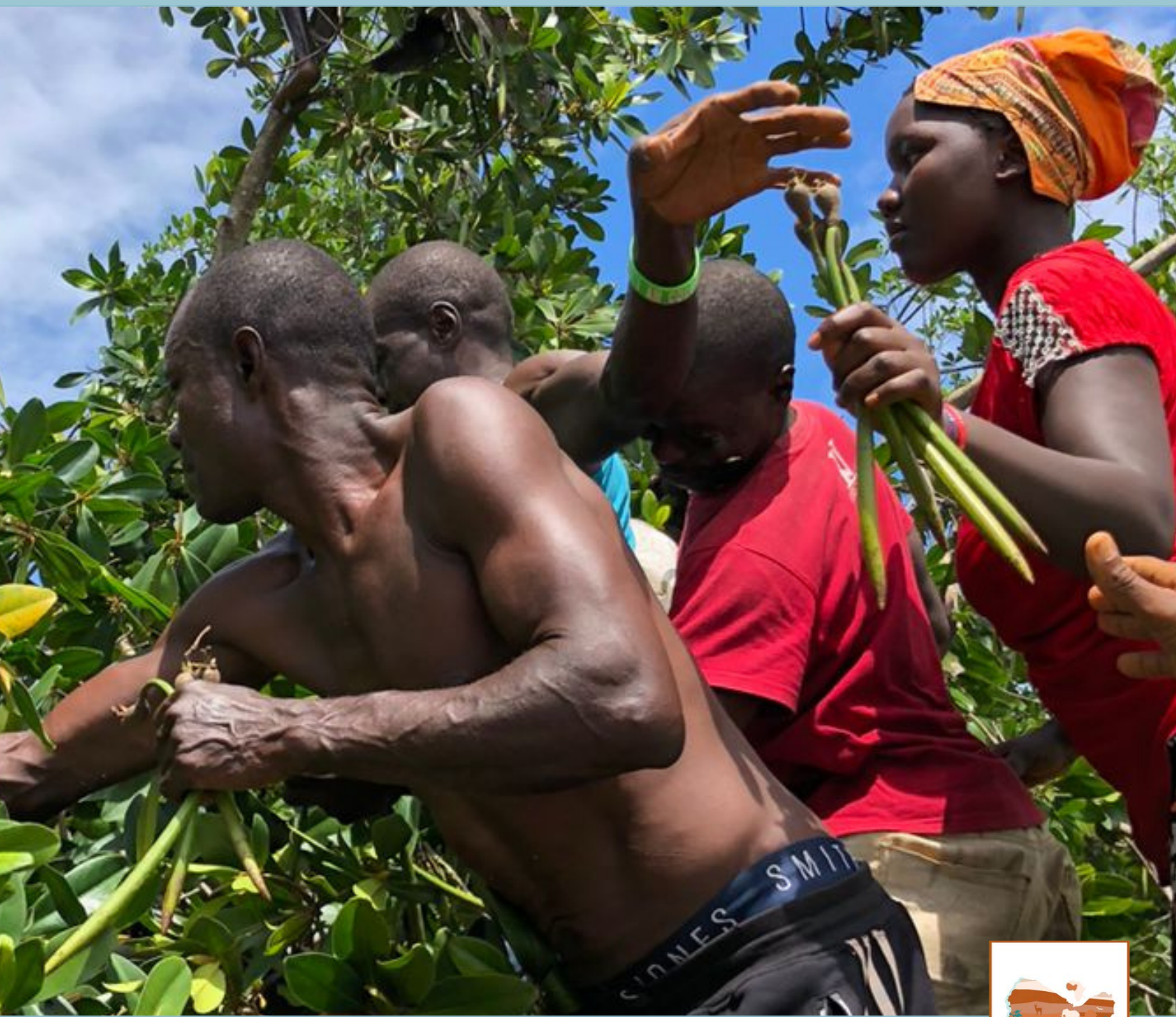
How to replant a mangrove forest

A case study and guidance for wetland restoration at Yawri Bay

September 2023



Wetlands INTERNATIONAL

About the Conservation Society of Sierra Leone (CSSL)

The Conservation Society of Sierra Leone (CSSL) was established in 1986 to promote a better life for all in tune with the environment. Our main mission is to preserve nature and ensure wise and sustainable use of our precious natural resources for the benefit of the country`s biodiversity, people`s livelihood, and the quality of life of all people in Sierra Leone. CSSL is a membership-based organisation open to the general public and includes members from many different backgrounds. CSSL follows its aims through education, policy development and implementation as well as through advocacy, research and site actions to conserve important and critical sites.

More information online: https://cs-sl.org

About Wetlands International

Wetlands International is the only global not-for-profit organisation dedicated to the conservation and restoration of wetlands. Wetlands International is deeply concerned about the loss and deterioration of wetlands such as lakes, marshes and rivers. Their vision is a world where wetlands are treasured and nurtured for their beauty, the life they support and the resources they provide. Wetlands International is dedicated to maintaining and restoring wetlands— for their environmental values as well as for the services they provide to people.

More information online: https://www.wetlands.org

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About this document

This document was developed by the Conservation Society of Sierra Leone (CSSL) as a case study and guidance for mangrove restoration after embarking on a successful restoration exercise that spanned from 20th to 26th July 2023 in two communities at Yawri Bay in Sierra Leone. The communities covered included Morchail and Mokaiyanbe in Ribbi chiefdom, Moyamba district.
This document provides insights and baseline information which could be useful for the development of a national mangrove restoration guide.

