Save a Life

UPDATED LANDSCAPE STRATEGY FOR BUILDING SOCIAL, ECONOMIC AND ECOLOGICAL RESILIENCE IN MANNAR COASTAL LANDSCAPE

UNDP/GEF/ SGP UNDP OPERATIONAL PHASE 07

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The GEF Small Grants Programme

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Sri Lanka

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Abbreviations and Acronyms

CBO	-	Community Based Organization
CKD	-	Chronic Kidney Disease
CRIWMP	-	Climate Resilient Integrated Water Management Project
DAEs	-	Direct Access Entities
DSD	-	Divisional Secretary Division
ESA	-	Environmental sensitive areas
FGD	-	Focus Group Discussion
GBV	-	Gender Based Violence
GCF	-	Green Climate Fund
GEF	-	Global Environment Facility
IAS	-	Invasive Alien Species
LS	-	Landscape Strategy
MS	-	Maha Season
NDAs	-	National Development Agencies
NGO	-	Non-Government Organization
NSC	-	National Steering Committee
OP	-	Operational Phase
PRA	-	Participatory Rural Appraisal
SEPLS	-	Socio - Ecological Production Landscapes and Seascapes
SGBV	-	Sexual and Gender Based Violence
SGP	-	Small Grants Programme
UNDP	-	United Nations Development Programme

Executive Summary

The coastal region from Mannar to Jaffna, the Colombo Wetlands, and the Knuckles Conservation Forest and its Buffer Zone are the areas targeted by the Seven Operational Phase of the Sri Lankan Small Grants Programme (SGP). The diverse coastal habitats of Sri Lanka include estuaries, lagoons, beaches, rocky shorelines, sand dunes, salt marshes, and mangroves, which have both ecological and economic benefits. The particular tropics are under extreme pressure that degrade ecosystem and climate change. This is causing significant harm to coastal ecosystems.

The Northwestern Coastal Plain from Mannar to Jaffna was chosen as the study's landscape which is located in the DS divisions of Manthai West, Madhu, Nanaddan, Mannar in Mannar District, and Poonekary in Kilinochchi District. Inclusive of the unique ecosystem, Mannar Island is to Adam's Bridge and sandy islands; sand dunes on the main Mannar Island; and the Korakulan wetlands. The island faces severe natural and anthropogenic activities that destroy the landscape and the biodiversity. For instance, deforestation and human intrusion could crush hundreds of bird eggs scattered while it dangerous to the mammals such as spotted deer, feral horses, and donkeys. every droughts and extreme weather events, sea intrusion and salinity in drinking water are alarming the health and well-being and basic access and livelihood opportunities of the community while overpopulation, infrastructure development and lack of knowledge on ecosystem protection deteriorate ecosystems eventually.

Therefore, the GEP-SGP aims to minimize further disturbance to the coastal ecosystems by human interventions, through a participatory, multi-stakeholder, landscape management modality which is expected to conserve biodiversity, optimize ecosystem services, carbon sequestration, reduction of land degradation, and mitigate and adapt climate change. GEP -SGP has proposed interventions to

empower communities to protect the unique eco-system through implementing participatory environmental conservation, restoration, and sustainable livelihood interventions, it is anticipated to develop civil society organizations and enhance the socioeconomic circumstances of local populations in the Mannar landscape.

The study proposes recommendations to increase the capacity and the resilience of the Landscape and its future sustenance to introduce environmentally friendly activities to develop coastal and marine conservation systems to protect fisheries and migrant and native birds at the Vankalai Bird Sanctuary through environmentally friendly techniques, the mangrove plantations and eco-tourism to promote lasting impacts in this unique ecosystem's services and the communities.

Background

Mannar district is situated in the North - West part of Sri Lanka. The district consists of Mannar Island and part of the mainland. While the Northern and Eastern boundaries of the mainland are Kilinochchi and Vavuniya districts respectively, the Southern boundaries of the mainland are adjoined by Anuradhapura and Puttalam districts. The mainland of Mannar district lies in the Gulf of Mannar in the Western point and is connected by four - kilometer causeway with the mainland.

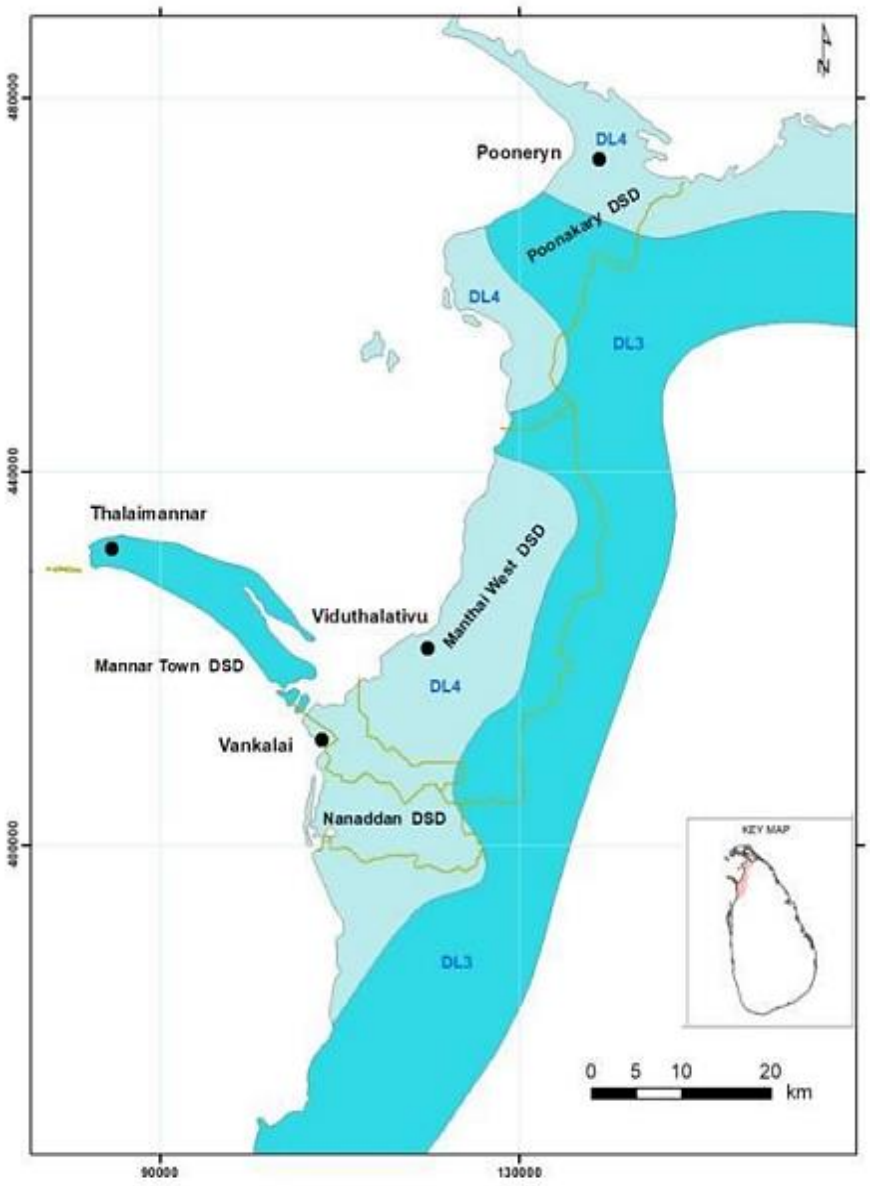

Plate 1 : Administrative divisions in Mannar Landscape

Mannar district has five administrative divisions - the coastal plain from Mannar to Jaffna falls in the DS divisions of Manthai West, Nanaddan, and Mannar Town which are marked under Mannar District, and Poonakary located in Kilinochchi District (Plate 1). The coastal landscape supports a mosaic of diverse ecosystems such as estuaries, lagoons, mudflats, sandy beaches, sand dunes, forests (tropical dry-mixed evergreen forests, tropical thorn forests, and scrub forests), and the seascape has vital habitats, such as coral reefs, seaweed communities, seagrass meadows and boasts, and also salt marshes, mangroves with unique biodiversity in the intertidal area.

