU's services to the members. It is also important that the BMU practices proper and prompt treatment at fish landing sites with efficient management. The BMU organizes the fish landing management team in the pilot activity. They received hands-on training for improving BMU management from September 21 to 23, 2021 with the County Fisheries Officers as lecturers.

The Takaungu BMU has been collecting fish landing data from the catch landed by the members including name of fisher/boat, date, catch volume by species and unit price per kilogram. The BMU also introduced fishing operation log per boat after the launch of the powerboat, managed by the BMU, in the pilot activity. The fishing operation log includes items such as name of the recorder, landing site, name of the BMU, name of the boat, propulsion, departure time, arrival time, number of crew members, name of the captain, date, fishing ground, fishing gear and method, mesh size, fuel consumed, fish species caught, catch volume, unit price, and catch amount. This is the first attempt at monitoring small-scale fishing operations and analysis of such fishing operation log can facilitate the improvement of small-scale fishery household management.

Based on the facts above, it can be concluded that Output (2) has been almost achieved.

(3) The BMU members who can respond immediately to marine accidents are trained on marine safety and security.

The activities to achieve Output (3) are as follows.

- 1) Conduct training on fishers' safety course for members of the BMU through capacity

development for staff of KeFS Mombasa and the County Fisheries Office to strengthen their abilities,

- 2) Conduct rescue training for the BMU members through capacity development for staff of KeFS Mombasa and the County Fisheries Office.

Marine accidents occur occasionally at the entrance of Takaungu creek owing to hidden rocks and irregular currents, which is one of important challenges for the Takaungu BMU. The pilot activity supplied marine safety equipment such as life jackets and life buoy required against sea accidents in addition to supply of a powerboat and fishing net material. On October 11 and 12, 2021, an officer of KMA provided hands-on training on how to use the safety equipment and marine safety actions to the members of the Takaungu BMU.

The BMU members have experienced rescue incidents twice in 20 days since the launch of the boat. The first incident happened at night on November 9, 2021. A member of the BMU received an SOS call from a crew member of a fishing boat operating about 6 km off Takaungu, reporting that it had engine trouble and was unable to move by itself. Three members of the BMU rushed to the site with the rescue boat, found the troubled boat and dragged it to Takaungu. The second incident happened at daytime on November 19, 2021. Four high school students went fishing on foot when one of them was dragged by a strong wave into the sea. The others tried to but could not find him. On receiving this information, the BMU team rushed to the site with a rescue boat. Unfortunately, they could find only his dead body in the sea which was brought to Takaungu.

Based on these facts, it is fair to say that Output (3) has been partially achieved.

#### 4.2.2 Value addition for dry fish production by women entrepreneur group in Gazi, Kwale county

The purpose of the pilot activity here was to improve the quality of dry fish products by introducing a new processing technique and establish new distribution and sales promotion methods.

The outputs to attain this purpose of the pilot activity are as follows:

- (1) Development of dry fish production technique suitable for the target area;

- (2) Establishing distribution and sales promotion methods suitable for the target area;  
and
- (3) Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.

Each output is assessed hereunder.

- (1) Development of dried fish production technique suitable for the target area.

The activities to achieve Output (1) are as follows.

- 1) Clarify the status and problems of dried fish production including capacity needs assessment and awareness for Gazi women entrepreneurs, BMU members, and community leaders;
- 2) Clarify possible improvements in production methods of dried fish;
- 3) Construct improved dry racks for dried fish production;
- 4) Plan and implement training on new dried fish processing techniques for women entrepreneurs and BMU members; and
- 5) Develop an improved technical package on dried fish production suitable and applicable to the target area.

The Team, composed of JICA consultants and staff of KeFS Mombasa, implemented a marine coastal survey in cooperation with the County Fisheries Officers to clarify the status and issues of fish processing practiced by women entrepreneurs in Gazi. Thereafter, they specified improvement measures for the fish processing in the PCM workshop.

At present, the dried small fish (*dagaa*) processing, being conducted by women at Gazi in Kwale County, has several issues on sustainable use of marine resources including the following.

- (a) Overconsumption of mangrove firewood;
- (b) Poor quality and post-harvest loss caused by excessive boiling;
- (c) Seawater is used for boiling and more salt is added; and
- (d) Hygiene issues caused by boiling water and spreading the fish on the ground for sun-drying, which smears the dried fish with sand.

The improvement measures include the following: introduction of a closed-type fireplace with accessories, which enables rapid heating of the fish with boiled water; and dry racks

which can avoid sand and insects getting attached to the fish during the sun-drying process.

Based on the analysis mentioned above, the Team supplied improved types of dry rack, a boiler type of fireplace (*jiko*), and accessories to women entrepreneurs at Gazi in cooperation with the BMU members, the County Fisheries Officers, and a private company.

The Team invited a research officer of KMFRI as a lecturer of hands-on training on improvement of fish processing for women entrepreneurs at Gazi and the BMU members on October 27 and 28, 2021. The training was coordinated by staff of KeFS Mombasa in the absence of the JICA consultants.

The season for *dagaa*, which normally begins in September, was delayed in 2021 as the fish school had not migrated to the Gazi waters until the end of November 2021. The first school of *dagaa* landed on the beach of Gazi on December 6, 2021, and women entrepreneurs in Gazi rushed to purchase and process it. They adopted the improved way of the processing the fish with the following procedures.

- (a) Wash the purchased fish;
- (b) Cook the seawater mixed with pure water on the boiler type of fireplace (*jiko*);
- (c) Put the washed fish in the meshed caldron (*tenga*), and dip it in the boiled water for 10 seconds; and
- (d) Spread the heated fish on the dry rack and close the meshed cover to avoid flies and other insects.

The steps mentioned above improved the quality of the fish products: the fish retains its fresh color, size, and is not deformed. The fish also has better taste with little salt, which is better for the health of the consumer. Therefore, an improved technical package has been developed for dried fish production suitable and applicable to the target area.

The analysis above indicates that Output (1) has been partially achieved.

- (2) Distribution and sales promotion methods suitable for the target area are improved. The activities to achieve Output (2) are as follows.

- 1) Clarify the status and problems in the methods of distribution and sales promotion in the dried fish business, including capacity needs assessment and awareness for Gazi women entrepreneurs, BMU members, and community leaders;
- 2) Identify distribution and sales promotion methods for the dried fish business suitable and applicable to the target area;
- 3) Plan and implement training on new distribution and sales promotion methods of dried fish to women entrepreneurs and BMU members; and
- 4) Develop an improved technical package on the distribution and sales promotion methods of dried fish.

In February 2020, a marine coastal survey clarified the status and issues of sales and distribution of processed fish—as practiced by women entrepreneurs at Gazi. According to the survey, they sell dried three-centimeter-long *dagaa* at KES 250 per kilogram. These products are not distributed to markets in Nairobi or Mombasa, but local markets around the area. However, sun-dried small fish is sold at KES 100 per 100 grams packed with a plastic container at supermarkets in Mombasa. Comparing the two cases, the packed product has succeeded in achieving nearly four times the value addition. It should be recognized that the two products are different in quality; for instance, most dried fishes sold in the plastic container have heads with bodies while most fishes of traditional processing in Gazi are deformed without heads owing to excessive heating or boiling.