Introduction and background

In recent years, scientists have cautioned against the unceasing vanishing of mangrove forests worldwide. The decline is reported at 1–2% per year with a total loss of around 35% disappearing in the last 20 years. Mangroves in Sierra Leone are amongst the worst degraded globally, but solutions are starting to root at both local and national levels.

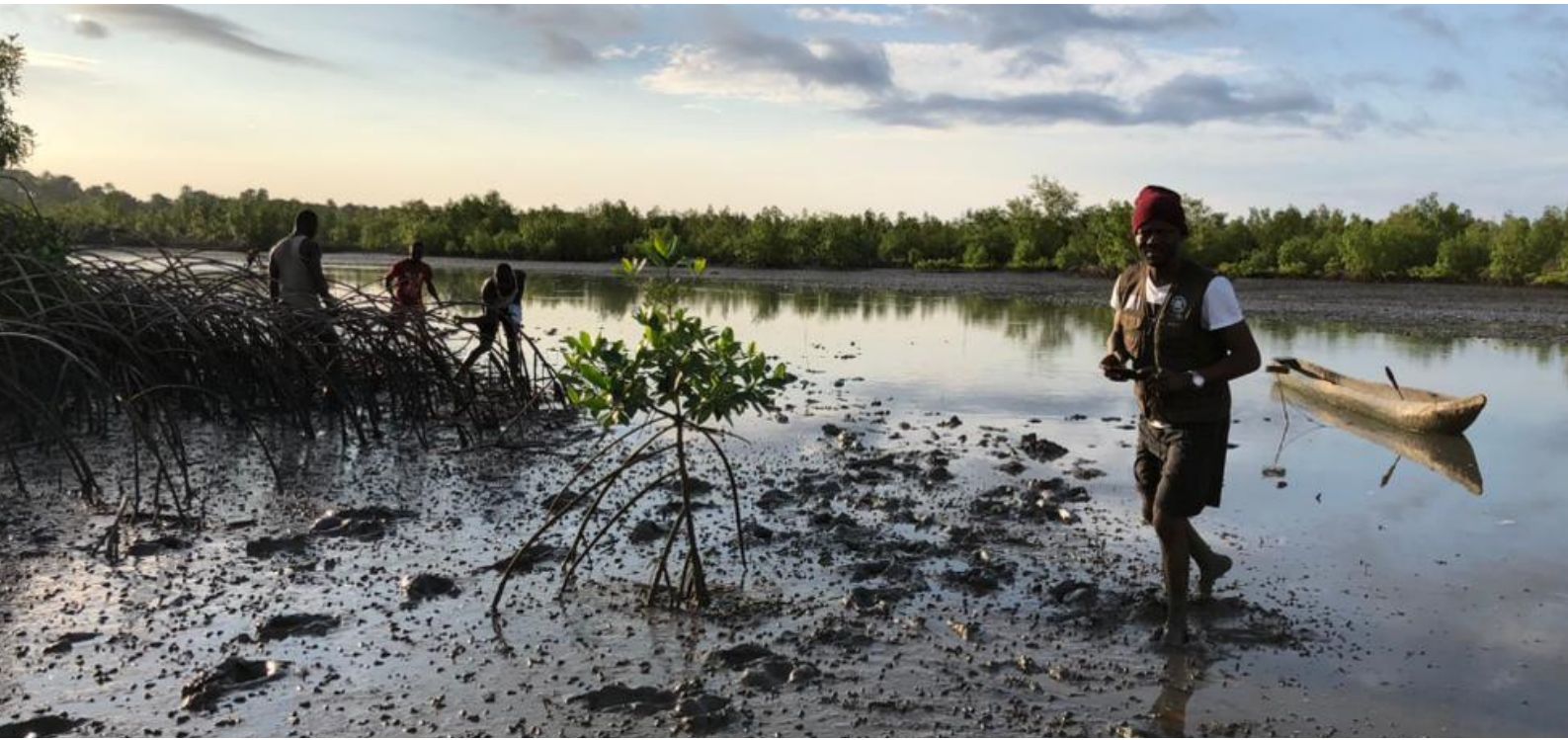
Mangroves are important nature-based solutions to the climate change crisis. They store carbon four times more than traditional rain forests, serve as shoreline protection against floods and storms, prevent erosion, and maintain water quality and clarity. They are a hub for biodiversity, while providing various economic benefits.

In Sierra Leone, mangroves are mostly present along the coastline (totaling 506 km in length), major rivers (Scarcies, Sierra Leone and Sherbro Rivers), and tidal creeks. Yawri Bay is one of the major mangrove sites in the country. Its coastal landscape incorporates three major creeks: Ribbi Creek, Bompeh Creek and Kagboro Creek and consists of marshes, mudflats, mangroves, and intertidal sand and mudflat at the mouth of the Kagboro Creek.

The most important feature of the vegetation of Yawri Bay is its mangrove endowment, which constitutes 14.3% of the mangrove estate in Sierra Leone. Nonetheless, coastal communities along Yawri Bay harvest mangrove wood for domestic use, particularly for cooking and smoking fish, and for salt processing. Also, the increasing demand for mangrove wood and the steady encroachment for rice farming in Yawri Bay have exposed the mangrove forests to severe degradation. Furthermore, wood from mangrove forests is also used for housing material, scaffolding, fishing stakes and more.

