# Restore More: Sri Lanka's first major Seagrass Restoration project

by

OCEA
OCEAN CONSERVATION & EDUCATION ALLIANCE

Location: Kalpitiya
Proposed Duration: One year (2024)
Target number of plants: 3,000 (~ 0.5 Hectare)
Number of volunteers or local community members:  100 - 120

**Why restore seagrass?**

Seagrass, which covers about 0.1% of the ocean globally but provides 18% of carbon storage, is shrinking by 7% each year. We are losing equivalent to a football pitch worth seagrass every 30 minutes, according to a 2020 UN report. Seagrass meadows in Sri Lanka are highly degraded, fragmented and are vulnerable due to number of stressors. It has led to the population shrinking of Dugongs, sea turtles and commercially important fishery species inhabiting seagrass meadows. The existing seagrass beds need to be conserved and expanded in order to increase marine productivity, biodiversity, quality of water and fishing resources, all of which directly or indirectly benefits humans.

**Carbon Sequestration**

Seagrass plants have a large capacity for absorbing and storing carbon in the seafloor. They sequester approximately 10% of the carbon which is buried in ocean sediment annually (27 – 44 Tg of carbon per year globally). Many factors influence the exact amount of carbon that can be taken up by a seagrass meadow, but rough calculations show that **if we restore one hectare of seagrass, it would soak up as much carbon dioxide each year as ten hectares of rainforest.**

No published data are available for local seagrass meadows, but according to research conducted in Indonesia, median carbon storage in an Indonesian seagrass meadow is **119.5 Mg C ha-1**. Considering the similar species of tropical seagrasses, it could be assumed that the carbon storage in seagrass meadows in Sri Lanka is similar in average.

**Can seagrass be restored in Sri Lanka?**

Planting vast areas of seagrass meadow is an eminently doable task as these plants produce seeds that can be sown in the seabed or small shoots that can be easily planted. There are 14 seagrass species in Sri Lanka to choose from, but we focused on ribbon seagrass (*Cymodocea* sp.) and turtlegrass (*Thalassia hemprichii*). They are the most common species and grow well around coasts in Sri Lanka. We tested planting seagrass plugs using various techniques and our latest technique appears to be a promising way to re-establish seagrass in shallow coastal areas. The lessons from those trials are now being applied in a larger scale trial, where one hectare being planted within one year.

**Local community involvement**

Throughout the project, boat services are acquired from the local community. As much as men, women in coastal communities are often closely connected to their coastal ecosystems. The hessian bags used throughout the project are sewn by local community women upon providing materials.

*Women from Kalpitiya gleaning on the seagrass beds*

Participatory, community-based project approaches ensure that women's voices are considered equally and aim to improve women's social and economic empowerment. To support the women in the local community by providing income opportunities through training and awareness raising on the importance of restoring seagrass meadows, the project wishes to secure increased household income and help mitigate climate change. In this approach, in addition to volunteers, we intend to involve women from the local community in planting. Even though this adds an extra budget to the project, it definitely increases the quality of the local community.

**About us:**

Ocean Conservation and Education Alliance **(OCEA)** is a small environmental charity registered under Central Environmental Authority: 6/6/17/04/59 in Sri Lanka. OCEA has been involved in seagrass restoration since 2015. OCEA team comprised of lecturers from local universities, graduate students and undergraduate students. Mission of OCEA is to create a link between local community knowledge and scientific research. OCEA considers volunteer support is of uttermost importance for any kind of conservation project hence welcomes volunteers from different backgrounds all around the world.


Chathurika Munasinghe (Chathu), the coordinator of ‘Restore more’ seagrass restoration programme is an experienced marine biologist and has expertise on seagrass biology and coastal ecosystems. She works as a lecturer of the Department of Zoology, University of Peradeniya and is involved in teaching seagrass and coral reef biology, marine resources, marine pollution and related topics to undergraduates. She has worked on seagrass meadow exploitation and implications for food security with Project seagrass, UK and has over 6 months experience working with Marine savers in the Maldives. She is the main character in developing new techniques for seagrass restoration in Sri Lanka and successfully continuing and monitoring this project over the years. She takes monitoring as a vital part of the project to develop more research opportunities and ways to contribute more to the local community.

The main goal of ‘Restore more’ project is to transplant one hectare of seagrass within one year **ensuring the long-term survival of seagrasses.** The project also consists of **conducting research** on seagrass restoration. Over the coming years we also aim to inspire future major projects in other areas to restore seagrass meadows to help support our climate, our fisheries and our coastal livelihoods.

To develop new techniques for actually planting seagrass on a massive scale, OCEA has been involved in trialed seagrass planting with the funds from Rufford foundation, UK, a conservation fund for pilot projects on research and conservation in developing countries. Pilot projects were conducted with continuous monitoring for more than 5 years in Mannar and Kalpitiya. These pilot projects have shown more than 50% success rate after two years of planting.

| Number of months after planting | ~ Success rate (%) |
|---|---|
| 3 – 6 months | 80 |
| 1 year | 70 |
| 2 years | 60 |
| 2- 5 years | 50 |

Explanations to the budget:

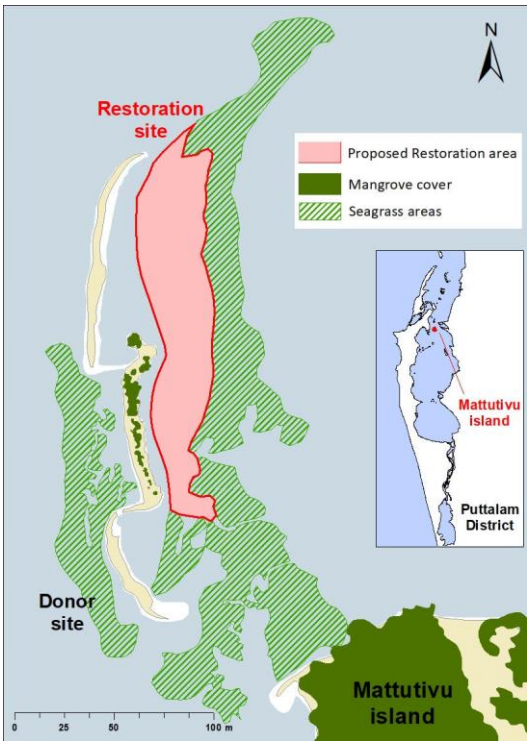
* Hessian bags – to restore one hectare of seagrass, ~10,000 hessian bags will be required. However, to replace the missing plugs due to natural causes during monitoring, extra 500 bags will be prepared for the entire project. Hessian bags are sewn by the local community upon providing material. Cost includes both material and sewing cost.
* Boat hires - one boat can accommodate 6 people. Throughout the project ~40 boat rides will be required to transport the volunteers and the team to the restoration site.
* Monitoring - costs for monitoring include approximately 10 site visits by researchers from University of Peradeniya within one year. Monitoring cost include costs associated with transportation, food and boat hires. Minimum 3 researchers participate per monitoring session.
* Miscellaneous – stationary, honorarium (external), etc.

During one planting effort we assume that one volunteer/local community member plants 50 new plugs in the restoration site. However, the number of actual plantings can vary from 40- 70 per planting effort depending on the sea conditions, raining and effectiveness of the volunteers. Hence, we roughly assume that about 250 volunteers or local community members are needed and about 25 planting efforts should be done in order to cover one hectare of restored seagrasses.

**Location:**

Site selection plays the biggest role in any kind of restoration. it is important to restore the respective species with the best possible environment for growth, survival, fitness, and successful recruitment.

For our half-a-hectare restoration, both donor and restoration sites are based in a small island called ‘Mattutivu’ in the Kalpitiya lagoon (figure next page). Site was selected considering evidence for the historical distribution, feasibility of restoration in terms of logistics and environmental conditions: quality of abiotic and biotic factors.




*Proposed restoration site in Mattutivu*

**Methods:**

Our approach is simple, it is all about underwater gardening to collect, separate and plant seagrass plugs. Transplanting will be done in an area where pre-restoration baseline surveys were conducted and successful trials were made. seagrass plugs will be extracted from donor beds situated not more than 500 m to the restoration site while ensuring minimal disturbance to donor sites.


Jute hessian bags will be used to plant extracted seagrasses. All bags will be spaced approximately 1 m apart on site as isolated bags facilitated greater longer-term densities than bags grouped together. Hessian bags are biodegradable and fully degraded within 6 months after planting. One pre-prepared hessian bag with sand and compost mixture will be ~400g and once buried with the seagrass plugs, it can withstand the ripples on site.

**Monitoring:**

All monitoring sessions will be conducted by the graduate and undergraduate students of University of Peradeniya. Monitoring is mainly based on visual observations of planting unit survival. Survival of each species as a percentage of original number will be the main data collected using transects and quadrats.

- Monitoring starts 60 days after (post stabilization) restoration
- Examining the Survival of planting units, shoot density and areal coverage
- Photo documentation of planted sites
- Measuring surface water quality parameters such as dissolved oxygen, salinity, temperature, turbidity, pH, and a variety of other parameters
- Inventory of other species/organism diversity and population densities associated with the restored seagrass areas
- Collecting data on competitive algae load, utilization of the site by fish or macro-crustaceans and benthic invertebrate community, predation

**Blue carbon research (Carbon sequestration):**

The science behind blue carbon is still developing. It is an important part of the complex jigsaw to fight climate change. Estimating how much carbon seagrass restoration can soak up is just one problem. Even though much information on seagrass carbon sequestration is present for temperate and Mediterranean species, information on carbon storage in tropical seagrass meadows is scarce. No published data or research is available on carbon sequestration of seagrass meadows in Sri Lanka.

Estimations of seagrass carbon budgets are highly variable as they depend on the species considered, the local environment and time of the year, as well as the associated epiphytes. Therefore, to quantify the amount of organic carbon stored in healthy seagrass meadows in Sri Lanka and to compare that with the restored seagrasses is of high importance for the management and conservation of this highly valuable yet vulnerable ecosystem. These blue carbon stock assessments lead to the development of blue carbon credits later.

**Outcomes:**

The list of outcomes is enormous. Here, we document a few.

- One hectare of restored seagrass
- A barrier habitat to protect the beach from erosion
- Experimental research on seagrass restoration
- Contribution to climate change mitigation

**Challenges:**

There are a number of challenges to ecological restoration that needs to be addressed;

- Low success rates in restoration due to changing natural conditions
- Promoting biodiversity conservation while providing economic benefits to communities.
- Development of practical and sound procedures for improving and monitoring restoration activities
- Equal distribution of opportunities and benefits to local communities
- Achieve a self-sustainable ecosystem in the long term