1.Priority Area

1.1 Landscape & seascape boundaries

Mannar district is situated on the Western side of the Northern Province of Sri Lanka. It's bordered to the West by the Gulf of Mannar and Palk Strait, to the North by Kilinochchi District, to the South by Wilpattu National Park, and to the East by Anuradhapura District. The Mannar Coastal Plain Landscape is located in the districts of Mannar and Kilinochchi, which are part of the four coastal Divisional Secretariat Divisions (DSDs) of Nanaddan, Mannar Town, Manthai West (Mannar), and Poonakary (Kilinochchi) (Plate 2).

Plate 3: Selected landscape and the seascape of Mannar Island to Jaffna coastal region

The shallow coastal waters of the Northwest, which include Palk Bay and the Gulf of Mannar, are included in the seascape. The Palk Bay and Gulf of Mannar, which are divided by the so-called Adam's Bridge or Rama Sethu—a network of sporadic

sandbars and reefs linking Thalaimannar island are two mostly contained water areas that surround the Mannar landscape. The two sea areas are too large to be considered in their whole for this study, therefore the sea is only considered as the boundary up to around 10 km from the coastline.

The land area between the coastline and a 30-35 meters contour on the landward side is considered to be the approximate extent of the coastal plain. The Malwathu Oya (Aruvi Aru) is recommended as the Southern boundary, and the Poonakary Peninsula is suggested as the Northern boundary. With the exception of the widening coastal plain to the east of the DSDs, the interior boundary of the coastal plain roughly corresponds to the interior boundary of the coastal DSDs above.

1.2 Hydrological aspects of the landscape

Mannar district is located in low country dry zone agro-climatic zone of Sri Lanka. Hydrological aspect of the landscape is principally ruled by tropical climate, topography, and geological features. The Gulf of Mannar, a shallow sea with a depth of less than 70 meters, separates Mannar Island from the mainland. The annual rainfall average in Mannar is just about 800 mm, and it is erratic and scarce. November through January is typically the rainy season, and May through September is the dry season. A year-long severe water deficit in the area has been caused by the seasonal distribution pattern of rain. Mannar relies heavily on groundwater, which is primarily found in the limestone aquifers, as a result of the region's infrequent rainfall. For the efficient utilization of groundwater and to prevent from sea water intrusion, the prehistoric inhabitants of this region created a

remarkable tank-based irrigation system. Plate 3 illustrates the Tanks and rivers in Mannar landscape.

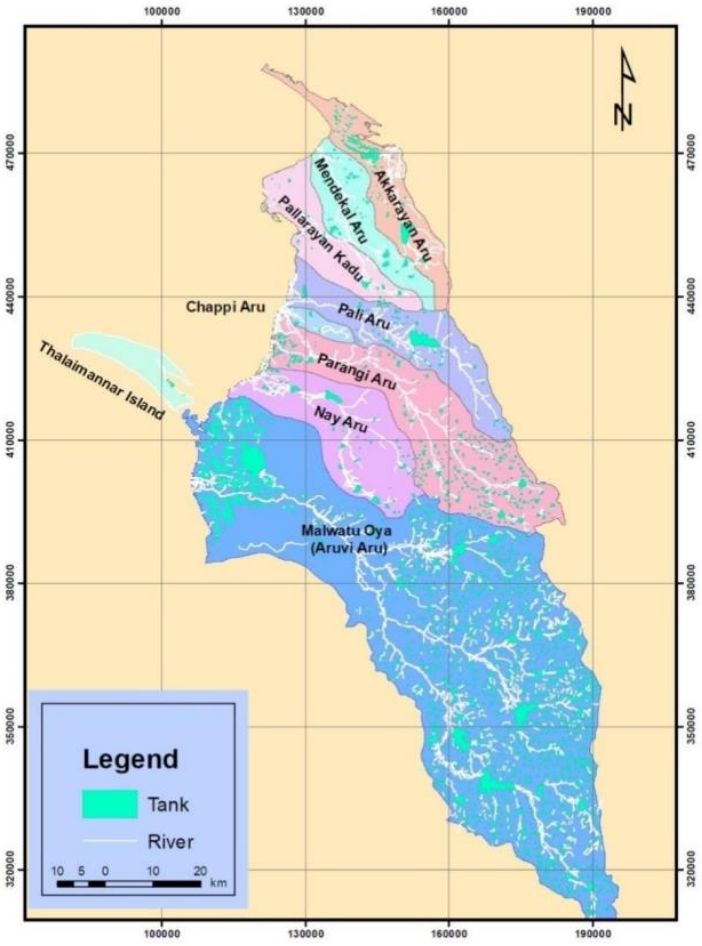

Plate 4: River Basins of Mannar landscape

The hydrology of Mannar is considered a complex network of rivers, streams, and lagoons. On the Mannar coastal plain, there are eight significant river basins, including Malwathu Oya (Aruvi Aru), Nay Aru, Parangi Aru, Pali Aru, Pallarayankadu, Mendekal Aru, and Akkarayan Aru. The Malvathu Oya and Kala Oya are vital sources of fresh water for the district, used for irrigation and drinking water. Among the major river basins, Malwathu Oya is the main source of water for irrigation to the Mannar plain, and provides approximately 566 million cubic meters of annual discharge. It supplies the irrigation systems for the Giant's Tank Cascade and Akattimurippu Cascade. The Giant's Tank, a historic reservoir constructed during the Anuradhapura era, is a distinctive hydrological feature on Mannar Island. With

a surface area of over 1,350 hectares, The Giant's Tank is one of Sri Lanka's largest prehistoric irrigation systems and is still in operation today. The Kala Oya is the largest river in Mannar, and flows through the Wilpattu National Park before reaching the Gulf of Mannar.

Mannar Island is also home to several lagoons, including the Jaffna Lagoon, Elephant Pass Lagoon, Thondaimanaru Lagoon, and Vidathaltheevu Lagoon. These lagoons provide crucial habitats for many aquatic species and offer local residents a means of subsistence through fishing and aquaculture. Several tiny water basins and tanks on Mannar Island are also used for farming and fishing.