To reverse the level of degradation and maintain the integrity of the Yawri Bay ecosystem, CSSL, with support from Wetland International through the PAPBio project, has secured funding to pilot restoration of at least 4 hectares in selected communities including Morchail and Mokaiyanbe.

The planting exercise took place from 20th to 26th July 2023, with the full participation of the communities. This guide is one of the outcomes of this activity.



Importance of mangrove forests

1 **Prevent soil erosion**
Mangroves hold the soil with their roots and stop the sea from taking soil with the tides.

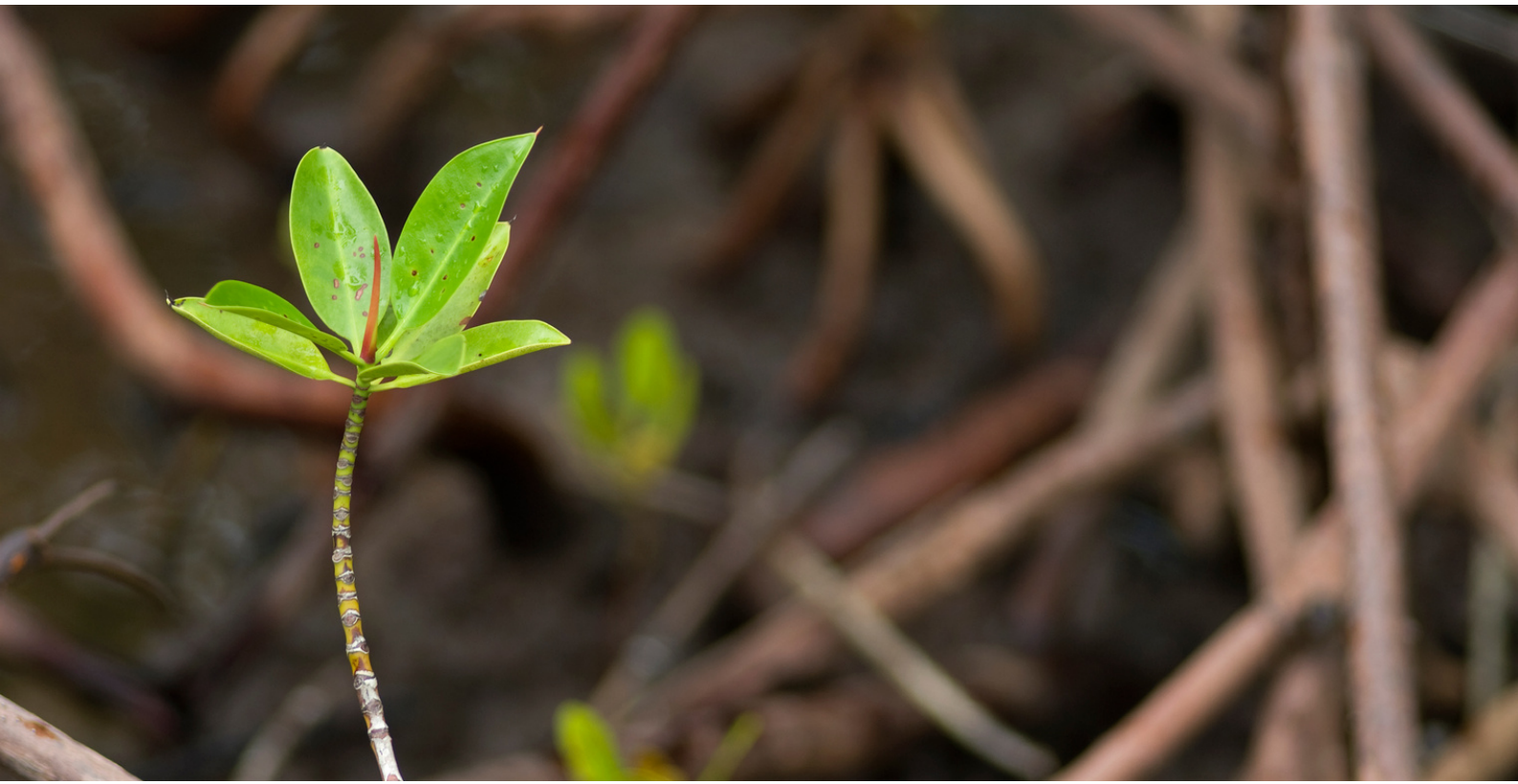
2 **Important carbon dioxide storage**
Mangrove forests store more carbon dioxide than any other type of forest.

3 **Breeding area for fishes**
Mangroves are breeding areas for fishes. The small fishes are protected by the roots and small channels. Without these breeding areas, there are less fish in the ocean.

4 **Water purification**
Mangroves purify water as one of their unique ecosystem services.

5 **Prevent flooding**
Mangroves prevent flooding of areas behind the mangrove forest as they brake waves and function as barriers.

6 **Unique ecosystems**
Mangrove forests are areas of high biodiversity. Their unique ecosystem is the home to fishes, birds, crabs and many other animals. This habitat is special and many species rely on it.



Steps of mangrove restoration

Step 1

Community engagements

Community engagement is particularly necessary to involve community members and to ensure ownership of the process. The community people are the ones who will be doing almost all of the groundwork, and will ensure the sustainability and well being of the re-planted mangroves. Make sure in your engagement, all the stakeholders including the headmen/town chiefs, Mamy queens, youth leaders, religious leaders and all others participate.