On October 27 and 28, 2021, the Team organized hands-on training for women entrepreneurs and members of the Gazi BMU on value addition and sales promotion of the fish processing with a lecturer from KMFRI. The Team also talked with the stakeholders in Gazi and decided to sell the improved processed fish in plastic containers with labels.

The necessary materials, such as plastic containers, labels, and weighing equipment, were supplied to women entrepreneurs and members of the Gazi BMU for improvement of distribution and sales promotion. The small fish did not migrate to the Gazi water until the end of November 2021, and the first batch landed on the beach of Gazi on December 6, 2021. Although the people of Gazi succeeded in developing a new technical package for the fish processing, the opportunity to practice the sales promotion was only on the

occasion of the wrap-up seminar held at Nyali Sun Africa Beach Hotel and Spa, Mombasa on December 16, 2021.

Based on this analysis, it is fair to say that Output (2) has been partially achieved.

(3) Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced

The activities to achieve Output (3) are as follows.

- 1) Identify staff of KeFS Mombasa and the County Fisheries Office and clarify the status and problems in their technical and extension capabilities;
- 2) Conduct training of trainers (TOT) for extension teams (especially for extension officers) to train staff of KeFS Mombasa and the County Fisheries Office; and
- 3) Analyze the results of the pilot activity and improve training and extension material.

When the Team, comprising JICA consultants and staff of KeFS Mombasa, conducted the marine coastal survey in Kwale County, they asked the County Fisheries Officers to accompany them to the target communities, talk with and collect information from local residents through the fisheries officers. Therefore, the staff of KeFS Mombasa and the contacted officers in the County Fisheries Office are the target officers for capacity development in this pilot activity.

The Team invited the officers mentioned above to the PCM workshop conducted in the board room of KeFS Mombasa after the marine coastal survey to identify development approaches. The Team also provided TOT to the officers to share ideas of pilot activities with a cascade system. The trained officers in the County Fisheries Office facilitated the residents of the target community to establish the pilot activity; thus, almost all the stakeholders agreed to implement the pilot activity.

Such target officers acted as primary bodies of the pilot activity in cooperation with other staff of KeFS Mombasa, County Fisheries Office, and members of the BMU to implement the pilot activity. They presented the progress of the pilot activity, to share their experience with other stakeholders at the wrap-up seminar held on December 16, 2021.



Through these experiences, the target staff of KeFS Mombasa and the County Fisheries Office have developed their capacity well. However, only parts of Outputs (1) and (2) have been achieved for a short time owing to the limited period of the pilot activity and delay in the fish migration. Thus, Output (3) has been achieved partially.

#### 4.2.3 Value addition of seaweed soap production for Kibuyuni Seaweed

##### Farmers' Co-operative Society Limited in Kibuyuni, Kwale County

The purpose of this pilot activity was to improve the quality of seaweed soap products by introducing a new processing technique and establishing new distribution and sales promotion methods.

The outputs to attain this purpose of the pilot activity are as follows.

- (1) Quality of seaweed soap that satisfies consumers' needs is developed;
- (2) Distribution and sales promotion methods are improved; and
- (3) Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.

Each output is assessed hereunder.

- (1) Quality of seaweed soap that satisfies consumers' needs is developed.

The activities to achieve Output (1) are as follows.

- 1) Clarify the status and problems of production of seaweed soap, including capacity needs assessment and awareness in the field, for members of the Kibuyuni Seaweed Farmers' Co-operative Society Limited as well as the community leaders;
- 2) Identify the quality of seaweed soap that satisfies consumers' needs;
- 3) Identify locally available materials (such as coconut oil and palm oil) that can be used for the seaweed soap;
- 4) Conduct verification trial on new production methods of seaweed soap; and
- 5) Develop an improved technical package on seaweed-soap production that satisfies consumers' needs.

The Team, composed of JICA consultants and staff of KeFS Mombasa, implemented the marine coastal survey in cooperation with County Fisheries Officers in Kwale County to

clarify the status and issues of seaweed soap production business conducted by Kibuyuni Seaweed Farmers' Co-operative Society Limited (Kisefa). Thereafter, they specified improvement measures for the business in the PCM workshop.

In implementing the pilot activity, the Team discussed the challenges in improving the soap quality with the members of Kisefa, staff of KeFS Mombasa, the County Fisheries Office, and KMFRI. As a result, several obstacles were recognized, and one of them was the roughness of the seaweed powder mixed in the soap. This was caused by an old machine that made it hard to produce finer seaweed powder.

Through repeated discussions, the stakeholders formulated the following ways to improve the quality of the seaweed soap.

- (a) Produce finer seaweed powder to mix in the soap;
- (b) Add lavender essential oil for fragrance of the soap; and
- (c) Modify the oil composition to include coconut oil, palm oil, and olive oil.

In accordance with these ways, Kisefa verified a production measure for an improved type of seaweed soap; thus, the new commodity named “Seaweed Lavender Soap” was released. The procedure to develop the seaweed soap is compiled in the “Guidelines for Improvement of Seaweed Soap Business in Kibuyuni, Kwale County” as an improved technical package on seaweed-soap production that satisfies consumers' needs.

(2) Distribution and sales promotion methods are improved.

The activities to achieve Output (2) are as follows.

- 1) Clarify the status and problems in distribution and sales promotion methods of seaweed soap, including capacity needs assessment and awareness in the field, for members of Kisefa as well as the community leaders;
- 2) Identify distribution and sales promotion methods suitable and applicable to the consumers' needs;

- 3) Develop the soap package that meets the needs of general consumers. The package should be designed for traceability; and
- 4) Develop an improved technical package of distribution and sales promotion methods.

The Team implemented a marine coastal survey with cooperation of the County Fisheries Officers in Kwale County in February 2020. In this survey, the Team also analyzed the status and issues in sales and distribution of seaweed soap produced by Kisefa. The central government also keeps a constant watch on this business as it is an important economic activity where the local marine coastal communities produce soap made of seaweed, which is among high-potential marine resources. Nevertheless, it is necessary to analyze patiently if their business has economic sustainability even after the phase of initial attention.

It is also important to improve the quality of their product and review the sales channel continuously. The Team discussed distribution and sales promotion methods suitable and applicable to the consumers' needs with members of Kisefa, staff of KeFS Mombasa, the County Fisheries Office, and KMFRI. Based on the discussions, the package design for the Seaweed Lavender Soap was shared with the stakeholders and finalized. The new package contains an image of the new product, which is appealing to the consumers with the producers' message. The package also introduces the concept of traceability to the product.

The Team supported Kisefa to apply the newly developed Seaweed Lavender Soap to Kenya Bureau of Standard (KEBS) for the registration of the product; and it was approved by KEBS and succeeded to obtain the registration number of the product on December 2, 2021. Therefore, it is possible to sell it at major supermarket chains like NAIVAS.

