AFRICAN UNION
INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES

Sweden
Sverige

The Report on July Fieldwork Activities

Strengthening Conservation and Climate Impact Mitigation through Nature-Based Seaweed Farming Initiatives in Zanzibar

Prepared by: Dr. Flower E. Msuya

Edited by: Hellen Guebama, Stephanie Achieng, Mohamed Seisay, Eric Nadiope and Joel Mokenye

Citation: AU-IBAR, 2024. : Strengthening Conservation and Climate Impact Mitigation through Nature-Based Seaweed Farming Initiatives in Zanzibar

The Director
African Union – Inter African Bureau for Animal Resources (AU-IBAR)
Kenindia Business Park, Museum Hill, Westlands Road
P.O. Box 30786-00100, Nairobi, KENYA
Or by e-mail to: ibar.office@au-ibar.org
Published by AU-IBAR, Nairobi, Kenya

TABLE OF CONTENTS

1. INTRODUCTION

The African Union Inter-African Bureau for Animal Resources (AU-AIBAR) under the main project titled Conserving Aquatic Biodiversity and Ecosystems in the Context of Africa Blue Economy" partnered with the Zanzibar Seaweed Cluster Initiative (ZaSCI) to facilitate implementing a project aimed at "strengthening conservation and climate change impact mitigation efforts for identified ongoing initiatives on nature-based solutions on seaweed farming in Zanzibar- towards conserving aquatic biodiversity and environmental management". This project contains activities that are planned quarterly with the first quarter to be completed by December 2024. Field activities for the first phase of the quarter were conducted for seven days, from 21st to 27th July 2024 in Unguja and Pemba islands of the Zanzibar archipelago. In this report, a summary of the activities conducted is given as well as a description of the outcomes. The report also outlines best practices, lessons learnt and recommendations.

2. SCOPE OF WORK

The specific tasks of the consultant were to:

a. Design the Team for the Fieldwork in Zanzibar.
b. Lead the Team for the fieldwork activities in Zanzibar to identify tree species used as pegs for Seaweed Farming.
c. Support the identification of seaweed farm clusters as demonstration farms for promoting best practices with regards to environmental and climate mitigation considerations.
d. Develop a report highlighting recommendations, best practices and lessons learnt from the field study.

3. OBJECTIVES OF THE FIELD MISSION

The July activities were aimed to achieve the following:

i. identifying tree species mostly used as pegs in seaweed farms of Zanzibar,
ii. Identifying practices that contribute to coastal pollution and environmental degradation in seaweed farming areas.
iii. Identifying seaweed farm clusters implementing climate change mitigation programs, including but not limited to nature-based solutions, in view of supporting these farms as demonstration farms for promoting best practices with regards to environmental and climate mitigation considerations.

4. EXECUTION OF THE ASSIGNMENT

4.1 Designing and leading the Team for the Fieldwork in Zanzibar

The consultant designed and led a team of researchers comprised of two sub-teams namely Team 1 and Team 2 for conducting field activities in Unguja and in Pemba islands, respectively as summarized in Table 1. These teams worked parallel whereby each team was led by one senior seaweed researcher/expert (Dr. Flower Msuya/Dr. David Simiyu and Dr. Amelia S. Buriyo). Note that the field activities coincided with two days of seaweed day celebrations, thus Dr. Simiyu led Team 1 while Dr. Msuya was coordinating seaweed day activities, and she took over the role immediately after the celebrations. In addition, each team was accompanied by a local researcher to guide/and coordinate local logistics with community leaders (Sheha) and seaweed farmers' leaders. Two taxonomists, one from each island (Pemba and Unguja) were recruited as well, and joined the ZaSCI team for the purpose of translating local names of the plant species used as pegs to their scientific names.