Step 2

Restoration committee

Establish a restoration committee in the proposed community. Before restoration exercise commences, a committee should be established to lead and facilitate the groundwork and mobilize other community members to help in the process.

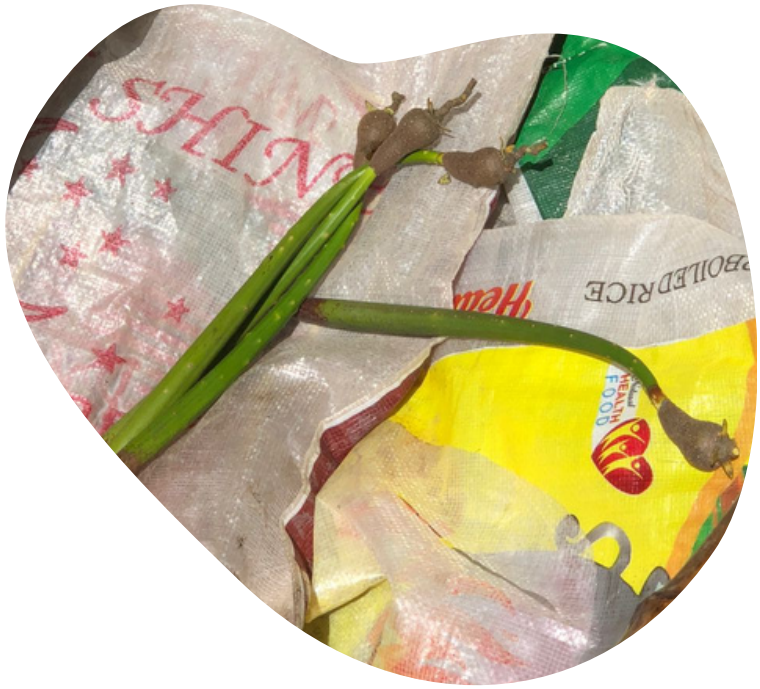
The important role of communities

It is evidenced that local people's participation in mangrove restoration activity contributes to increasing social capital, consequently improving their access to information. Local communities, as the cornerstones of the participatory approach, play a pivotal role in the success of any restoration work, and hence, strengthening their participation is highly significant.

Step 3

Site selection and demarcation

Together with the community members, the site(s) identified for the restoration work should be visited. The sites should be chosen by the community guided by consultations. The site must be moist with silty soil, as propagules cannot grow in dry soil. The area should be entirely immersed by water at high tide, including neap tides in the dry season.



Step 4

Selection of mangrove species

Select an appropriate mangrove species. The type of species in the selected site is worth noting and should be restored in the site. Every species is adapted to different environmental conditions, for example, rhizophora racemosa is adapted to a habitat with a regular tidal flow with moderate salinity concentration, etc.

The choice of the right species

Mangrove restoration success depends largely on the choice of species. Determining which species to plant is a complex decision that is based on the plantation's purpose and the biophysical characteristics of the selected area. Species found within the immediate vicinity should be chosen.

Step 5

Site clearing

The site should be cleared of debris, and all other unwanted materials must be removed. Dead wood from mangroves that have been cut down in the past must be completely cleared off from the planting site.

Step 6

Collection of propagules

With the help of the committee and every other person involved in the process, collect the required mangrove propagules for restoration of the degraded site. Here, ensure that enough propagules are collected. You will need approximately 5.000 propagules per hectare.

How to identify the right propagules

Seedling collection will start if (1) some propagules have already fallen to the ground naturally, (2) the propagules are coloured dark green (light green = not mature enough), and (3) when uncapping the end, a small bud appears (if the bud breaks, the propagule is not good).

Step 7

Inspection and sorting of propagules

The mangrove propagules collected are assorted with both long and short ones. For this, it will be good to sort the propagules, separating the long propagules from the short ones, and packing them accordingly in bags. Also, care must be taken to choose the best propagules while separating the damaged and immature ones.

Step 8

Storage of propagules

The propagules collected and sorted are stored at a cool temperature before planting. This is done especially if the propagules are not planted immediately after collection.

Step 9

Transportation of propagules

Before planting, the propagules are transported to the planting site. Make sure they are transported carefully, and do not get damaged on the way to the planting site.

Step 10

Planting of propagules

Once the propagules are transported to the site, the team members will embark on the planting exercise. For effective growth and reduced competition, the mangroves are planted 2 meters in a row and 1 m apart. That is, 6 feet by 3 feet. The easiest way to organise the planting is to use a rope. Community members can align the rope accordingly to plant the propagules.