The compiled "Guidelines for Improvement of Seaweed Soap Business in Kibuyuni, Kwale County" include analysis of the production cost for the newly developed "Seaweed Lavender Soap" to make it possible to decide the selling price of the product. Thus, the guidelines can also be used for sales promotion of the seaweed soap business. However, the Team could not practice the sales promotion in full-scale under the limited period of the pilot activity. Nevertheless, sales promotion of the soap was done during the wrap-up seminar held at Nyali Sun Africa Beach Hotel and Spa, Mombasa on December 16, 2021.

Therefore, an improved technical package on distribution and sales promotion methods has not been fully developed.

(3) Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced

The activities to achieve Output (3) are as follows.

- 1) Identify staff of Kenya Fisheries Service and the County Fisheries Office and clarify the status and problems of their technical and extension capabilities;
- 2) Conduct training of trainers (TOT) for extension teams (especially for extension officers) to train staff of Kenya Fisheries Service and the County Fisheries Office; and
- 3) Analyze the results of pilot activities and improve training and extension materials.

When the Team conducted the marine coastal survey in Kwale County in February 2020, the Team asked the County Fisheries Officers to accompany them to the target communities, and talked with and collected information from local residents through the fisheries officers. Therefore, the staff of KeFS Mombasa and the contacted officers in the Kwale County Fisheries Office are the target officers for capacity development in this pilot activity.

The Team invited the officers mentioned above to the PCM workshop conducted at the board room of KeFS Mombasa after the marine coastal survey to identify development approaches. The Team also provided TOT to the officers to share ideas of the pilot activity with a cascade system. The trained officers in the County Fisheries Office facilitated the population at Kibuyuni to establish the pilot activity; thus, almost all the stakeholders agreed to implement the pilot activity.

Such target officers participated and acted as main bodies of the pilot activity in cooperation with other staff of KeFS Mombasa, the County Fisheries Office, and members of the BMU. They presented the progress of the pilot activity with a representative of Kisefa to share their experience with other stakeholders at the wrap-up seminar held on December 16, 2021.

Through these experiences, the target staff of KeFS Mombasa and the County Fisheries Office developed their capacity well. They developed their ability and knowledge, which was recorded in the technical package compiled as the “Guidelines for Improvement of Seaweed Soap Business in Kibuyuni, Kwale County,” although the part of sales promotion was not well covered owing to the shortage of practice due to the limited period of the pilot activity. Therefore, training and extension materials could not be fully improved.

## 5. Recommendations and Prospects

### 5.1 Recommendations for the Purpose of the Assignment

#### 5.1.1 Capacity Development of the Government Officers

The Assignment aims at capacity development of the government officials in C/P and related agencies. The Team, composed of JICA consultants and staff of KeFS Mombasa, implemented the marine coastal survey in cooperation with the County Fisheries Officers. The County Fisheries Officers accompanied the Team to the target communities, and the Team collected information and discussed relevant matters with the local population in coordination with the County Fisheries Officers. In the following activities as well, the staff of KeFS Mombasa in the Team and County Fisheries Officers in charge of the target communities are the main target for capacity development in the Assignment.

The Team invited staff of KeFS and the County Fisheries Officers in charge of the target communities to the PCM workshop conducted after the marine coastal survey. The Team also transferred the techniques to identify a development approach from the facts found in the survey. To prepare for the pilot activities, the Team provided training of trainers (TOT) from JICA consultants to the staff members of KeFS Mombasa, and from the trained staff members of KeFS Mombasa to the County Fisheries Officers with a cascade system to share purposes and effective methodology to attain outputs effectively.

In the kick-off workshop of the pilot activities, the trained County Fisheries Officers explained the purpose and outputs of the pilot activities to the target residents and facilitated them in their commitment to the implementation. Once the pilot activities commenced, the staff of KeFS Mombasa and County Fisheries Officers were the main facilitators for beneficiaries at the target communities.

From implementation of the marine coastal survey, identification of development approach in the PCM workshop, facilitation of target population for setting up the pilot activities, to implementing hands-on training in the pilot activities, the Team tried to involve as many officers as possible in related organizations such as KeFS Mombasa, County Fisheries Offices, Kenya Maritime Authority (KMA), and KMFRI. The

stakeholders acted as the survey cooperators, participants of the workshop, facilitators at coastal communities, and lecturers of hands-on training. Through these activities, they realized that these were their own activities and projects with their capacity development on their technical fields.

In the wrap-up seminar held on December 16, 2021, these staff members of KeFS Mombasa and the County Fisheries Offices presented the outputs of their activities and shared their experiences with other stakeholders through the plenary discussion. From fact finding in the marine coastal survey, identification of development approaches in the PCM workshop, preparing and implementing the pilot activities, to the presentation of their achievement in the wrap-up seminar, the officers of C/P agencies and related organizations experienced all the procedures for blue economy development. Their experiences are likely to have helped develop the capacity of the target government officials.

#### 5.1.2 Capacity Development of the Core Organization for the Blue Economy Development

The Team tried to strengthen cooperation with various agencies and organizations in the field of fisheries and others related to blue economy development. For instance, in the pilot activity at Takaungu, Kilifi County, the Team tried to strengthen cooperation not only with the Kilifi County Fisheries Office but also with the Kenya Coast Guard and KMA. The Coastal Regional Director of KeFS Mombasa requested KMA to dispatch a lecturer of hands-on training on marine safety and security to Takaungu. The director of KMA acknowledged the request and a KMA officer was dispatched as a lecturer of the hands-on training in Takaungu.

KeFS can be among the core agencies to achieve blue economy development on sites. However, for that purpose, it may need to overcome the barrier of vertically divided administration and establish comprehensive cooperation with various agencies and organizations related to blue economy development. Accordingly, capacity development of human resources of the agency is indispensable.

In August 2021, KeFS recruited 348 new staff members across Kenya. Among them, 46

were assigned to six counties along the marine coastal areas, and others were assigned to other inland counties. Among the 46 members assigned in the six marine coastal counties, 20 members were fisheries officers and 26 were fisheries constable guards. Some of them were assigned to the target areas of the Assignment and worked with the Japanese consultants. They have the potential to be capable officers and some of them have already shown their capability.

Whether KeFS remains one of the core agencies covering broad fields of blue economy development depends on how KeFS trains these young members to develop their capabilities. It is recommended that KeFS enhance its training system for staff members to develop their capacity constantly.

## 5.2 Prospects for Blue Economy Development

Based on the experiences of the Assignment, the blue economy development in Kenya may have two possible directions. One is the marine fisheries productivity development by capacity development of the BMUs as core organizations along marine coastal areas in the line of the current pilot activity at Takaungu, Kilifi County. The other is the effective use and value addition of marine resources by empowerment of women entrepreneurs, and a “one village one product” movement along the current pilot activities at Gazi and Kibuyuni, Kwale County.

The issues and prospects of the aforementioned potential fields in Kenya’s blue economy development are discussed hereunder.

### 5.2.1 Marine Fisheries Productivity Enhancement by Capacity Development of Organizations

One of the major issues in enhancing marine coastal fisheries productivity in Kenya is the limited fishing operation attributed to small-scale fishery household management, with a long off-season caused by rough weather during south-west monsoon (*kusi*), and with limited fishing ground within coastal water even during the calm season. Some coastal communities built a cold room or a cold storage. However, they could not use such facilities well because the amount of fishery production in the communities was insufficient.