The tides and currents of the Palk Strait and the Gulf of Mannar also have an impact on Mannar's coastal regions. Coral reefs, seagrass meadows, and mangroves are just a few of the diverse ecosystems found in the Gulf of Mannar. Marine mammals like dolphins and whales use the Palk Strait as a major migration route.

Nonetheless, these water bodies have faced severe difficulties in recent years as a result of the region's protracted drought and the overuse of groundwater resources. Climate change and human activities including deforestation, dam building, and sand mining have recently had an impact on Mannar's hydrology. These activities have changed river flows and made coastal areas more saline, which has an impact on local residents' livelihoods and biodiversity. By practicing conservation and sustainable resource usage, efforts are being made to lessen these effects.

1.3 Geographical and climate information of the landscape and Seascape

Mannar has dry or savanna ('summer' dry season) climate. Mannar typically receives about 143.4 mm of precipitation and has 149.49 rainy days (40.96% of the time) annually. The district's yearly temperature is 29.9°C - 30.7 °C and it is 1.8% higher than Sri Lanka's averages.

Table 1 : Demographic details of Mannar and Kilinochchi

Country	Sri Lanka
City	Northern
Longitude	79.9044149
Latitude	8.9809743
Attitude/Elevation	None (0 ft)
Local time	Friday 01:36
Annual high temperature	30.62°C (87.12°F)
Annual low temperature	26.89°C (80.4°F)
Average annual precipitation	139.38mm (5.49 inches)
Warmest month	April (32.19°C / 89.94°F)
Coldest Month	January (24.63°C / 76.33°F)
Wettest Month	November (387.87mm / 15.27 inches)
Driest Month	March (53.4mm / 2.1 inches)
Number of days with rainfall (≥ 1.0 mm)	149.49 days (40.96%)
Days with no rain	215.51 days (59.04%)
Humidity	78.54%

1.4 Land use pattern

The Mannar district covers 2002 sq. km (200,207 ha) including the island of Mannar, approximately 3% of the total land area of Sri Lanka. Mannar district has a marine coastal line with a stretch of 222 km, from Theavanpiddi in the North to Mullikulam in the South. About 33% of the Mannar district's total land area is used for agriculture. The forest canopy covers a sizable portion of the land (Approximately 61%).

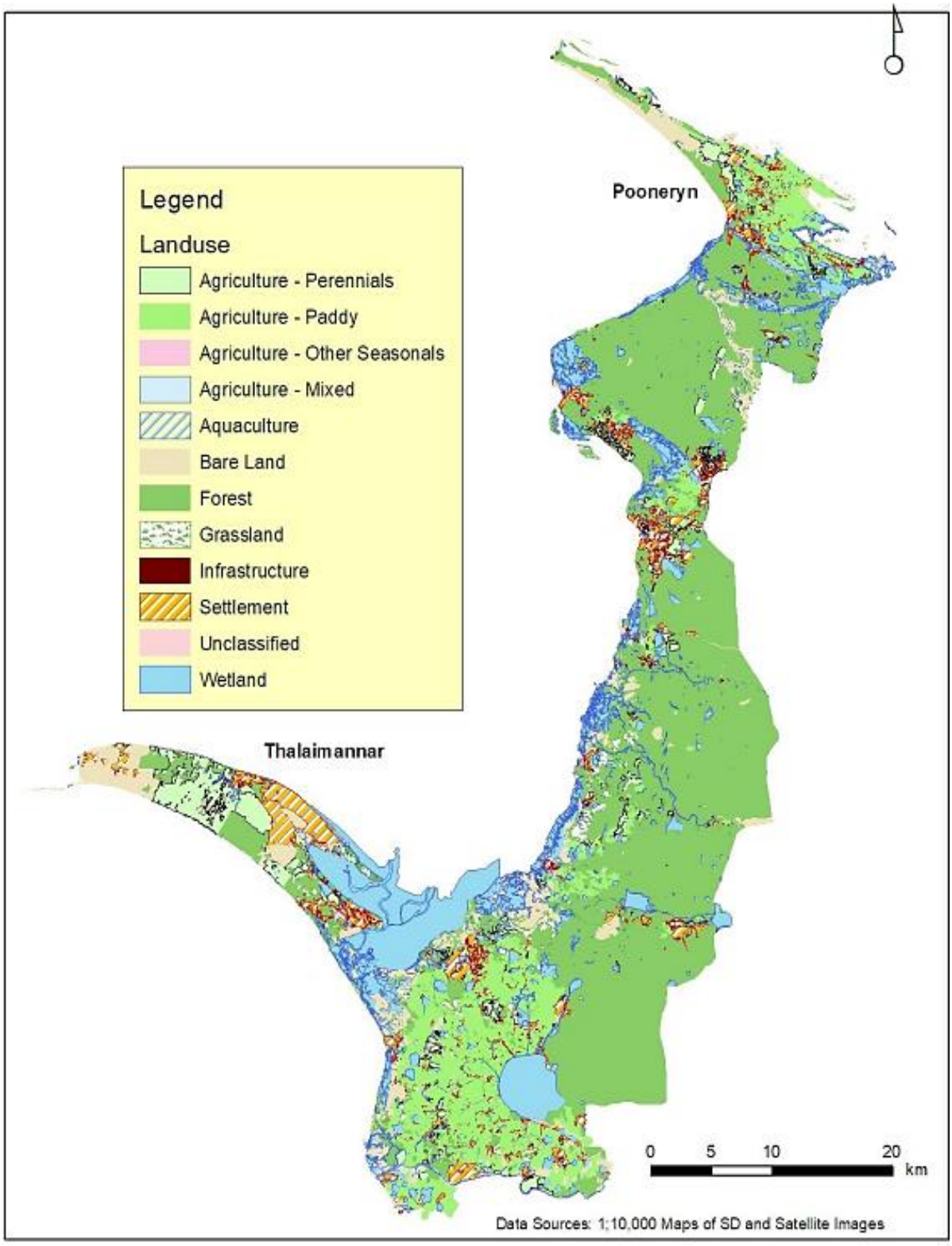

Plate 4: Landuse Pattern of Mannar Landscape

Table 2 : Land practice in Mannar

Land Use Type	Area in Hectare (ha)	Percentage %
Built up land	1,905	1
Agricultural Land	36,895	18
Non-Agricultural Land	2,789	1
Homesteads/Home Garden	11,292	6
Forest land	122,038	61
Wet Land	7,258	4
Water bodies	11,186	6
Barren Land	3,992	2
Other Land	2,852	1
Total	**200,207**	**100**

Percentage of land practice in Mannar expressed in round values

Kilinochchi district covers nearly 1,279 sq. km (127 900 ha). Majorly land utilizes for agricultural purposes, approximately 33% of the total land area of Kilinochchi. Around 29% of the land is covered by the forest canopy.

Table 3 : Land practice in Kilinochchi

Land Use Type	Area in Hectare (ha)	Percentage %
Built up land	1,543.11	1
Agricultural Land	42,549.78	33
Non-Agricultural Land	0.00	0
Homesteads/Home Garden	17,493.59	14
Forest land	37,012.58	29
Wet Land	8,370.17	7
Water bodies	17,114.06	13
Barren Land	331.01	0
Other Land	3,485.70	3
Total	**127,900.00**	**100**

Percentage of land practice in Kilinochchi expressed in round values

1.5 Socio-economic status of the landscape

There are 48,113 families with 162,113 inhabitants in the Mannar district, according to statistics from the Statistical Information, Northern Provincial Council, 2022. While

resettlements continue following the end of the civil war in 2009, it is crucial to keep in mind that population statistics are continually changing.