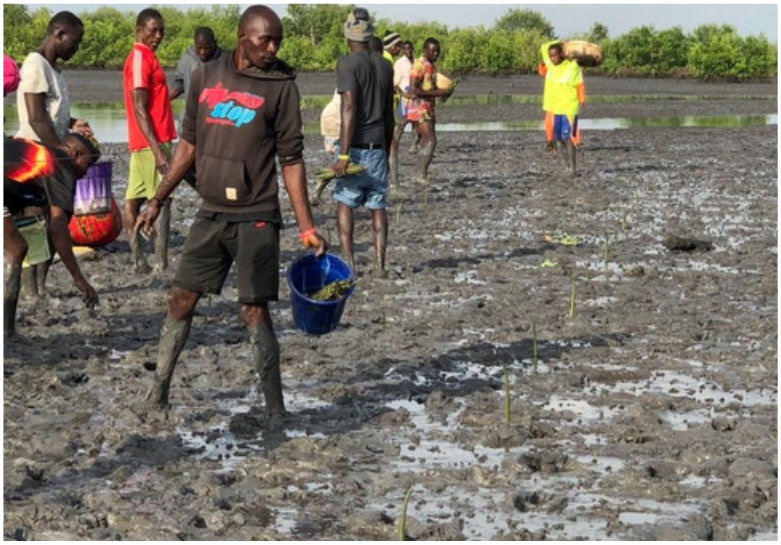
Step 11

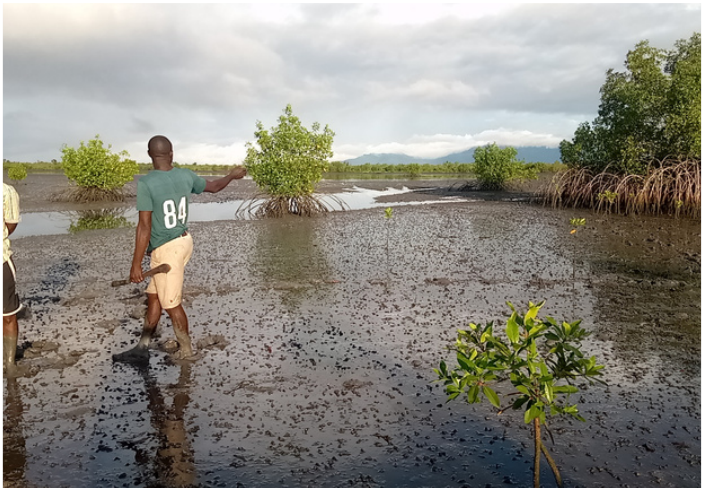
Post-planting engagement

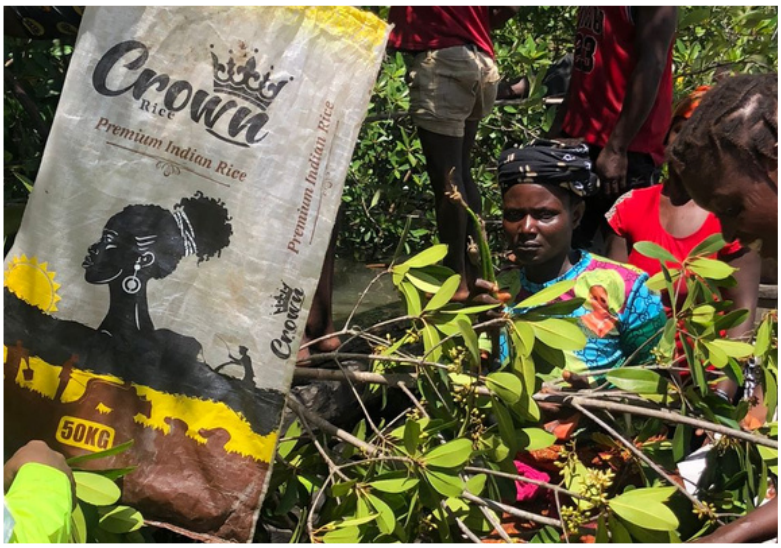
After completing the entire process with the community members and all other stakeholders, it is important to re-engage them to understand their views, perceptions and challenges regarding the exercise. Through this, you will be informed about what went right and what didn't go well. This will help you correct all anomalies in your subsequent intervention.

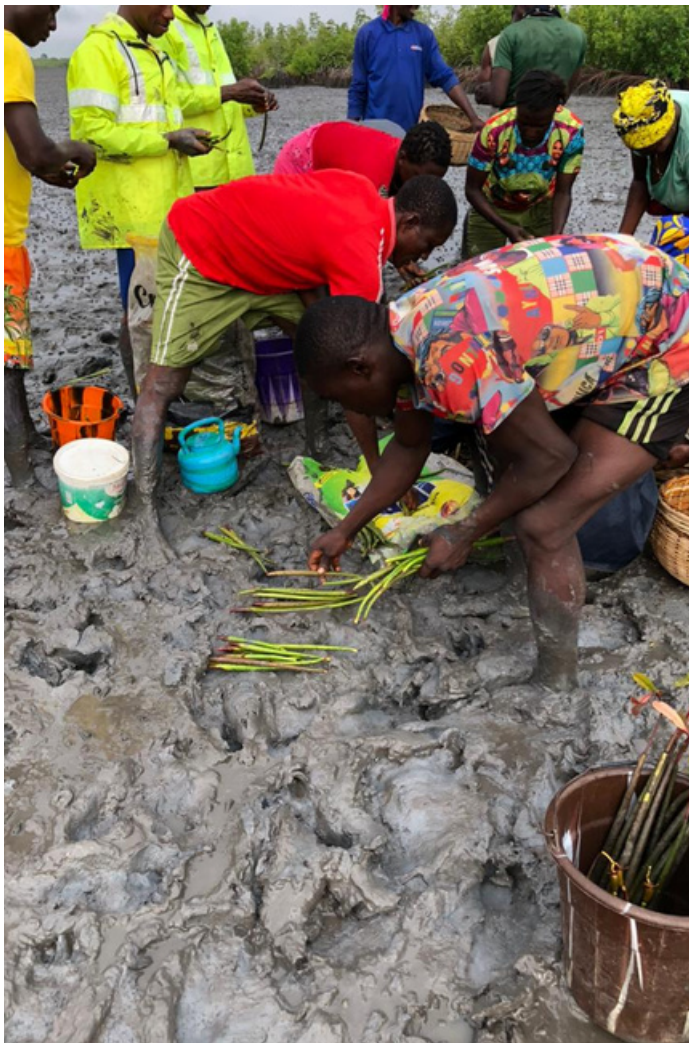
Why is post-planting crucial?