Table 1: ZaSCI Research Team for the Fieldwork in Zanzibar during July 2024

Team 1		**Team 2**	
Name	**Role**	**Name**	**Role**
Dr. Flower E. Msuya	Team leader	Dr. Amelia Buriyo	Team leader
Dr. David Simiyu	Researcher/team leader	Mr. Abdallah Hemed	Researcher and Local guide.
Mr. Issa Muharami	Researcher and Local guide	Mr. Muhene Ali Salumu	Taxonomist
Mr. Malim Tahir	Taxonomist		

4.2 Summary of field activities and Methodology

To achieve the objectives set out for July activities, 11 seaweed farming villages (Shehia), five in Unguja and six in Pemba were visited by ZaSCI team. Upon arrival, the team introduced themselves to village leaders (known as Sheha) and explained the main objectives of the field mission. Furthermore, researches explained to seaweed farmers on how the information that will be generated from the research will be treated and used, and requested their consent to participate. After filling consent forms either by individual farmers or representatives (Sheha), seaweed farmers were then asked questions and their responses were recorded on interview forms. Between 17 to 20 seaweed farmers per farming community were interviewed using the structured pre-developed questionnaires, and focus group discussions were conducted among 6-8 experienced farmers and key-informants in each village using interview guide questions (refer to research tools presented in initial consultancy report). The FGDs were conducted to probe further and obtain common answers to supplement the information collected by questionnaire. The interviewees granted permission to record their voices for accurate reference during the

interpretation of the collected information. Ultimately, this undertaking engaged a total of about 280 respondents (Table 2). The local language (Kiswahili) was used in both surveys and FGD so as to allow clear understanding, freedom of expression and full engagement of all participants. The names of village visited, and the number of participants in each village are shown in Table 2. Some photos of the interviews and focus group discussions are shown in Annex 1.

Table 2: *List of seaweed farming villages in Zanzibar where field activities took place in July 2024*

Date	Island	District/Region	Village/Shehia	Respondents
21/07/2024	Arrival of researchers from Dar es Salaam to Unguja and Pemba islands, and holding inception meetings with local researches in respective islands			ZaSCI team
22/07/2024	Unguja	Magharibi B/Mjini Magharibi	Bweleo	34 farmers
	Pemba	Micheweni/North Pemba	Micheweni	26 farmers
23/07/2024	Unguja	Kusini/Kusini Unguja	Muungoni	20 farmers
	Pemba	Micheweni/North Pemba	Makangale	25 farmers
24/07/2024	Unguja	Kusini/Kusini Unguja	Paje	22 farmers
	Pemba	Micheweni/North Pemba	Tumbe Mashariki	26 farmers
25/07/2024	Unguja	Kaskazini A/ Kaskazini Unguja	Pwani Mchangani	20 farmers
	Pemba	Micheweni/North Pemba	Kiuyu Mbuyuni	34 farmers
26/07/2024	Unguja	Kati/ Kusini Unguja	Pongwe	20 farmers
	Pemba	Wete/North Pemba	Fundo island	26 farmers
27/07/2024	Unguja	Mjini	Mjini Magharibi	ZaSCI team
	Pemba	Mkoani/South Pemba	Chokocho	26 farmers

4.3 Findings from field activities

4.3.1 Identified Tree species used as pegs in seaweed farming in Zanzibar

A total of 94 species were identified in both islands (Unguja and Pemba) which are used as pegs in seaweed farming (Table 3). With except of seaweed farmers in Bweleo village (Unguja) who use stones to hold the ropes, and Makangale village (Pemba) who fill up sacks (polo) with sand and use them to tie ropes, due to the rocky nature of the substratum at their farms, the rest of the farmers in other villages in both Unguja and Pemba rely on wooden pegs. These pegs are obtained from several species available in the forests within the village's vicinity. To be able to rank the most and least commonly utilized tree species, quantitative analyses of the collected data is need.