The Department of Agriculture's 2022 statistical records show that, the achievement of paddy production for the period of 2020–2021 was 74,537 mt in 15083 ha of land. Mannar district's paddy farming is more productive than Kilinochchi district. Around 232.30 ha of land was used for maize culivation in *Yala* and 682.50 ha in *Maha* season in 2020–2021. In addition to paddy and maize, other crops grown include leguminous crops like green gram, black gram, cowpea, ground nut, *etc.*, as well as fruit crops like banana, guava, papaya, lemon, orange, mango, *etc.*, vegetables like long beans, cabbage, pumpkin, brinjal, tomato, manioc, bitter gourd, and snake gourd and economical crops include chillies, large onions, and red onions.

According to the statistics of Resource Profile of the Mannar district (2022), the district's Agriculture is the main livelihood are farmers and about 43.50% of the district's population, nearly 20,932 families cultivating 34,683 acres of land (14,036ha). Meanwhile, the major livelihood of approximately 22.62% of the population- 10,886 families is fishing in the region. Meanwhile, approximately 183 acres of land have been developed as a salt production area having the present market share of about 3.5% of the total production of salt in the country. However, interventions and initiatives are anticipated to increase the market share up to 5%. The household per capita income in Mannar district is 5043 LKR in 2021/22 that is far below the national average per capita income of 13,022 LKR.

Based on data from the fisheries extension officers for the Mannar district, the pre-war fisher folk population in Mannar consisted of 40,530 persons from 10,886 fishing families and 43 fishing villages, approximately 22.62% of the population of the district. As Mannar island is surrounded by the fishing area, the most productive fishing grounds lie in the Palk Bay and Gulf the Mannar.

1.6 Reasons for the selection of the landscape and seascape

The landscape and seascape of the Mannar region are distinctive and valuable to Sri Lanka and the rest of the globe due to their substantial ecological, cultural, and economic importance.

- **Cultural relevance**

With a long history of human settlement and trade stretching back thousands of years, the Mannar landscape and seascape have great cultural value. The region served as a hub for maritime trade that linked the Middle East, Sri Lanka, and South India. A number of historic temples, churches, and archaeological sites may be found in the area, including Anuradhapura, which was once the capital of Sri Lanka. These monuments are significant cultural and religious landmarks. Traditional fishing methods and local handicrafts are significant cultural practices in the Mannar region, which was also a hub for the old pearl trade.

- **Ecological relevance**

A biodiverse area, the Mannar landscape, and seascape feature a distinctive fusion of terrestrial and marine ecosystems. For marine mammals including dolphins, whales, and dugongs, the Mannar Gulf is a crucial feeding and nesting area. A diversity of marine life, including fish, crabs, and sea turtles, including some endangered species like the dugong and the hawksbill turtle, depends on the nearby coral reefs, seagrass meadows, and mangroves for habitat. In the Mannar region, rivers and lagoons provide as crucial freshwater habitats for aquatic animals.

The area is home to a number of distinctive terrestrial ecosystems, such as scrublands, sand dunes, and salt flats. Several endemic plant and animal species, including the Mannar rock agama lizard, the Mannar fan-throated lizard, and the Mannar dry-zone frog, are supported by these environments.

Miththapala, S. (2012) reveals that the Gulf of Mannar is the first marine biosphere reserve in Asia. The Gulf of Mannar is the biologically richest coastal region with 3,600 species of plants and animals known to live within its boundaries. Furthermore, the Reserve is home to sea horses, 450 species of fish, hundreds of species of sea cucumbers, sponges, all kinds of corals, and species of seagrass found nowhere else. In addition, more than 150 species of bird are found on islands in the reserve. Due to the large diversity of birds there, BirdLife International designated it as an Important Bird Area (IBA). Many migratory bird species call it home, including the black-tailed godwit, the Eurasian spoonbill, and the Indian spot-billed duck.

Vital to the ecology of the reserve are the 17 species of mangrove which act as important fish nurseries. The reserve covers 10,500 sq. km and has 21 islands with continuous stretches of coral reef. The core area of the reserve comprises 560 km^2 core area of coral islands and shallow marine habitat. Commercial fishing is done in about 5,500 sq. km. and nearly 50,000 people dwelling in 47 villages along the coastline bordering the Gulf of Mannar depend directly on the natural resources of the Biosphere reserve for their livelihood. The Reserve's fishery is dominated by fish species like lesser sardine, silver belly, mackerel, anchovy, threadfin, bream, lobster, molluscs, and prawns. The fragile Coral reefs and the unique flora including the Sea Grasses of the Gulf of Mannar, which provide homes to an abundance of marine creatures, are under multiple threats. Many marine mammal species, including the *Bottlenose dolphin* and *Spinner dolphin*, use the Palk Strait, which borders the Mannar region to the north, as a major migratory route. The largest mammal in the world, the blue whale, has been spotted in the area on occasion. The abundance of 3600 flora and fauna species can be seen in Mannar (Mannar Development Plan 2018 - 2030).

Palk Bay is a shallow, and generally calm sea that lies between the North Western Province of Sri Lanka on the east and Tamil Nadu in India on the west. Palk Bay's Sri Lankan shore is covered in various-sized coral reefs. The areas nearest to these islands are scattered with rocky terrain, while the spaces between these islands are muddy or mixed with sand and mud, which is ideal for the prawns' rapid population growth. Diverse finfish, prawn, crab, and other marine fisheries resources benefit greatly from the vast biodiversity of the coral reef and mangrove ecosystems as breeding and nursery grounds (Kasim, 2015). According to Sivasubramaniam (1985) of all the places in Sri Lanka, Palk Bay, which is in the zone between Mannar and Jaffna, has the greatest demersal fish catch rate (an average of 100kg/hr). This suggests that in all of Palk Bay, only this region has access to the richest abundance of fisheries resources. These are the benefits that Tamil Nadu fishermen can take advantage of when fishing outside international borders.

Mudflats are found scattered around Mannar islands and Mantai West area lagoons and bays. These mud flats are important in processing nutrients for the ecosystem and providing feeding areas for fish at high tide and for birds, especially migratory birds, at low tide. Further, Sand dunes can be seen in Nadukudah. The Gulf of Mannar coast and Islands have relatively dense growth of seagrass meadows, mainly between the mainland and the islands, as well as towards the seaward sides of the islands. On the seaward sides of the islands, seagrass appeared as patches. They are found about 2 to 3 km wide from the Island shores towards the open sea. Coral reefs are found in shallow seas in the Bar Reef area, Mannar (off Pallimunai), South West of Mannar Island, Arippu, Silavatturai, and Vankalai, and near Thomaiyar and Kokkupadyan. (Mannar Development Plan 2018 - 2030).