The promotion of the small-scale fisheries sector in Kenya is a part of the country's fisheries development policies. The issues in fisheries development include motorization of small boats to increase fishing operation days, exploitation of offshore fishing ground by introducing middle-scale fishing boats, cold chain development from fishing operation in the sea to fish distribution after fish landing, and introduction of improved fish processing for mitigation of post-harvest loss and value addition. It is necessary to provide technical training to the fishers to handle and maintain larger boats with marine engines and to improve their knowledge and skills for new types of fish processing. Other types of training would also be required for capacity development of stakeholders, including marine safety and security action, for exploitation of offshore fishing grounds. A credit system and tax-free fuel for small-scale fishers would also help enhance marine fisheries' productivity. Fishers' organizations such as BMUs and fishers' cooperative societies should be responsible for such schemes to benefit small-scale fishers. In addition, if BMUs are strengthened, they can help improve small-scale fishers' productivity.

#### 5.2.2 Blue Economy Development by Effective Use of and Value Addition to Marine Resources

Mitigation of post-harvest loss and value addition to marine products are to be promoted by the use of marine resources that have not been used well. For this purpose, the target area may be Kenya's southern coastal area where women's fisheries activities include seaweed farming, *dagaa* processing, and fried fish business called *mama karanga*. Promoting a one-village-one-product movement and value addition to marine products through the empowerment of women would be another path for blue economy development.

Women's fisheries activities in the southern coastal area in Kenya face several issues. For instance, they cultivate and harvest seaweed and sell it after drying to dealers from Tanzania, but the women have always complained that its price is too low.

The people of Kibuyuni, Kwale County have succeeded in producing soap, shampoo and juice made of seaweed for value addition. Nevertheless, they face issues in quality

improvement, sales promotion, and distribution. A business of this nature is likely to earn a profit because it has value in scarcity based on a one-village-one-product movement. Therefore, it is not advisable to expand the same business to the neighboring communities.

Here is a sample marine resource with a wide potential for value addition. Carrageenan is a family of natural linear sulfate polysaccharides that are extracted from seaweed. This material is widely used in the food industry, for its gelling, thickening, and stabilizing properties. Its main applications are in dairy and meat products because of its strong bonds to food proteins.

Sun-dried *dagaa*, processed by women along the coastal areas and islets of east Africa, is widely distributed to not only the coastal areas but also inland areas in the region. This product is a source of important fish protein to many people there. Therefore, improving this product with regard to quality and hygiene helps the people of east Africa improve their health and nutrition status.

These activities for value addition and sustainable use of marine resources through empowerment of women must be considered as an important field for blue economy development.

End

### **Appendix 1: PDM for the pilot activity in Takaungu, Kilifi County**

**Title of pilot activity:** Pilot activity of strengthening multi-function of BMU in Takaungu, Kilifi county

**Period:** August 2021--December 2021

**Target area:** Takaungu, Kilifi county

**Target group:** Takaungu BMU

<b>Project Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Important Assumption</b>
<b>Overall Goal of the Project:</b> Strengthening the multifunction of Takaungu BMU by enhancing their income generation through their fishing operation.	1. Income of Takaungu BMU increases XX% compared from the time at the beginning of the pilot activity.  2. Takaungu BMU fulfills functions of Beach Management Unit required for the main body of the marine coastal community.	(To be confirmed)	
<b>Purpose of pilot activity :</b> Takaungu BMU can take accurate fish landing data and take appropriate actions when sea accidents occur through the income generated from their fishing operation.	1. Takaungu BMU develops new type of fish landing log. 2. Takaungu BMU conducts rescue action XX times in a year.	(To be confirmed)	- Department for Fisheries and Blue Economy will maintain current fishery and marine coastal village development policies.  - No dynamic change occurs in the BMU.  - No dynamic change occurs in the situation of land ownership within the target area.
<b>Expected Output:</b> 1. BMU members can conduct fishing activities throughout the year using the provided powerboat and fishing gears.	1-1. Fishing activities are practiced with provided powerboat and fishing gear by BMU members.	Pilot activity reports	- Drastic reform of State Department for Fisheries and Blue Economy including the responsibility of the organization is not to be done during the activity period.
2. BMU members can accurately record fish-landing at the fish landing sites.	2-1. A method for recording fish-landing is established, and such fish-landing records from all landing sites are gathered at Takaungu BMU.	Pilot activity reports	

	2-2. At least two members of the BMU are capable of recording fish landing at the sites accurately.		
3. The BMU members who can respond immediately to marine accidents are trained on marine safety and security.	3-1. At least three BMU members participate in training for fishermen's safety and rescue in the sea.	Pilot activity reports	

Activities:	Input		
1-1. Clarify the status and problems of the BMU. 1-2. Identify strengthening measures for BMU's function. 1-3. Procure a powerboat and fishing gear according to the identification of the strengthening measures. 1-4. Formulate boat management plan of the donated fishing equipment and material. 1-5. Conduct fishing operation as per the formulated plan.	<Japanese side> 1. Experts Chief Advisor/Survey and planning Expert of pilot activity  2. Provision of equipment, materials, and facilities a) An FRP boat with an outboard engine b) Life jacket c) Fishing net with accessories  3. Allocation of other activity costs	<Kenyan side> 1. Allocation of Counterpart Project Director Project Manager Project Coordinator Technicians of pilot activity  2. Budget allocation  3. Provision of office space	- No catastrophic change occurs in the natural environment.  - Public security situation of the target area does not worsen.
2-1. Clarify the status and problems on fish landing record at each fish landing site. 2-2. Conduct training to and practice with members of the BMU through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office how to keep accurate record of fish landings. 2-3. Develop a technical package on method of accurate record of the fish landing.  3-1. Conduct training on fishers' safety course to members of the BMU through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office to strengthen their abilities. 3-2. Conduct rescue training to the BMU members through capacity development for staff of Kenya Fisheries Service and the County Fisheries Office.			Preconditions

## **Appendix 2: PDM for the pilot activity in Gazi, Kwale County**

**Title of pilot activity:** Pilot activity of value addition for dried fish production by women entrepreneur group in Gazi, Kwale County

**Period:** August 2021--December 2021

**Target area:** Gazi, Kwale County

**Target group:** Women entrepreneurs and members of Gazi BMU

<b>Project Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Important Assumption</b>
<b>Overall Goal of the Project:</b> Through the value addition of dried fish production, the livelihood of the members of dried fish processing group in Kwale county are improved.	1. Income of members of dried fish processing group in the Kwale county is increased by XX%.	(To be confirmed)	
<b>Purpose of pilot activity :</b> Improve quality of dried fish products by introducing a new processing way and establish new distribution and sales promotion methods.	Conduct demonstration sale of dried fish produced by the improved method.	(To be confirmed)	<ul style="list-style-type: none"><li>- State Department for Fisheries Aquaculture and Blue Economy will maintain current fishery and marine coastal village development policies.</li><li>- No dynamic change occurs in marketing system of <i>dagaa</i> products.</li><li>-Market price of dried <i>dagaa</i> does not greatly drop.</li><li>- No dynamic change occurs in the situation of land ownership within the target area.</li></ul>
<b>Expected Output:</b> 1. Dried fish production technique suitable for the target area is developed.	1-1 . One of the technical packages and training and extension material are prepared for dried fish production.	Pilot activity reports	<ul style="list-style-type: none"><li>- Drastic reform of State Department for Fisheries Aquaculture and Blue Economy including the responsibility of</li></ul>