Table 3: List of Tree species used as pegs in Zanzibar seaweed farms

SN	Local name	Scientific name
1	Mkole	*Grewia bicolor*
2	Mkwamba	*Flueggea virosa*
3	Mzindigwi	*Sideroxylin inerme*
4	Mtumbika	*Mallotus oppositifolius*
5	Mlapaa/Mgudi	*Polysphaeria parvifolia*
6	Mkunguni	*Terminalia boivinii*
7	Mjenga uwa	*Gliricidia sepium*
8	Msiliza	*Euclea natalensis*
9	Mbebeta	*Psiadia punctulata*
10	Mkonge	*Pyrostria bibracteata*
11	Mvinje/Mvuma	*Casuarina equisetifolia*
12	Mdimu msitu	*Suregada zanzibariensis*
13	Msiti/Mchu/Mchunga (Mkoko Mweupe)	*Avicennia marina*
14	Mkandaa Mwekundu	*Ceriops tagal*
15	Mkandaa Mweusi	*Rhizophora mucronata*
16	Mwato wa Jiwe	*Bridelia carthatica*
17	Mkomwe	*Cordia subcordata*
18	Mhina wa Tumbili/Mhinamsitu	*Margaritaria discoidea*
19	Mkungu	*Terminalia catappa*
20	Mkeshia/Mkeshia majani membamba	*Acacia auriculiformis*
21	Mnyungunya/Mnyunywa	*Pluchea sardida*
22	Mchefuo	*Monodora grandidieri*
23	Mnuka Mavi	*Ferula fostida*
23	Mfupapo	*Lannea schweinfurthii*
25	Mbura	*Parinaria curatellifolia*
26	Mpepe	*Flagellaria guineensis*
27	Mkichaka	*Solanum bojeri*
28	Kwamba	*Flueggea virosa*
29	Mkuu Kilemba	*Blighia unijugata*
30	Mpilipili Doria	*Sorindeia madagascariensis*
31	Mkanja	*Cremospora triflora*
32	Mzambarau	*Syzygium cuminii*
33	Mchocha	*Pachystela brevipes*
34	Mpera	*Psidium guajava*
35	Mwembe/Mwembe Mwitu	*Mangifera indica*
36	Mfenesi	*Artocarpus heterophyllus*
37	Mlonge	*Moringa oleifera*
38	Muarobaini/Mtunda	*Azadirachta indica*
39	Mgolegole	*Adenia rumicifolia*
40	Mkanja Mwitu	*Polysphaera parvifolia*
41	Mvunja Shaka	*Dichrostachys cinera*
42	Mvivuivu	*Psychotria sp*
43	Mfuu/Mfuru	*Vitex doniana*
44	Mtondoo	*Calophyllum inophyllum*
45	Mkorosho	*Anacardiam occidentale*
46	Msizimizi	*Antidesma verosum*