Adam's Bridge, also known as Rama's Bridge or Rama Setu, is a chain of limestone shoals, between Pamban Island, also known as Rameswaram Island, and off the

South-eastern coast of Tamil Nadu. Hettiarachchi, K. (2016) stated that Korakulam is also a critical feeding ground for more than 10,000 migratory birds including gulls, ducks, storks, and shorebirds, adding that the 'globally vulnerable' Great Knot (*Calidris tenuirostris*) habits this wetland annually. Several locally important species such as the Greater Flamingo (*Phoenicopterus roseus*), the Great Black-headed Gull (*Ichthyaetus ichthyaetus*), Heuglin's Gull (*Larus heuglini*), Eurasian Spoonbill (*Platalea leucorodia*) and Northern Teal (*Anus crecca*) are also frequently spotted.

Sea grass: Seagrasses are submerged marine angiosperms having adapted to survive in a saline environment. There are several species of seagrasses occur in the Gulf of Mannar. Of these, *Thalassis, Halophila, Halodule, Enhalus*, and *Cymodocea* are common. *Thalassia* and *Syringodium* are dominant in the areas of coral reefs whereas the others are distributed in muddy and fine sandy soils. Many species of crustaceans, molluscs, gastropods, sponges, and fish inhabit the world of coral reefs and sea grasses there. The seagrass communities are valuable habitats for commercially valuable aquatic species such as shrimps. Mangroves Mainland fringing and island fringing mangroves are the type of mangroves observed in Mannar. Major mangrove areas bordering the coast of the Gulf of Mannar are found in the areas Achchankulam, Nrivillukulum, Vankalai, and just north of Mannar town (Kanankottiko).

Corals: There are extensive coral reef ecosystems in the Gulf of Mannar in India as well as in Sri Lanka. In Sri Lanka, the largest coral reefs are found in the Gulf of Mannar from Kalpitiya Peninsula to Mannar Island (Rajasuriya & White, 1995). There are four large coral reefs namely the Bar Reef on the west of the Kalpitiya Peninsula, Silavathurai, Arippu and Vankalai. These large coral reefs are mainly 'patch reefs'

located offshore from 1-2 km to more than 10 km away from the coastline. All of these coral banks are in very shallow water up to about 5m depth and the deepest coral banks do not exceed 15m. The dominant forms are branching, foliose, and massive corals belonging to the genera of *Acropora, Montipora, Echinopora, Pocillopora*, and *Porites.* However, the overall species diversity of these reefs is very high with more than 100 species of reef-building corals recorded for the Bar Reef alone. The famous pearl banks of Sri Lanka are located to the west of the reef system from Silavathurai to Vankalai. In addition to large banks of patch reefs, there are extensive sandstone/beach rock reef habitats, which support a variety of marine life, most of which are economically important.

Having ratified the Ramsar Convention on Wetlands in 1990, the Vankalai Sanctuary Wetland in Mannar Island was designated as a Ramsar Wetland in July 2010. The Vankalai Sanctuary is a combination of terrestrial coastal ecosystems and shallow wetlands. This Ramsar site is instead made up of a variety of ecosystems, including tidal flats, seagrass beds, sand dunes, mangroves, salt marshes, lagoons, arid-zone pastures, and marine grasslands. As a result, it sustains a larger ecosystem and more diverse range of species. The Ceylon Bird Club has counted 149 different bird species at Vankalai. In 2010, the Ceylon Bird Club conducted its annual waterbird census, which showed that during a migration season, the Vankalai Sanctuary is home to more than 20,000 waterbirds. The Ceylon Bird Club requested that the Department of Wildlife Protection designate the Vankalai Triangle as a sanctuary as a result (CBD).

For a large number of water birds, it provides excellent feeding. Factors for 2008's Ramsar Wetland Designation. Because of the recent civil war, this area has been spared from destructive human activity, helping to conserve its incredible bird diversity. The site's coastal and marine ecosystems are crucial for over 60 species of fish, marine turtles, and rare species like dugongs (*Dugong dugon*), which host

several threatened species like the green turtle (*Chelonia mydas*), dugongs (*Dugong dugon*), and saltwater crocodiles (*Crocodylus porosus*), as well as important spawning and feeding grounds for young fish species like trevally (*Caranx* spp.), snappers (*Lutjanus* spp.) (Ramsar sites information service, 2010). The Vankalai Sanctuary also supports significant Sri Lankan wildlife, including wading birds and crabs whose habitats are threatened with extinction (Wijesinghe, 2014). A variety of waders, egrets, herons, storks, and birds of prey are attracted to the Vankalai wetland throughout the winter (Sanctuary Destination, 2019).

- **Economic relevance**

Fisheries, aquaculture, agriculture, and tourism are just a few of the lucrative industries that local people may take advantage of thanks to the Mannar landscape and seascape. While the region's agricultural fields are crucial for food production, its fisheries and aquaculture industries also give local inhabitants employment and income. Due to its distinctive biological and cultural characteristics, the area also has promise for ecotourism.

1.7 Threats in the coastal region from Mannar to Jaffna

The coastal region from Mannar to Jaffna, in particular, faces numerous concerns, including the destruction of the coastal ecosystem and lagoons, population growth, soil erosion, dryness, deterioration of soil and water quality due to pollution, illegal disposal of solid wastes, and, increase in commercial activities. In addition, illegal encroachment with land grabs and scrub forest clearance is being carried out with impunity. Garbage and refuse are being dumped in the North-Eastern boundary of the wetland near the dam, with high winds littering the wetland with muck. Harmful human practices including ill-advised urbanization, disposal of waste, and filling wetlands for commercial uses are some of the problems that have led to endangering the wetland ecosystem.

Meanwhile, the illegal trapping and shooting of waterfowl in Korakulam go unabated, and from the descriptions. The migratory species such as Pintail and Gargany Ducks, and large gulls such as Great Black-headed and Huglin's Gulls and also Grey Partridge, endangered Spot-billed Ducks are being hunted.

Therefore, the Mannar landscape has been nominated by the National Steering Committee (NSC) of UNDP-GEF-SGP in the GEF-7 operational phase of Sri Lanka due to emerging threats and vulnerability to the ecosystem services due to unplanned activities including infrastructure and development activities, deforestation, and sand mining that are extremely harmful to the long-term sustainability of the Mannar Island as it is one of the unique and rich biodiversity hotspots in the island.

Further, as the prioritized area is still undergoing development activities to recover from severe loss and damage made to the ecosystem and the community over the 30 years of civil and political unrest and the final war in 2009, the region is in the immense urge of environmental conservation interventions and sustainable developments that could enable collective actions of the community and institutions for environmental friendly adaptive landscape management for socio-ecological resilience by addressing ecological, social, and cultural vulnerabilities in this region. Thus, considering the socio, political, economic, and energy crisis context in this region, the natural resources, and infrastructure facilities, the possibility of sustainable energy and resources utilization, population distribution and livelihood opportunities, the existing environmental projects and development to sustain the ecosystem services, engagement with stakeholder institutes and community leaders, climate change impacts, mitigation and adaptation practices, the study team proposed the project implementation areas to be within the boundaries as described below.

1.8 Relationships with other SGP and UNDP sponsored projects

The Small Grants Programme (SGP) is a Global Environment Facility (GEF) program administered by the United Nations Development Programme (UNDP). The Small Grants Programme funds and provides technical assistance to community-based organizations and civil society organizations in order to support local initiatives that promote sustainable development and biodiversity protection.