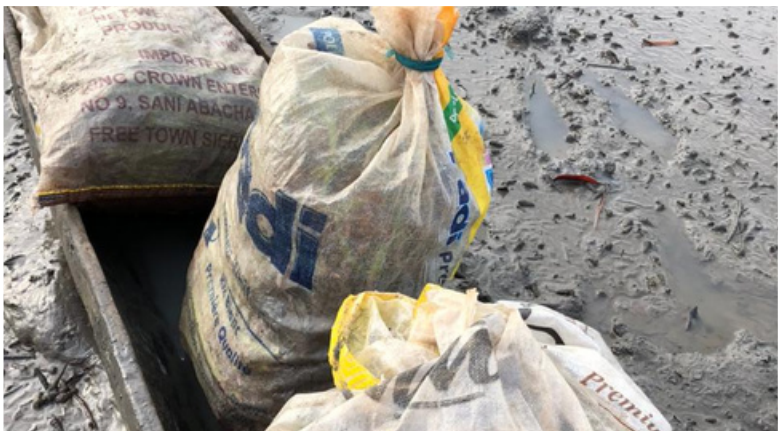
Post-planting engagements are not only important to get feedback from community members. It is also an important method to strengthen the relationship with the communities, and to ensure that the planting exercise will be sustainable. The mangrove forest takes time to grow. The process is not done with the planting. It is very important to keep close contact with the community and to follow-up with them on the progress of the little plants.

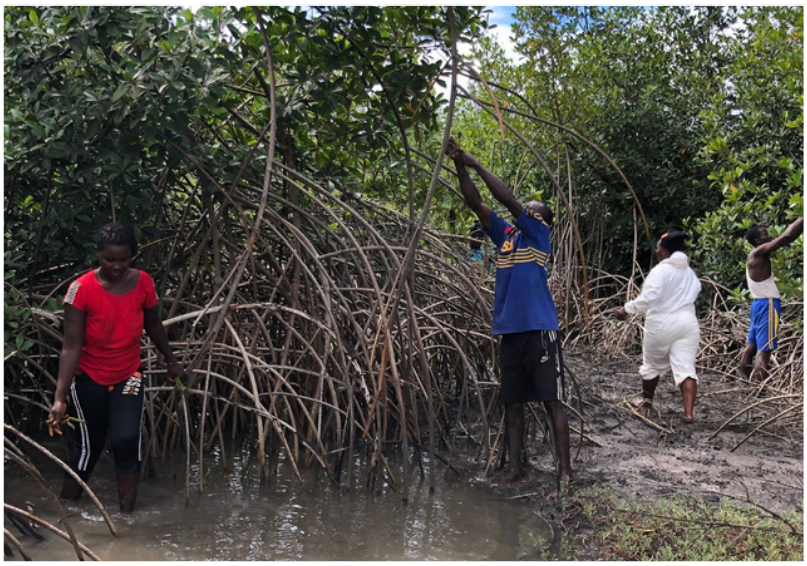


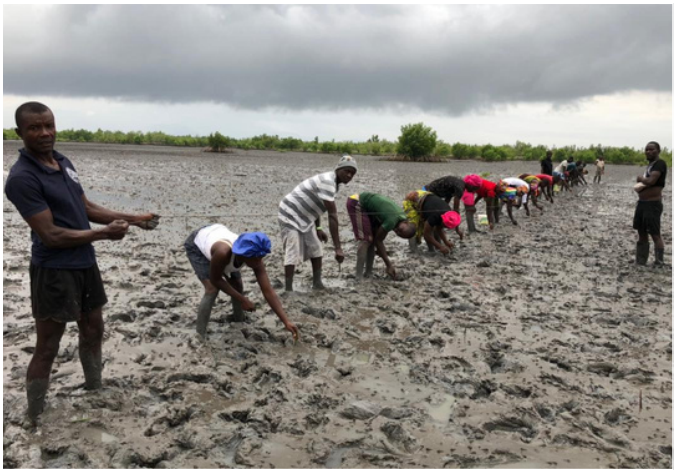



Crown
Rice
Premium Indian Rice
Premium Indian Rice
Crown
50KG









Key challenges faced during the restoration project, and lessons learned

There are several challenges towards achieving a successful restoration of mangroves including environmental, technical, social, economic and political. But in this document, we will focus on the observable obstacles experienced while implementing the restoration work for the PAPBio project, and the approaches we used to mitigate them.

1 **Site selection:** During our preparation, we noticed that wrong site selection has been responsible for many failed mangrove restoration projects in most areas. In many instances, restoration did occur in sites conflicting with private land. For our work, the team together with the communities ensured that the site was selected in a protected area which does not have any bearing with private ownership.