47	Mchenza Mwitu	*Uapaca guineensis*
48	Mkome	*Grewia forbesii*
49	Mchenga Mwiko	*Bruguiera gymnorhiza*
50	Mchakavi	*Crotalaria retusa*
51	Mnuka Mavi2	*Alongium salvifolum*
52	Mtumbi	*Garcinia livingstonii*
53	Mcheji	*Manilkara sulcata*
54	Mtarawando	*Markhamia zanzibarica*
55	Mtikisiwa	*Sorindeia madagascariensis*
56	Mkuu Kilemba2	*Bersama abissinica*
57	Mwezi Upande	*Pittosporum viridiflorum*
58	Mchongoma	*Flacuatia indica*
59	Mlapaa	*Polysphaeria parvifolia*
60	Msiliza	*Euclea natalensis*
61	Mdamba	*Seaside tree*
62	Mpendapo	*Keetia zanzibaricum*
63	Mbura2	*Pyrostia curatellifolia*
64	Mfukufuku	*Brexia madagascariensis*
65	Mchocha	*Pachystela brevipes*
66	Mihogo	*Manihot esculanta*
67	Mdaa	*Euclea racemosa*
68	Mchengele	*Searsia longipes*
69	Mkumba	*Searsia natalensis*
70	Mkunazi	*Ziziphus mucronata*
71	Mpera	*Psidium guajava*
72	Mjoma	*Macphersonia gracilis*
73	Mtopetope	*Annona senegalensis*
74	Mpiinga waume	*Senna petersiana*
75	Kidaramba cha Pwani	*Pemphis acidula*
76	Mhina	*Lawsonia inermis*
77	Mjohoro	*Senna siamea*
78	Mlakunguru	*Lantana camara*
79	Muharita	*Sapindus saponaria*
80	Muwango	*Rauvolfia mombasiana*
81	Mrimbo	*Mystroxylon aethiopicum*
82	Mng'ombe	*Ozoroa obovata*
83	Mpuvuu/Mnyevuu	*Mimusops obtusifolia*
84	Mnusi	*Gymnosporia heterophyllus*
85	Mkeneta Dume	*Dodonaea viscosa*
86	Mkaaga	*Eugenia capensis*
87	Mgo	*Flacourtia indica*
88	Msigino	*Dichrotachys cinerea*
89	Mpava	*Millettia usaramensis*
90	Mbunduki	*Bourreria petiolaris*
91	Mkuyu/Mkururu	*Diospyros consolatae*
92	Kidaramba cha Juu	*Olea woodiana*
93	Mbulugamu	*Eucayptus spp.*
94	Mzeze	*Leucaena leucocephala*

According to the farmers, some of these species especially mangrove, are durable and can be used for the whole seaweed planting season while others are relatively softer and are used because there are no best options. Moreover, farmers added that the durable tree species are becoming rarer and hence farmers in villages such as Muungoni and Paje (Unguja), and Tumbe (Pemba) do buy pegs from vendors who obtain these pegs from far distances or from protected forests, for a cost ranging from 5,000/ to 10,000/ for a bunch containing 50 pegs.

Despite the fast-declining availability of durable tree species used for pegs, there are no efforts to restore the forests in the villages visited.

4.3.2 Identified practices that contribute to coastal pollution and environmental degradation in seaweed farming areas

Results show that most farmers especially who participated in quantitative surveys perceived that seaweed farming activities do not directly contribute to coastal pollution, but natural processes such as strong wind and storms pollute their farms and beach by detaching and casting wild macrophytes over seaweed farms and beaches. Farmers reported that this is happening during seaweed growing period, and is controlled by nature/God, thus they have nothing to do to stop it. Through probing questions, some farmers reported that the practice may produce pollutant especially during harvesting period. Among of the pollutants emanating from seaweed farms, the following were ranked as most produced:

- Old pegs
- Tie-tie remains
- Sacks (used to carry seeds or harvests)

Farmers expressed their need for environmental education that will help them understand how best to protect their shoreline from pollution and environmental degradation. This is underscored by the fact that in all villages visited, none had attended such educational programs, and no village had an initiative in place that deals with pollution management. However, several farmers insisted that their level of pollution is insignificant when compared to the pollutants coming from other activities such as recreation/tourism. Farmers also expressed their willingness to clean the beach frequently if they are provided with the necessary equipment.

4.3.3 Identified existing climate change mitigation programs as well as nature-based solutions to climate change impacts in seaweed farming villages

Climate change mitigation programs are scarce in Zanzibar seaweed farming villages. However, seaweed farmers mentioned some nature-based (restoration in particular) initiatives that have helped them mitigate impacts of climate change. Nonetheless, with off-bottom farming method in shallow intertidal water is becoming difficult as a result of climate change impacts, initiatives that help farmers access deep-water farms have been hailed as important factors contributing to their steady income amidst increasing seawater temperatures. These initiatives include provision of boats by the government, and swimming lesson provided to women farmers by stakeholders such as Milele Zanzibar Foundation. However, these initiatives have not covered all villages.