2. Distribution and sales promotion methods suitable for the target area are improved.	2-1. One of the technical packages is prepared for distribution and sales promotion.	Pilot activity reports	the organization are not to be done during the project period.
3. Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.	3-1. At least two staff members from Kenya fisheries service and the County fisheries office are capable of being trained regarding dried fish processors and of supporting others with dried fish processing techniques.	Pilot activity reports	

Activities:	Input		
1-1. Clarify the status and problems of dried fish production including capacity needs assessment and awareness for Gazi women entrepreneurs and BMU members as well as community leaders. 1-2. Clarify possible production methods of dried fish for improvement. 1-3. Construct improved racks for the dried fish production. 1-4. Plan and implement training on new dried fish processing techniques to women entrepreneurs and BMU members. 1-5. Develop an improved technical package on dried fish production suitable and applicable to the target area.	<Japanese side> 1. Experts Chief Advisor/Survey and planning Expert of pilot activity  2. Provision of equipment, materials and facilities a) Construction of improved racks for drying <i>dagger</i> b) Vacuum packing machine c) Brazier and pot  3. Allocation of other activity costs	<Kenyan side> 1. Allocation of Counterpart Project Director Project Manager Project Coordinator Technicians of pilot activity  2. Budget allocation  3. Provision of office space	- CPs would not transfer to different positions or other regions.  - No catastrophic change of the natural environment occurs.  - Public security situation of the target area would not deteriorate.
2-1. Clarify the status and problems of distribution and sales promotion methods of the dried fish business including capacity needs assessment and awareness for Gazi women entrepreneurs and BMU members as well as community leaders. 2-2. Identify distribution and sales promotion methods of the dried fish business suitable and applicable to the target area. 2-3. Plan and implement training on new distribution and sales promotion methods of dried fish to women entrepreneurs and BMU members. 2-4. Develop an improved technical package on distribution and sales promotion methods for dried fish.			

3-1. Identify staff of Kenya Fisheries Service and the County Fisheries Office and clarify the status and problems of their technical and extension capabilities. 3-2. Conduct training of trainers (TOT) for extension teams (especially for extension officers) to train staff of Kenya Fisheries Service and the County Fisheries Office. 3-3. Analyze the results of pilot activities and improve training and extension material.			
			<b>Preconditions</b>

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### **Appendix 3: PDM for the pilot activity in Kibuyuni, Kwale County**

**Title of pilot activity: Pilot activity of value addition of seaweed soap production for Kibuyuni Seaweed Farmers' Co-operative Society Limited in Kibuyuni, Kwale County**

**Period: August 2021--December 2021**

**Target area: Kibuyuni, Kwale county**

**Target group: Members of Kibuyuni Seaweed Farmers' Co-operative Society Limited**

<b>Project Summary</b>	<b>Objectively Verifiable Indicators</b>	<b>Means of Verification</b>	<b>Important Assumption</b>
<b>Overall Goal of the Project:</b> Through the value addition of seaweed soap production, livelihoods of seaweed soap producers in Kwale County are improved.	1. Income of seaweed soap producers is increased by xx%	(To be confirmed)	
<b>Purpose of pilot activity :</b> Improve quality of seaweed soap products by introducing a new processing way and establishing new distribution and sales promotion methods.	1. Conduct demonstration sale of seaweed soap produced by the improved method in Mombasa or Nairobi.	(To be confirmed)	<ul style="list-style-type: none"><li>- State Department for Fisheries and Blue Economy will maintain current fishery and coastal village development policies.</li><li>- No dynamic change occurs in the present marketing system.</li><li>No dynamic change occurs in the utilization of coastal waters within the target area.</li><li>-No dynamic change occurs in the situation of land ownership within the target area.</li></ul>



<b>Expected Output:</b> 1. Quality of seaweed soap that satisfies consumers' needs is developed.	1-1. One technical package is prepared for improved seaweed soap production.	Pilot activity reports	- Drastic reform of State Department for Fisheries and Blue Economy including the responsibility of the organization is not to be done during the activity period.
2. Distribution and sales promotion methods are improved.	2-1. One technical package is prepared for distribution and sales promotion to consumers.	Pilot activity reports	
3. Capacity of staff of Kenya Fisheries Service and the County Fisheries Office is enhanced.	3-1. At least two staff members from Kenya Fisheries Service and the County Fisheries Office are capable of training seaweed soap producers and of supporting others with improved seaweed soap processing techniques.	Pilot activity reports	

Activities	Input		- CPs do not transfer to different positions or other regions.  - No catastrophic change occurs in the natural environment.  - Public security situation of the target area does not worsen.
1-1. Clarify the status and problems of production of seaweed soap including capacity needs assessment and awareness in the field for Kibuyuni Seaweed Farmers' Co-operative Society Limited and members as well as the community leaders. 1-2. Identify the quality of seaweed soap that satisfies consumers' needs. 1-3. Identify locally available materials (such as coconut oil and palm oil) that would be used for the seaweed soap. 1-4. Conduct verification trial on new production methods of seaweed soap. 1-5. Develop an improved technical package on seaweed soap production that satisfies consumers' needs.	<Japanese side> 1. Experts Chief Advisor/Survey and planning Expert of pilot activity  2. Provision of equipment, materials, and facilities a) Overhaul of soap processing machine b) Soap box of new design (approximately 6,000 boxes) c) Banners for sales promotion d) Natural fragrances and pigments	<Kenyan side> 1. Allocation of Counterpart Project Director Project Manager Project Coordinator Technicians of pilot activity  2. Budget allocation  3. Provision of office space	
2-1. Clarify the status and problems of distribution and sales promotion methods of seaweed soap including capacity needs assessment and awareness in the field for Kibuyuni Seaweed Co-operative Society Limited and members as well as the community leaders.			

<p>2-2. Identify distribution and sales promotion methods suitable and applicable to the consumers' needs.</p> <p>2-3. Develop the soap package that meets the needs of general consumers. The package should be designed for traceability.</p> <p>2-4. Develop an improved technical package on distribution and sales promotion methods.</p>	3. Allocation of other activity costs		<b>Preconditions</b>
<p>3-1. Identify staff of Kenya Fisheries Service and the County Fisheries Office and clarify the status and problems of their technical and extension capabilities.</p> <p>3-2. Conduct training of trainers (TOT) for extension teams (especially extension officers) to train staff of Kenya Fisheries Service and the County Fisheries Office.</p> <p>3-3. Analyze the results of pilot activities and improve training and extension materials.</p>			

## **TAKAUNGU BMU BOAT MANAGEMENT PLAN (MV TAKAUNGU)**

### **1. BACKGROUND**

Takaungu BMU is one of the 17 beach management units (BMUs) found in Kilifi County. It has five designated landing sites, namely: Madauni, Ngazini, Kitangani, Vitanga Viwili and Vuma. The main landing site is Madauni, found within Takaungu creek. The BMU has **239** members, composing of fishers, fish traders, boat owners, and other members. The BMU has relatively good infrastructure at its landing sites: an office, a cold store, and several fish bandas.