2 **Collection of propagules**: In the location where the restoration took place and its environs, propagules are abundantly made available in August. At this time, there will be enough propagules for which collection will be made easier for planting. For this work which was implemented in July 2023, propagules collection was extremely difficult because it was not abundantly available. This made collectors to travel at a far distance to collect the propagules which in itself posed significant cost implications.

3 **Capacity and knowledge:** Limited knowledge of restoration can hinder restoration implementation and success. Observing this as a barrier, the team members who are experienced in restoration work ensured that they provided the necessary skills and expertise that guided the process to the end. Awareness raising on mangrove restoration for participants was a major vehicle in overcoming this barrier.

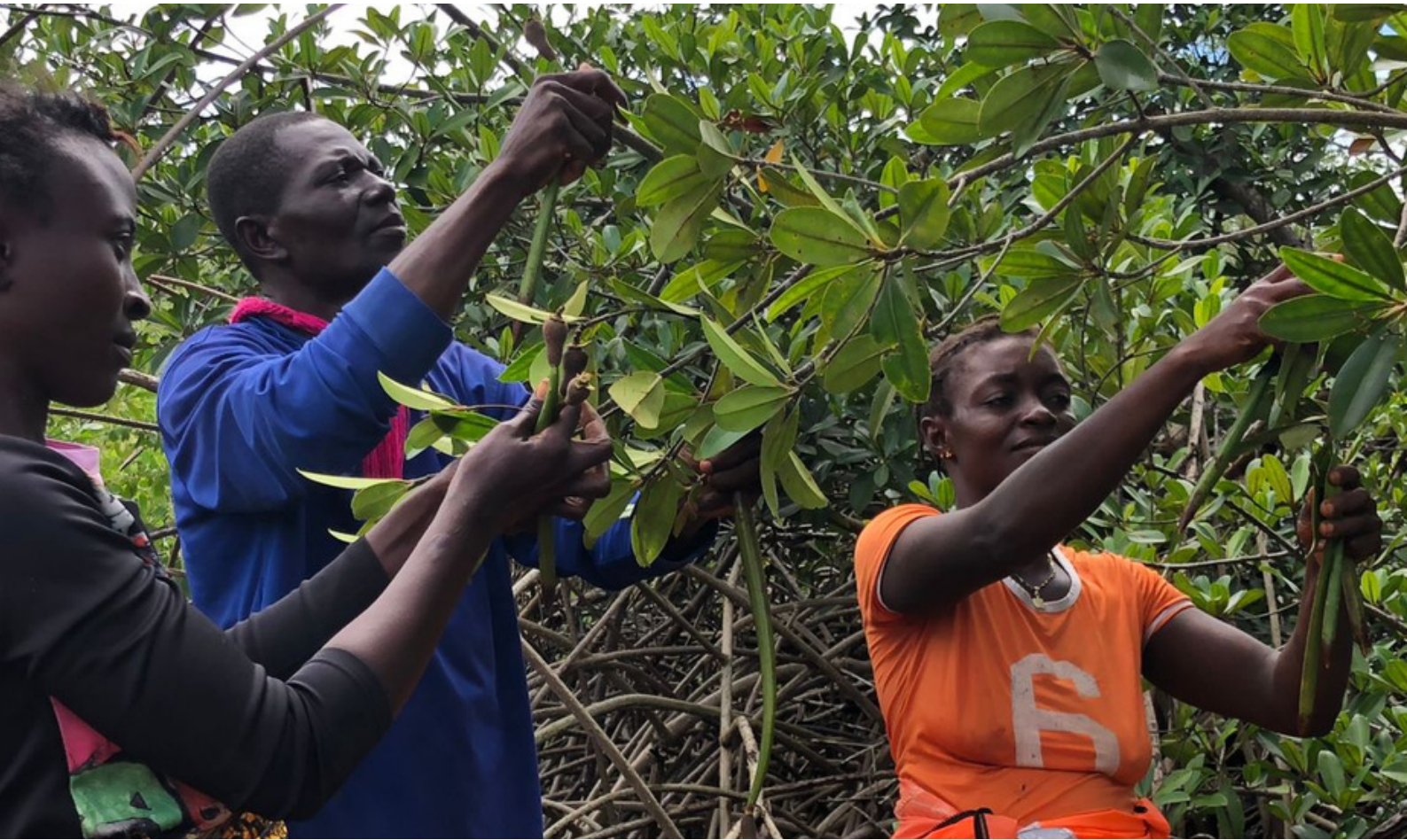
4 **Community expectations:** The communities anticipated that they would generate huge income from the process, which was not the case. This was overcome by having extensive engagement with the communities and providing an explanation of the benefits they will generate from the process in the future.

5 N**avigating in the mud:** The site was extremely muddy with consistent tidal flow which made it extremely difficult to move.

Key recommendations

The following recommendations are addressed to organisations and institutions planning to undertake replantation of mangrove forests, as well as government bodies charged with the responsibility of environmental restoration in the country. The recommendations should help to improve and sustain mangrove restoration in Sierra Leone.