UNDP and the Small Grants Programme have a tight association because UNDP implements the Small Grants Programme in over 120 countries. The Small Grants Programme contributes to the achievement of various SDGs, notably SDG 13 (climate action), SDG 14 (life below water), and SDG 15 (life on land).

UNDP and the Small Grants Programme collaborate to assist community-based organizations and civil society organizations in carrying out small-scale, innovative initiatives that promote sustainable development and biodiversity protection. UNDP provides technical assistance and supervision to the Small Grants Programme, which gives funding and assistance to local communities.

UNDP Sri Lanka and the SGP have collaborated to assist a variety of sustainable development initiatives in Sri Lanka. The SGP, for example, has financed programs that promote sustainable agriculture, renewable energy, and biodiversity protection, while UNDP Sri Lanka has offered technical assistance to ensure that the projects are in line with national and global sustainable development goals.

Global Environment Facility implemented to “Enhancing Biodiversity Conservation and Sustenance of Ecosystem Services in Environmentally Sensitive Areas” in 2013. In the national scale-up plan, at least 5% of Sri Lanka's land area is designated as an Environmentally Sensitive Area.

Because of thirty years of civil conflict. The Mannar landscape and seascape was not cared for or preserved, GEF/SGP has had limited opportunities to conduct initiatives in this area. After the fighting ended in 2009, however, environmental

conservation measures began, particularly because the area is recognized as having numerous valuable ecosystems.

From 2019 to 2022, UNDP-Sri Lanka is implementing the GEF-funded 'Environmentally Sensitive Area' (ESA) project, which covers sections of the North-western and North-central provinces. The project adopts an ecosystem perspective and employs a land use planning and management framework to test a variety of land management strategies in a coordinated and compatible manner. It focused on sustainable utilization of sensitive ecosystems to ensure structural long-term sustainable development of Sri Lanka's biological diversity.

The Climatic Resilient Integrated Water Management Initiative (CRIWMP) is a project in Sri Lanka funded by the Green Climate Fund (GCF) from 2017 to 2024. Sri Lanka, being a small island and developing country, is particularly exposed to the negative consequences of climate change. The GCF has accepted funding proposals to boost the capacity of Direct Access Entities (DAEs), National Development Agencies (NDAs), and GCF project programming stakeholders in Sri Lanka to access climate finance through better stakeholder engagement frameworks and a reinforced project pipeline. The GCF also promotes to improving integrated water management within the Dry Zone of Sri Lanka in order to strengthen the resilience of smallholder farmers in the face of rising temperatures and extreme weather events attributable to climate change.

1.9 How the landscape strategy contributes to the goals and objectives, outcomes and targets of the GEP SGP OP07

The project is part of the Global Environment Facility/Small Grants Programme Operational Phase 7 (GEF/SGP OP7), which provides an opportunity to refine and broadly apply a community-based landscape approach through grant project design, implementation, and evaluation for global environmental benefits and

sustainable development in this ecologically sensitive landscape/seascape of the coastal region along Mannar Island to Jaffna, drawing on experiences from other other SGP countries, sectors and regions and their well-developed civil society and market networks into consideration.

North-Western coastal plain landscape is threatened by a number of issues. Such as, Mannar's terrain is defined by dense woods that support a diverse diversity of plant and animal species. However, human-caused deforestation and habitat degradation, such as logging, mining, and agriculture, are putting major strain on the region's biodiversity, the area is subjected to climate change, including as rising sea levels, rising temperatures, and shifting rainfall patterns. These consequences can result in the destruction of natural habitats and the displacement of local inhabitants, Pollution from industrial and agricultural operations might also endanger the Mannar landscape. Pollution can contaminate soil and water supplies, affecting plant, animal, and human health and Mannar's landscape may be jeopardized by rapid and unsustainable development. Poorly planned development can result in the destruction of natural ecosystems, relocation of local inhabitants, and environmental deterioration.

The landscape of the Northwestern coastal plain can be categorised as a human dominated anthropogenic landscape and largely natural landscape and transitional landscape with significant human interferences. The anthropogenic landscape dominated by human activity including both highlands and man created wetlands. It may also include natural wetlands that are used by humans for deriving food supplements, grazing of animals and the recreation space.

The technique will be used to carry out identified projects through participatory, community-driven, multi-stakeholder landscape/seascape management. The proposed treatments aim to improve social and ecological resilience through community-based programs that conserve biodiversity, enhance ecosystem

services, sustainably manage land (especially agro-ecosystems), and adapt to or mitigate climate change and Multi-stakeholder groups gain knowledge, and best practices from previous initiatives, and will put into action a number of possible scaling up activities over the course of this project. Coordinated community projects in the landscape will generate ecological, economic, and social synergies, resulting in larger and potentially long-term global environmental advantages, as well as increased social capital and local sustainable development benefits.

2. Situation Analysis (Threats and Opportunities)

2.1 Methodology followed

This study was conducted using the Resilience Indicators Toolkit which was translated into the local language where the necessary descriptions and analytical questions and the Toolkit were adapted to reflect the Local Setting. The Findings grounded on the Community understanding were followed with a comprehensive Literature Review, focus group discussions, Local authorities and community meetings and field visits, and observations of the respective areas of focus.

Following the Resilience Indicators Toolkit Methodology, the Historical Transformation, Present Context, and Future Trends associated with the Mannar and Poonakary landscape and seascape. Accordingly, Community Resilience Assessment/Mapping workshops with the local authority and local community were conducted in the identified zone clusters for mapping the problems and challenges/gaps using Participatory Rural Appraisal (PRA) methodology. Table 4 illustrate the Community Resilience Assessment/Mapping Workshop Series.

Upon the completion of the Community Level workshops, a Validation Workshop of the Outcomes of the Resilience Indicators Assessment to generate a Common platform for the study is planned to be conducted in March, 2023. This workshop will be held with the participation of state and Private sector stakeholder agencies, selected Community-Based Organizations from each Zone, and selected members of the community in Mannar and Kilinochchi.

The Analysis was carried out on identifying the possible challenges for the Wetland Landscape combining the outcomes gathered from all the workshops conducted together with institutional perspectives. The results of the analysis were interpreted following the literature review covering a comprehensive Literature review

regarding the Dynamic Environmental, Socio-Economic, and Physical context of the Colombo Wetlands region as a Socio–Economic Production Landscape.