The main challenge facing the BMU is low income, especially during the south west monsoon season, when the sea is rough and small craft cannot venture out to sea. Another challenge the BMU faces is a high number of accidents at sea, with most occurring at the mouth of the creek, where there are sunken rocks.

The team composed of JICA consultants and staff of Kenya Fisheries Service Mombasa (hereinafter referred to as “the Team”) identified the challenges faced by the BMU and intervened through several initiatives in their pilot activity in Kilifi County:

- i. Purchase of a W23 power boat, 25HP outboard engine, 10 fishing nets (with mesh sizes of 2.5” and 3”) and their accessories and various marine safety equipment.
- ii. Providing training on BMU management, sea safety and rescue to BMU members.

In Kilifi County, the implementation of the pilot activity is being done by the Team in collaboration with Kilifi County Fisheries Directorate.

This is a management plan to ensure smooth and proper management of the boat provided.

### **2. OBJECTIVES**

- (1) Enhance fisheries production and income generation in Takaungu BMU.
- (2) Improve marine safety in Takaungu BMU by conducting rescue missions for vessels and individuals under distress in the sea.

### **3. BOAT MANAGEMENT COMMITTEE**

For effective management of the boat, a committee of 5 members will be formed comprising.

- (i) Chairman

- (ii) Secretary
- (iii) Treasurer
- (iv) Member
- (v) Member
- (vi) Fisheries Officer (ex-officio member)

#### Functions of the committee

- i. Oversee maintenance of the boat and gears.
- ii. Oversee maintenance of marine safety equipment.
- iii. Oversee safety standards/regulations and procedures of the operations of the boat.
- iv. Ensure the boat is registered and compliant with all required licenses.
- v. Monitor fish catches, marketing/sales and savings of proceeds.
- vi. Implement the revenue sharing structures as stipulated in this plan.
- vii. Develop fishing plan (fishing schedule) that will stipulate:
  - ❖ The crew going on fishing expeditions at a particular time.
  - ❖ The coxswain going on fishing expeditions at a particular time.
  - ❖ Number of days each individual will be on the expedition.

NB: *Taking into consideration members from different landing sites.*
- viii. Development of management procedures for the boat operation and management, which will be ratified by the BMU assembly.
- ix. Opening and running of boat operations account. The account name shall be “Takaungu BMU Boat” account.
- x. Ensure the boat carries out fishing and rescue operations concurrently.
- xi. Implement guidelines and modus operandi for marine safety and rescue, which will be ratified by the BMU assembly.
- xii. Spearhead expansion/establishing fishing fleets in Takaungu BMU.

## 4. GUIDELINES FOR FISHING OPERATIONS

The operation of the boat will entail the following, **unless** stated otherwise by the boat management committees (and approved by the BMU assembly);

- i. Fishing operations will take place every day between approximately 4.00am and 8.00am, depending on the tides and seasons.
- ii. The fishing crew will comprise of a **four (4)** man crew and a **coxswain**.

- iii. The boat will be operated by two coxswain, whose selection will be as outlined in this plan.
- iv. All fish captured should be landed at the designated BMU landing site, weighed and sold at BMU landing facilities.
- v. There will be established benefit sharing mechanisms for sustainability (*detailed below*)
- vi. Through the sharing mechanism, revolving fund will be used to purchase similar boats to be distributed along the BMU coastline on the same arrangement.

#### **Benefit sharing based on total sales of fish caught/other revenue generating activity**

- A. All revenue will be handled by the designated treasurer of the Fishing Operations Committee.
- B. For sustainability of the fishing boat, the production sales of the boat will share according to the following arrangement:

From the total amount of revenue earned in a day, the following will be deducted:

- (i) Fuel cost
- (ii) Engine maintenance- KES400 per trip.

After deducting the above items, the remainder will be split equally among the remaining parties as follows:

- (iii) Coxswain and fishing crew- **50%**
- (iv)BMU Kitty- Maintenance of the boat and fishing gears- **50%**

#### **Criteria for selection to participate in fishing activities of MV Takaungu**

For one to be a part of the crew involved in the boat's fishing operations;

- i. She/he must be an active BMU member i.e. all BMU fees and requirements should have been met.
- ii. She/he must have a valid fishing license.
- iii. She/he will follow the guidelines and direction outlined in the developed fishing schedule (mentioned earlier- developed by the boat management committee).

For one to be the coxswain involved in the boat's fishing and rescue operations;

- i. She/he must be an active BMU member i.e. all BMU fees and requirements should have been met.
- ii. She/he must submit an application to the boat management committees stating his /her intention to be appointed as coxswain.
- iii. She/he must have all the requisite licenses.

- iv. She/he should preferably have a coxswain certificate from the relevant authorities.
- v. She/he should be conversant with marine rescue procedures.

## **5. GUIDELINES FOR MARINE SAFETY AND RESCUE OPERATIONS**

- i. Priority will be given to rescue and safety activities over fishing operations i.e. the crew at the boat at any time should abandon any such fishing operations once they get a distress call.
- ii. The crew on the boat will always include one member trained on marine safety and rescue; he is also obliged to share such knowledge with the other crew.
- iii. The coxswain are responsible for the overall safety and make the final decisions in rescue situations and operations.
- iv. If boat is not on a fishing expedition, it should be moored at one of the BMU landing sites i.e. to ensure the boat is always available for rescue missions should they arise.

## **6. DISBANDMENT OF THE BOAT MANAGEMENT COMMITTEE**

In the event that the appointed boat management committee does not adhere to this plan or their implementation of it is unsatisfactory; it may be disbanded by the Executive Committee on approval of the Assembly.

Once this committee has been disbanded, the BMU Executive Committee, together with the office of the County Director of Fisheries will be responsible of constituting a new committee. The new committee should be constituted within a period of 2 weeks.

## **7. PROGRESS MONITORING AND EVALUATION**

The implementation of this plan will be monitored on a frequent basis by the BMU Executive Committee, together with the office of the County Director of Fisheries.

The Chairman of the Boat Management Committee will provide monthly progress reports to the BMU Executive Committee and quarterly progress reports to the BMU Assembly.

The financial records pertaining to the boat operation should be available for scrutiny by any BMU member, within a period of xx days.

## **8. REVIEW AND AMENDMENTS**

- i. This document is to be reviewed after six (6) months from the beginning of the implementation of the plan, or when it is deemed necessary by the BMU assembly.
- ii. Amendments to the plan can be initiated by members of the BMU Assembly or the Executive Committee.
- iii. Any amendments in the plan should be approved by the BMU assembly.