1. A **mangrove restoration plan, mangrove restoration guide and a mangrove monitoring plan on national level** should be developed with its associated indicators such as growth, mortality and recovery rates to ensure long-term monitoring of the restored mangroves.
2. Establishment and training of local **community-based monitoring groups.**
3. Provision of **stipends/incentives** to local community-based monitors to engage in regular monitoring.
4. Sierra Leone currently has vast areas of degraded land. It is therefore, recommended that **the restoration exercise should be continued and spread** to restore more of former mangrove forests in the country.
5. For any subsequent intervention, the restoration of mangroves should be **done at the appropriate time** as stated in the restoration guide according to the species.
6. Institute **joint monitoring initiative** with local community monitors.
7. Planning, species selection and site selections should be done in **consultation with experienced experts** in the field.



Conclusion and further thoughts

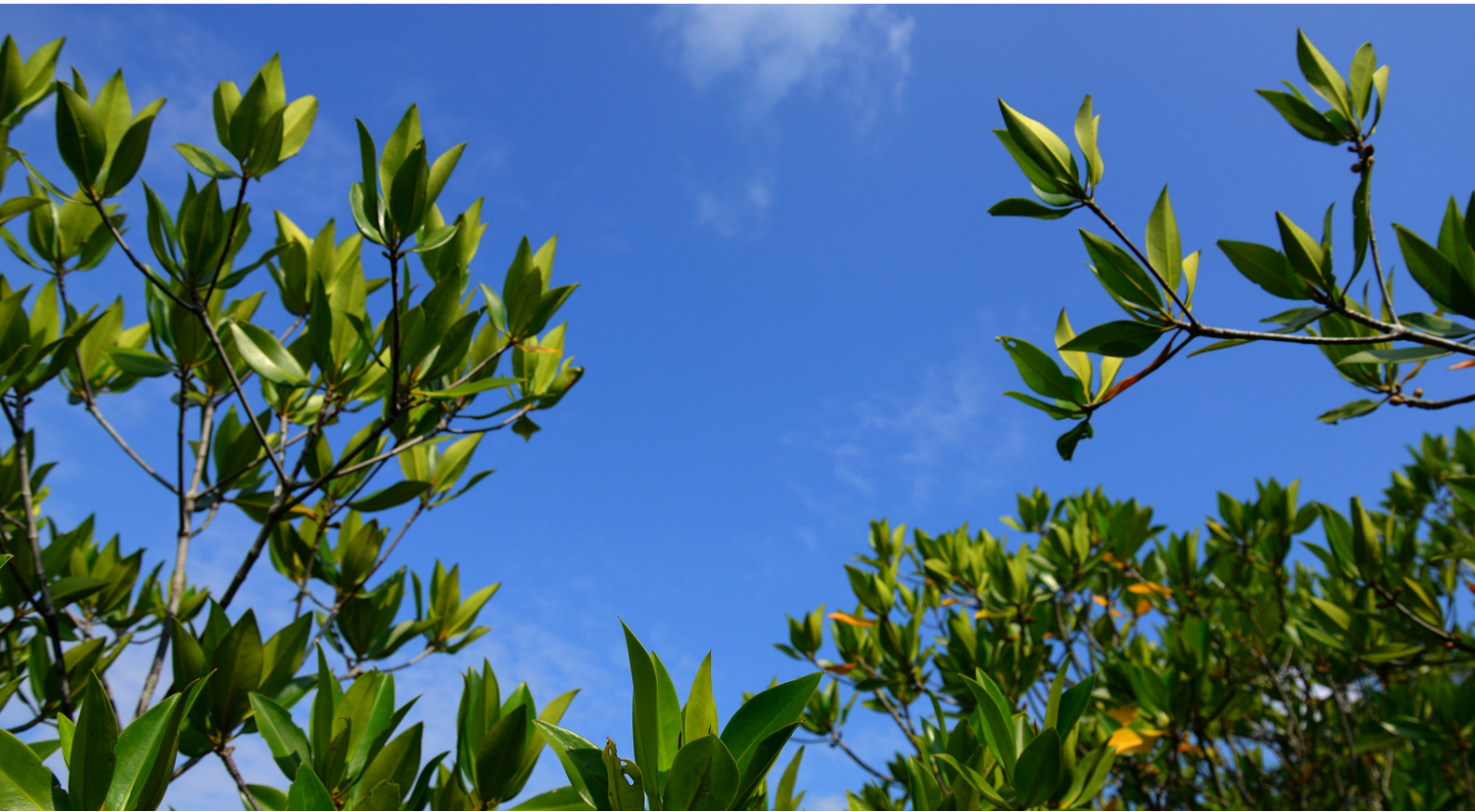
Mangrove restoration is an important way of reviving the coastal ecosystem. When we look at places like Yawri Bay in Sierra Leone, it is the only way forward. The pilot project in the two communities proved again that restoration can only be successful if communities are involved, participate in the process and take full ownership.

In our experience, incentivizing communities is one of the driving vehicles towards attaining a successful restoration as this was practically evidenced in the entire process. Even though education and understanding are also important, immediate incentives are still needed to guarantee full participation.

Mangrove restoration needs expertise to be successful. Proper planning, site selection, species selection, planting time and knowledge transfer have to be considered properly before starting any reforestation work. This document should be the start of experience and knowledge sharing to improve and strengthen everyone´s efforts for mangrove restoration.

As there are still so many hectares of degraded mangrove forests, we hope that this document will help to take the next steps for the full regeneration of the mangroves of Yawri Bay and other parts of the country.

In a time of increasing climate pressure, mangrove restoration can be one important answer to mitigate the climate crisis and ensure livelihoods of community people. We look forward to the next reforestation activities to support nature to heal.



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