Table 4 : Community Resilience Assessment/Mapping Workshop Series

No	Dates	Organization	Male Participants	Female Participants	Total Number of Participants
01	16/02/2023	Kilinochi District Secretariat	10	02	12
02	27/02/2023	Poonakary Divisional Secretariat	11	16	27
03	28/02/2023	Mannar District Secretariat	23	03	26
04	02/03/2023	Small Help Group Poonakary	00	18	18
05	02/03/2023	WRDS Poonakary	01	15	16
06	02/03/2023	Children Club Poonakary	19	17	36
07	03/03/2023	St'Joseph Fisheries Society	39	00	39
08	03/03/2023	Elampuyal National Youth Organization	26	02	28
09	07/03/2023	Nanattan Divisional Secretariat	37	20	57
10	07/03/2023	Mannar Towan Divisional Secretariat	22	47	69
11	08/03/2023	NGO's Meeting (OpEnE)	08	03	11
12	07/03/2023	Manthai West Divisional Secretariat	35	29	64
13	08/03/2023	Agrarian Service Centre	19	00	19
14	08/03/2023	Fisheries Department	20	02	22
		Total	**274**	**170**	**444**

Table 5 : SATUYAMA initiative and tools

	Exercise	Method of analysis
01	Community mapping exercise & Stakeholder mapping exercise	• Contextual overlay Analysis
02	Questionnaire preparation	• Contextual Analysis
03	20 Indicators forum	• Cluster analysis
04	Indicators scoring exercise	• Socio-Economic production Landscape Indicator Data • Capture Tool and Trend Analysis using MS Excel

2.2 Analysis and Interpretations

The Present Capacity level of the Mannar Landscape and Seascape shows the performance of the region in terms of five pillars as follows.

1. Landscape/ seascape diversity and ecosystems
2. Biodiversity (including agricultural/ fisheries diversity)
3. Knowledge and innovation
4. Governance and social equity
5. Livelihoods and well-being

Table 5: SEPL Performance

	Landscape/ seascape diversity and ecosystem	Biodiversity (including agricultural diversity)	Knowledge and innovation	Governance and Social Equity	Livelihoods and well-being
Lowest third	2.10	1.40	2.60	2.23	1.80
Mean rating	2.27	1.28	2.64	2.75	1.84
Highest third	2.38	1.35	2.75	3.00	1.99
Standard dev.	**0.37**	**1.02**	**0.50**	**0.94**	**0.49**

The overall Landscape wide Community Resilient Capacity Assessment results indicate Biodiversity including agricultural and fisheries diversity, livelihoods and well-being, and Landscape /seascape diversity and ecosystem protection are at a greater risk. Meanwhile, none of the other criteria signposts decent performance. It is agreeably reflecting the community's need for support for livelihood and well-being initiatives while the awareness and development activities on sustainable resource management, natural resources, and energy are to be initiated to protect the ecosystem and the human well-being in the region.

Table 6: Trends of the criteria

Major criteria	Trends	Mean score	Standard score
Landscape/seascape diversity and ecosystem protection	No change	2.27	→ No change (2-3)
Biodiversity (including agricultural diversity)	Downward trend	1.28	↓ Downward trend
Knowledge and innovation	No change	2.64	→ No change (2-3)
Governance and social equity	No change	2.75	→ No change (2-3)
Livelihoods and well-being	Downward trend	1.84	↓ Downward trend (1-2)

According to Table 7 and the radar graph (Annexure A), the data shows that the landscape and seascape diversity and ecosystem protection, Knowledge and innovation and governance, and social equity do not show any significant changes as the mean value is between 2-3 and the trend determines no changes while the biodiversity (including agricultural diversity) and the livelihoods and well-being point our downward trend as the mean score is in between the average scoring of 1-2.

However, in terms of the sub-criteria, on the landscape and seascape diversity, the ecosystem protection and ecological interaction in terms of natural resources

taken into consideration point out that the trend is low due to the community's lack of knowledge awareness and the negligence of local authorities and stakeholders who are engaged in this pillar. In terms of Biodiversity- agricultural diversity, the diversity of local food systems and sustainable management of common resources require more attention as it shows a low trend on average. The knowledge and innovation criteria determine that innovation in agricultural and conservation practices needs to be taken into consideration though the major criteria remain the same in terms of the no-change trend. Adding to that, community-based landscape and seascape governance and coordination and cooperation within and between communities for the management of natural resources show lower performance on average. The livelihoods and wellbeing criteria point out that the overall sub-criteria require intense focus as the trend is lower compared to the other three criteria. Therefore, the intervention focuses more on the livelihood and well-being criteria, Biodiversity in terms of agricultural diversity while other sub-criteria which need to be maintained for sustainable environmental protection and community's well-being are also inclusive in the proposed interventions.

2.3 Mannar Landscape and seascape- Problems, challenges and the way forward

The study identified several crucial gaps in the current context of environmental management and sustainable development practices in the community based on the discussion with the stakeholder and the focus group discussion.

Therefore, adhering to the problems addressed and suggestions proposed by the stakeholders, the list of themes to be focused on the proposal.

1) Inadequate or even complete absence of coordination (both vertical and horizontal levels) and communication between various levels of state officials and the grassroots level creates a fundamental gap in the manner each group perceives the purpose and management of the landscape and thus contributes to suboptimal and ineffective implementation of policies and regulations related to the ecosystems. For instance, the wind turbines have created a major impact on the community as the community was not aware and not acknowledged the project though they are the victims in this region. It has been reported that the noise and vibrations produced by wind turbines disturb the natural habitat of marine animals, migratory birds, and fish catch.

2) Lack of awareness of the value of small-scale environmental conservation and protection in the surrounding ecosystem that is often underestimated and neglected. For instance, Vidathaltheevu is one of the sensitive and unique environments that has been damaged by the community's lack of awareness of coastal protection and lack of environmental impact assessment and life cycle assessment of plastic waste. It has been noted that Vidathaltheevu has been affected by soil erosion for the extent of 5.6 km already. Further, fishermen use the fishing net with a mesh size of 2.5 inches while the recommended mesh size of the fishing net is 4.5 inches. So, small fishes and crabs are captured. Hence, the population of fish, and crabs reduces because of capturing small fishes, and crabs. Awareness programs about harvesting small fishes and crabs should be given to the fishing and the rules and regulations regarding the stipulated mesh size for fish catch need to be implemented strictly.

3) The inability of relevant Line Agencies to exploit the Traditional Knowledge available at grass root level with regard to coastal land, and related economic activities and responsible environmental management practices demands

immediate attention. Clear need exists for practical and real ground collaborations for blending local and community traditional knowledge and practices with Modern Technological Inputs that will yield considerable synergies. There has been evidence of serious gaps between technological advice provided by experts and the connected state incentives and the practices and expectations of the community. For instance, the wind turbine project has required sand mining and the illegal sand smuggling is occurring in Mannar region it has been reported that the sea intrusion and soil erosion are starting to occur. Further, it has been reported that the fisheries department has already allowed the transport of a certain amount of Couch-shell for animal feed production that is eventually a threat to the coastal environment Awareness.

4) Existence of multiple malfunctioning issues when providing support for farmers at Grassroots level, especially those farmers who are engaged in Traditional Agricultural Practices and cultivating Local Varieties that blend with the ecosystems Management. These deficiencies lead to the discouragement of the Farmers who practice Traditional Sustainable Agriculture thereby weakening the frontiers of local farmers. For instance, Poonakary landscape has very Vast lands and fertile lands for home gardens and farming. Residents grow vegetables for their household needs and supply the remaining vegetables to vegetable vendors, for example, green beans are sold to vegetable traders for Rs 400 per kg. The vegetable vendors sell it to the public for a price between Rs 550 to Rs 650. They prefer to practice organic farming in most parts of Poonakary, for example, peanuts and corn cultivation that do not require pesticides other than water. But it is not possible to implement and use a limited amount of pesticides in some vegetables (Tomato, Green beans, Bitter gourd). Even some of the fertilizers that are being used are Urea or Ammonium. Further, the most common

problem that they face is white pests. White pests cause damage the vegetable crops. So, they are unable to practice organic farming though they would like to. What the farmers required in this region is the technical know-how of organic farming and the proper guidance.