**The State Department of Fisheries and Blue Economy  
Ministry of Agriculture, Livestock and Fisheries  
Republic of Kenya**

**Marine Fisheries Promotion Advisor  
for Blue Economy Development**

**Guidelines**  
**For**  
**Improvement of Seaweed Soap Business**  
**In**  
**Kibuyuni, Kwale County**

**October 2021**

**Japan International Cooperation Agency**  
**IC Net Ltd.**



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## Preface

One of the pilot activities has taken place at Kibuyuni, Kwale County for value addition of seaweed soap production targeting members of Kibuyuni Seaweed Farmers Co-operative Society Limited under Marine Fisheries Promotion Advisor for Blue Economy Development funded by Japan International Cooperation Agency (JICA) collaborated with Kenya Fisheries Service and the State Department of Fisheries and Blue Economy under Ministry of Agriculture, Livestock and Fisheries, Republic of Kenya.

Seaweed farming business has already established at several coastal communities in southern Kenya with constant dealing network of dried seaweed with several dealing companies in Tanzania. Nevertheless, many women who work in the seaweed farming complain against low dealing price of dried seaweed at KES25/kg, therefore it is required to develop value added product made of the seaweed farmed by the women.

In these circumstances, Kibuyuni Seaweed Farmers Co-operative Society Limited has produced soap, shampoo and juice made of seaweed and sold them with technical and financial assistance of Kenya Government and other organizations such as Food and Agriculture Organization of the United Nations (FAO). This activity attracts many people's attention, and about 3,500 soaps are produced and sold at several exhibitions and other occasions as of September 2021. However, nobody knows if it is possible for them to keep on selling the seaweed soap continuously after the initial attention has been over.

This pilot activity aims at enhancement of their technical skill to improve their products in quality as well as to introduce the way for sales promotion of their products to ensure value addition of the seaweed soap production.

These are guidelines assisting staff of KeFS Mombasa and Kwale County Fisheries Office as well as members of Kibuyuni Seaweed Farmers Co-operative Society Limited, and also some other staff of organizations who propose to promote commodities linked to Blue Economy Development aiming at enhancement of local commodities for value addition.

## 1. How to Practice Handmade Soap

### 1.1 Recipe of handmade soap

Basic ingredient of handmade soap “for 10 pieces of 70g soap” is as follows.

Basic Oil (Coconut, Olive, Avocado, Palm, Shea butter) :	500g
Caustic soda (13.2g of caustic soda is required for 100g of oil) :	66g
Purified water (38.8g of purified water is required for 100g of oil):	194g
Essential oil (0.2 to 0.8% of the amount of oil) :	2ml

#### (1) Oil formulation for Marseille soap:

Good for body and face wash, washing hair and baby.

Oil	%	for 500g of total oil (g)
Olive	72	360
Coconut	20	100
Palm	8	40

#### (2) Oil formulation for normal soap:

Good for body and face wash and washing hair.

Oil	%	for 500g of total oil (g)
Olive	50	250
Coconut	25	125
Palm	25	125

#### (3) Oil formulation for Coconut oil as basic oil:

Good for body and face wash.

Oil	%	for 500g of total oil (g)
Coconut	50	250
Palm	25	125
Olive	25	125

(4) Oil formulation for Palm oil as basis oil:

Good for body and face wash.

Oil	%	for 500g of total oil (g)
Palm	50	250
Coconut	25	125
Olive	25	125

## 1.2 Characteristics of oil

Characteristics of oil used for soap are as follows.

Oil	Characteristics
Olive	Olive oil is rich in unsaturated fatty acids. Content of 72% or more is called Marseille soap. Good for body, face, hair and as baby soap.
Coconut	Coconut oil is rich in saturated fatty acids. Dissolves well even in cold water, has good foaming, also has strong detergency. High blending ratio, the soap dries and cracks. Good blending ratio of 25% or less.
Palm	Palm oil contains a good balance of saturated and unsaturated fatty acids. Sustains the hardness and foaming of soap. High blending ratio, soap will be hard and easily broken. Good blending ratio of 25% or less.
Avocado	Base oil for baby soap and sensitive skin. Blending a lot, the soap melt and crumble. Good blending ratio of 50% or less.
Shea butter	Shea butter can be used as a base oil for soap. It is rich in unsaturated fatty acids. It will be a creamy foam. Good blending ratio of 25% or less. Moisturizing soap can be made by adding shea butter.

## 1.3 Let's make a handmade soap

### (1) Make caustic soda water

#### How to measure caustic soda

- Place a heat-resistant measuring cup on the scale,
- Set the memory of the scale to 0,
- Measure 66 g of caustic soda with a spoon.



#### Weigh purified water

- Place a heat-resistant measuring cup on the scale,
- Set the memory of the scale to 0,
- Measure 194 g of purified water.



#### Mix purified water to caustic soda

- Pour the weighed caustic soda into a measuring cup of purified water little by little.
- After adding the caustic soda, stir until the caustic soda is completely dissolved.

**Caution:** Do not inhale!!

A pungent smell is generated, and the temperature rises to 80-90°C.

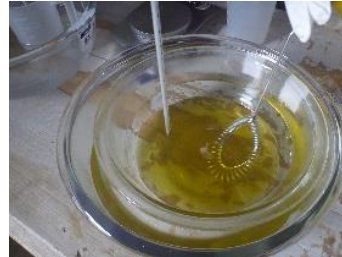
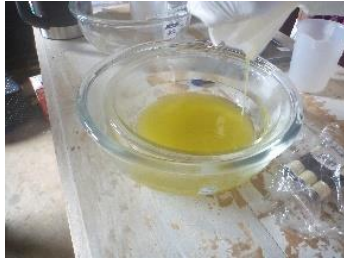
- Place a measuring cup containing caustic soda into a kitchen bowl with water and allow to cool to 38-42 °C.



## (2) Make soap dough

### Preparation of basic oil for making soap

- Decide basic oil whether to use one type of oil or a mixture type of two or more types of oil.
- Put the selected basic oil into a kitchen bowl.
- Warm the basic oil in a kitchen bowl with hot water bath to 38-42 °C.



- Adjust the temperature of the basic oil and the caustic soda water.



### Mixing caustic soda water and basic oil

- Add caustic soda water to the basic oil little by little while mixing them with hand whisk.
- After adding all the caustic soda water to the basic oil, mix them with a hand whisk or an electric whisk at least 20 minutes. During the mixing, take care not to mix air into the basic oil.
- The transparent soap dough turns into white and little hard one.



### Making seaweed soap

- Add the seaweed powder of 0.02 to 0.2g in with while mixing the soap dough.



### Making fragrance soap

- Mix the essential oil for fragrance before putting the soap dough into a mold.



### (3) Shape of soap

- Pour the soap dough into a mold.
- Use a rubber spatula to take out all the dough in the bowl.
- Shake the mold to take out air in the soap dough.

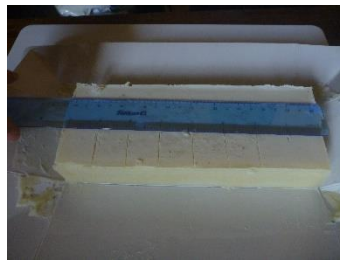


- Keep it warm for at least 24 hours in a store place.



- After 24 hours, remove the solid soap block from the mold and cut it evenly with a knife.