5. CHALLENGES FACED DURING THE FIELDWORK

- Interference with the seaweed day activities on 22/07/2024. The coincidence of the field activities with the Zanzibar seaweed day caused some stakeholders to miss either of the two activities.
- Overlapping of the filed activities and spring tides: being the period of spring tides, farmers were attending their farmers during the morning hours and availed time for research teams the afternoon hours. This resulted into completing surveys and interview meetings very late evening, hence, researchers arrived at their hotels while it is too late to work on data entry as per plan.
- Lack of pre-designed data entry templates: although data collection tools were well prepared, but the data entry templates were not prepared beforehand to enable both teams to use the same templates for easy subsequent data merge. Perhaps this would need someone with pre-conception insights of analysis tools of the collected data.
- Late arrival of funds to facilitate activities in Pemba, however, researchers did their best to achieve what was planned in all villages which were surveyed before the arrival of AU-IBAR team.
- Oversights of some aspects in the budget such as printing expenses, and air tickets for members traveling to Pemba. We commend the AU-IBAR project management team for adjusting the budget to cover all essential budget aspects, and Pemba team who worked one day (the sixth village) without payments.

6. BEST PRACTICES, LESSONS LEARNT AND RECOMMENDATIONS

6.1 Best practices

6.1.1 There are several uncoordinated mangrove restoration initiatives, however, Kiuyu Mbuyuni village is leading in restoration of Mangroves with well-established forest and recently they started beekeeping in the same forest.

6.1.2 Farmers in Makangale (Pemba) and Bweleo (Unguja) villages do not use wooded pegs, automatically do not destroy forests, instead they fill sand in sacks, and these to anchor/tie ropes. Their practices can be adopted to other places to minimize forest destruction. However, other environmental threats associated with this practice such as micro-plastics from sacks, prolonged sand shifting from the beach to farming areas, etc. are yet to be known.

6.1.3 Framers practice on-farm management by re-attaching loose seaweed bunches to their ropes, re-fixing uprooted and replacing broken pegs, removal of epiphytes, and quick harvesting of infected seaweed.

6.1.4 Farmers dry their seaweed on sheeting material, hanging ropes and racks to avoid direct contact with sand and other debris which lowers quality.

6.1.5 few farmers mentioned to avoid seagrasses while establishing their farms.

6.2 Lessons learnt

Almost all seaweed farmers (Pemba in particular) perceive the seaweed farming activity as their permanent employment, and in some villages e.g Chokocho, Micheweni, and Fundo island 90-100% of the village population are seaweed famers. They further iterated that they have been engaged in this industry for several years (more than 20 years), and still hope to remain in the same activity as they have no other income generating options. They are therefore, longing for support in various aspects geared towards sustainability of the industry such as research geared to solve the current diseases and pests, competitive prices and stable and reliable market; training in environmental conservation, small scale processing and provision of facilities/equipment for value-addition; introduction of innovative farming technologies and support for acquiring appropriate farming gears and skills.

All famers who participated in FGD were well informed of climate change impacts and extreme events such as heavy rains, floods unusual storms, hurricanes and cyclones; and considered these impacts as threats to their lives.

Almost all seaweed farmers agree that the current seaweed farming method (peg and rope) is a threat to local forests due to tree/mangrove cutting, and contributes to accelerate the climate change impacts such coastal erosion, floods and salt intrusion into their terrestrial areas/farms. They are ready to uptake any new environmentally friendly technology, which is affordable and rewarding returns.

Most of seaweed famers suggested the use of concrete anchors, sacks (polo) filled with sand and iron rods (nondo) to replace wooded pegs so as to control forest destruction. However, as these are neither natural in the marine environment nor biodegradable, their long-term uses may cause new environmental problems.

Most seaweed of farmers belief that the government in collaboration with researchers will bring/ come up with solutions for the current challenges they are facing including but not limited to seaweed diseases and pests, low prices, markets, and the current unproductive and environmental threatening farming method.