**Caution:** Wear gloves when cutting the soap block!!



- Place the cut soap in a well-ventilated place out of the sun and let it dry for about a month.





## 2. Improvement of the Seaweed Soap in Quality

Based on practice of the handmade soap production experienced by the members of Kibuyuni Seaweed Farmers Co-operative Society Limited (hereinafter referred to as Kisefa), the members have formulated the following directions to improve their seaweed soap.

### 2.1 Use finer seaweed powder to the soap

When we discuss issues on how to improve the present seaweed soap with members of Kisefa, staff of Kenya Marine and Fisheries Research Institute (hereinafter referred to as KMFRI), Kenya Fisheries Service Mombasa (hereinafter referred to as KeFS Mombasa) and Kwale County Fisheries Office, the staff of KMFRI mentions that the seaweed powder mixed with the soap should be finer, otherwise users feel pain on their skin whenever they rub their body with the soap. The most members of KISEFA also agree that point, thus the first issue to be focused should be the one on how we can make finer seaweed powder. Details of the solution will be explained in Chapter 3.

One of the members of KISEFA mentions that some consumers prefer the seaweed soap mixed with rough seaweed powder. For such consumers, they select the present seaweed soap which is kept on producing further. Focus of the discussion is finding the way to promote the value addition of the present products, thus the speaker was convinced.

### 2.2 Develop fragrant soap

The present seaweed soap has no essential oil mixed for fragrant and most members of KISEFA agree on production of fragrant seaweed soap to add the value. The lavender oil was only the choice we could find at the site among others at the moment, thus we had consensus among the members using lavender essential oil to add the seaweed soap in consideration of the sustainability. After that we have found an essential oil supplier in Mombasa, and we have some other options now to select other kinds of essential oil for fragrant which makes possible to use for further development of the activities.

One of the members of KISEFA mentions that some consumers prefer the seaweed soap without any fragrance. That is true, and for such consumers, select the present seaweed soap without any fragrance which is kept on producing further. Focus of the discussion is finding the way to promote the value addition of the present products as mentioned above, thus the speaker was convinced.

### 2.3 Improve the oil composition

The present product of seaweed soap consists of coconut oil (40%) and palm oil (60%). The team composed of JICA consultants and staff of KeFS Mombasa (hereinafter referred to as the Team) recommended adding the extra virgin olive oil in addition to coconut oil and palm oil to improve the quality of the soap, because olive oil is rich in unsaturated fatty acids; good for body, face, hair, and as baby soap. All the members of KISEFA agreed to add the olive oil to their new product.

Composition of three kinds of oil is recommended at 40 percent of coconut oil, 40 percent of palm oil and 20 percent of olive oil in considering the balance of quality of the product and the production cost as being mentioned in Chapter 4.

### 3. How to Produce the Improved Seaweed Soap by Machine

#### 3.1 Overhaul the soap-making machine

The Team invited a technician from D.K. Engineering in Nairobi (the machine maker) to the soap factory in Kibuyuni, Kwale County in August 2021 to check the status of the machine. The technician assessed the necessary days and spare parts for the overhauling. According to his assessment, though the machine is still in working condition, it would be broken down in one or two years, because the factory is located near the beach, always receiving the salty breeze which makes the machine rusty quickly. In accordance with his assessment, he visited to the factory again with necessary spare parts in October 2021, and thus he has done overhaul of the machine.

#### 3.2 Equip the machine of producing seaweed powder

A hammer mill and a sieve machine are the related machines to produce the seaweed powder. The hammer mill crushes the dried seaweed into pieces and powder; the sieve machine puts the powder through a sieve with 44  $\mu$  (millimicron) mesh size. During the overhaul of the machine in October 2021, we focused the overhaul of the sieve machine by renewing the netting material and several other parts of the machine. The hammer mill has been equipped into good condition at the factory of D.K. Engineering in Nairobi and sent it back to Kibuyuni in the beginning of December 2021. These challenges are required to materialize the finer seaweed powder mixed to the new type of seaweed soap.

#### 3.3 Decide to select molds for seaweed soap

Selection of molds for the new type of soap is another challenge. Kisefa had two kinds of mold one of which is rectangular shape of bigger soap at 184.71g/bar; and another is round shape of smaller soap at 115.92g/bar.

In one lot of soap production with the machine at present, they use 10 liters of coconut oil and 15 liters of palm oil to produce 230 bars of the bigger rectangular soap, thus 184.71g/bar x 230 bars = 42,485g (42.5kg). The Team has supplied five molds with 60mm (W) x 200mm (L) x 70mm (D) of interior size, which enable to produce 40 bars of rectangular soap in 60mm x 70mm x 25mm of size at about 94g/bar, thus 3,760g (3.8kg: 94g x 40 bars) at one lot of production.

If we use the five molds, we need to decrease the volume of one lot of production into one tenth (1/10), therefore we discussed whether we select five sets of the new mold or use the current molds. If they adopt the current molds for the new type of soap, their former product

must be stopped production because the shape of new soap must not be mixed with the former products, so that we shouldn't produce the former soap with the same molds, otherwise the consumers confuse the concept of the new soap.

As a result of the discussion, members of Kisefa have agreed on using the five sets of the mold only for the new type of soap by reducing one lot of production at 4.0kg with machine. Thereafter, the Team supplied Kisefa another 20 sets of the same mold to increase the volume of one lot of the production.

#### 4. How to Promote Sales of the Improved Seaweed Soap

##### 4.1 Composition of material for one lot (4kg) of the production

We prepare the following material to produce 40 bars of Seaweed Lavender Soap (70mm x 60mm x 25mm: 94g/bar) with five sets of the new mold:

Table 1. Necessary material for 4kg of Seaweed Lavender Soap

Material	Quantity
Coconut oil	1,143g
Palm oil	1,143g
Olive oil	571g
Caustic soda	377g
Purified water	1,109g
Lavender oil	29g
Seaweed powder	0.06g
Total	4,372g

##### 4.2 Cost and benefit analysis

The following table shows the cost breakdown for 40 bars of Seaweed Lavender Soap (60mm x 70mm x 25mm) with packages.

Table 2. Cost breakdown for 40 bars of Seaweed Lavender Soap

Material	Unit price (KES/litter/kg)	Volume (litter ÷ kg)	Amount (KES)
Virgin Coconut oil – 1 <sup>st</sup> quality	KES986.-	1.143kg	KES1,127.00
Palm oil – 1 <sup>st</sup> grade	KES928.-	1.143kg	KES1,060.70
Extra virgin Olive oil	KES2,784.-	0.571kg	KES1,589.66
Caustic soda	KES150.-	0.377kg	KES56.55
Purified water	KES40.-	1.109kg	KES44.36
Lavender oil	KES9,744.-	0.029kg	KES282.58
Seaweed powder		0.00006kg	
Package	KES15.50	40pcs.	KES620.00
Total		4.372kg	KES4,780.85

In accordance with the calculation in the Table 2, the cost of Seaweed Lavender Soap is at KES120/bar. If we sell the Seaweed Lavender Soap at KES180/package, the rough profit is at KES60/package with the profit rate at 33 percent.

End