High percent of seaweed farmers (especially in Pemba) believe that seaweed farming activities do not contribute to any coastal pollution, and they consider the wild macrophytes (wild seaweed and seagrasses detached by storms) as the major pollutants. Thus, they perceive it as nature (God)-controlled and they have nothing to do to control pollution related to seaweed farming.

Most farmers believe that good/high prices of seaweed would enable them to purchase appropriate farming gears and farm in deep waters, something which will enable them stop using pegs, thus reduce forest destruction, contributing to climate change mitigation; produce more seaweed and revolutionarize their economy.

6.3 Recommendations

From the findings and lessons earnt, the following recommendations are made:

6.3.1 Planting of trees for pegs and supporting restoration: Plans to establish nurseries and planting trees species most preferred by seaweed farmers for pegs need to be accelerated. The discussion with one

on the taxonomist who is also a forester yielded the information of some species which can be piloted as they are strong and durable, and either their seedlings are available in nurseries or seeds are available for collection and planting. These include but not limited to Acacia auriculiformis, Azadirachta indica, Casuarina equisetifolia, Sorindeia madagascariensis, Cremospora triflora, Syzygium cuminii, Pachystela brevipes and Psidium guaja. This undertaking requires land. Paje village (in Unguja) has set aside land for piloting, thus we recommend them to be supported.

Moreover, the ongoing restoration initiatives be enhanced, coordinated, monitored and evaluated to gauge the effectiveness and impacts. In this regard, Kiuyu Mbuyuni (Pemba) and Chwaka (Unguja) are recommended for support to be used as demonstration villages in nature-based solutions to climate change mitigations initiatives.

6.3.2 Training: The government collaborate/partner with other stakeholders such as ZaSCI, AU-IBAR, Milele Zanzibar Foundation, individual experts, etc, to reach seaweed farming communities for various skill development in their various groups in Zanzibar. Recommended training include, (but not limited to), swimming for female; small scale processing and valued addition; entrepreneurial education; and environmental education programs (awareness creation, conservation, restoration).

6.3.3 Upscaling/promoting small scale seaweed processing and value addition: The government and other stakeholders to support seaweed farmers in acquiring appropriate skills, facilities and equipment (such as seaweed millers and dryers) so as to establish/expand seaweed vale addition. This will not only increase farmers' resilience to climate change but also will increase income, alleviate poverty and sustain the seaweed industry.

6.3.4 Farming in deep water: Acquisition of appropriate skills and gears for farming in deep water will partly solve the current seaweed production challenges associated with farming in shallow water especially ice-ice diseases and pests which are promoted by elevated temperatures in these farming areas.

6.3.5 Research: Research on seaweed diseases and pests; potential environmental threats associated with the current use of plastic sacks (e.g increased micro-plastics in the marine environment), sand mining from the beach for filling in sacks; proposed aluminium/iron pegs; seagrass and mangrove restoration feasibility; new innovative and environmentally friendly technologies be conducted.

Data handling: Before field visits, experts to establish if the information collected will call for professional analysis, the expert/data analyst be engaged early in advance to guide/design templates for data entry during the field mission.

Budgets and funding: For smooth field activities, budget be shared and discussed early in advance between ZaSCI and AU-AIBAR teams preferably via Zoom before approval and funds be available to field teams timely.

ANNEX

Annex 1: Various Photos Taken During Field Activities in July 2024

Figure 1: *ZaSCI team interviewing seaweed farmers in Unguja*

Figure 2: *ZaSCI team interviewing seaweed farmers in Pemba*

Figure 3: *During a briefing from the village leader, Sheha, in Pemba*

Figure 4: *ZaSCI and AU-IBAR teams with a group of interviewees in Paje, Zanzibar*

African Union
Inter-African Bureau for Animal Resources (AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
P.O. Box 30786
00100, Nairobi, KENYA
Telephone: +254 (20) 3674 000 / 201
Fax: +254 (20) 3674 341 / 342
Website: www.au.ibar.org
Email address: ibar.office@au-ibar.org