5) Despite the Rules and Regulations for the protection and sustainable management of Natural and common resources related to the Wetlands, lack of poor administration has created a deep descent and a feeling of hopelessness among the local communities. Those who are powerful and politically connected are said to exploit the resources at a serious cost to the community. For instance, the Mannar Coastal area is below the sea level which leads to seawater invasion in nearby places to Nanattan, and Musali while the water becomes saline causing water-borne diseases. Yet, dynamite fishing in the coastal region, and explosives used for mining have been transported illegally to Mannar from the South though it affects the coral reefs and the illegal sand mining is parallel taking place with the support of the authorities who are in power.

6) Outward migration of traditional communities and inward distribution of communities from outside cause social imbalances leading to stress on sustainable living and ecosystem protection. Also, younger generations emerge increasingly alien to traditional practices and related wetland-based living. These changes are manifested by prevalent labour shortages with regard to wetlands-related economic activities. Concerns vividly expressed by farming communities and fisheries communities were among such issues raised. For instance, though the community relies on farming and fisheries, with the current economic crisis and price inflation, the skyrocketed cost of fuel and electricity has affected the farmers to pump water to their paddy fields and have to

purchase the paddy for higher prices. However, as the local market price does not favor the farmers to cover the cost of cultivation, farmers are undergoing poverty and abandoning the farmland. the farmers do not have an efficient space to dry the paddy harvest and store them to sell for a higher price when the demand for paddy increases. Further, the land occupied by the military is undertaken for infrastructure activities and not yet released to the land owners of the local community.

7) There appears to exist a considerable gap among Non-Government Organizations, Community Based Organizations, and the community at large. Especially, issues and queries on accountability and trustworthiness with regard to the set-out purposes and deliverables. In particular, concerns were expressed that a considerable number of projects have not achieved the claimed deliverables or never met the goals set out for "benefiting the communities".

In addition to that, operational plan 06 had prioritized the ten problems of the uncertainty of crop production and poor productivity of farming systems, low productivity of dairy cows and lack of grazing grounds, unsustainability of the fishing industry, lack of viable alternative livelihood options, non-exploitation of eco-tourism, under exploitation of potential benefits of palmyrah palm mainly for tapping, handy craft, degradation of mangrove vegetation and its ecosystem services, marshes and grasslands are invaded by invasive *Prosopis juliflora* and reduced the extent of productive lands and gender inequality that have been taken forward to the operational plan 07 by identifying and analyzing the current context in the landscape. Therefore, addressing issues on livelihood has adhered with entrepreneurship and unemployment issues while gender equality has been synced with the increased usage of drugs and alcohol and SGBV. Meanwhile, the

proposed objectives are inclusive of women's participation and leadership at every stage.

Table 7 : Analysis between OP6 and OP7

Problems addressed in OP6	Lesson Learnt and the way forward
Uncertainty of crop production and poor productivity of farming systems especially in paddy cultivation mainly due to water limitation	• Hydro-meteorological centers have been established that have Malwathu Oya and other two tank cascades from this river in this landscape are expected to be benefitted. • Renovating some of the feeder canals to these tanks will be a focus in OP7. • The overnight policy changes on fertilizers, price inflation of fuel and electricity, current economic crisis, skyrocketed cost of living, lack of investments, higher loss and demand due to lack of marketers, and inefficient post-harvest storage have resulted in the loss of interest in farmers that have affected the agriculture and farmers.
Low productivity of dairy cows and lack of grazing grounds	• Many sites are polluted, and others are not easily accessible, as they are under the management of the Sri Lankan Navy.

	• However, OP7 will focus on this problem by replacing the high-quality native forage that would be an alternative for cattle feeding as well
The unsustainability of the fishing industry (including fishing in lagoons). Lack of viable alternative livelihood options.	• Sustainability and productivity had been implemented through several projects through OP6 initially. • Though 07 projects have secured co-financing in terms of cash and in-kind from different stakeholders, lack of alternative livelihood options to agriculture and fishing due to a lack of investors and lack technical knowledge and the current crisis has resulted negatively. • Therefore, OP7 focuses on engaging women and youth entrepreneurs on local products that could be an alternative livelihood option while the zero plastic -alternative products would be a cross-cutting activity proposed in OP7.
Non-exploitation of eco-tourism (ET) potential.	• Sri Lanka Tourism Strategic Plan (2017-2020), the Sri Tourism Development Authority identified Mannar as an emerging tourism hub, as it is very popular with local tourists for

	migratory bird watching (MoTDCRA, 2017). • Although ecotourism is growing, there is no overall plan for its development in the region due to lack of infrastructure and a lack of trained personnel and knowledge of ecotourism. • The Field Ornithology Group of Sri Lanka is using satellite tracking of migratory birds to understand their migratory pathways. FOGSL has established a station in Urumale and in Vankalai. • One of the identified areas for action has been the capacity building for the development of responsible ecotourism in this landscape. • The Palmyrah House, Serendipity Retreats promotes and supports avi-tourism and avi-tourism-based projects. • However, especially avian-tourism, and targeted training in tandem with community consultations and local planning are taken into consideration to be evaluated as part of the broader collective process of

	adjusting management strategies to new information, knowledge, capacities, and conditions to divert funding towards developing the capacity of organizations by providing proposal writing guidance and building awareness on the landscape approach.
Under exploitation of potential benefits of palmyra palm mainly for tapping, handy craft making.	• The palmyra palm (Borassus flabellifer) is underutilized because of the lack of trained personnel, as well as technical and marketing knowledge. • However, as unemployment has drastically increased and caused social and economic unrest in the community, OP7 focuses on promoting women and youth entrepreneurs.
Degradation of mangrove vegetation and its ecosystem services.	• The Land Use Plan (2016) for the Kilinochchi District provides for protection (as Environmentally Sensitive Areas) of the main sand dunes in the Poonakary peninsula, and also mangroves and marshes (likely salt marshes) in the rest of the Poonakary Divisional Secretariat

	division which is within the landscape and one of the focal areas of cycle 7 is biodiversity conservation. • OP7 focuses on mangrove restoration adding to the value of projects carried out on mangrove restoration in this landscape.
Degraded forested areas of about 1000 ha along the Jaffna-Mannar (A 32) route.	• Integrating community-centred, ecosystem-based approaches into forestry, agriculture, and tourism sectors were focused on a holistic landscape approach to incorporating biodiversity conservation into planning and implementation in agriculture, tourism, and forestry in the Malwathu Oya Basin of north-west Sri Lanka. • One of three trial landscapes included the land bordering the Malwathu Oya Estuary, and the adjacent seascape, including coral reefs of Vankalai, Arippu, and Silavaturai, Pearl Banks of Mannar, Cheval Bank and the seagrass beds in shallow coastal seas. • However, significant numbers of sites are polluted, and others are not

	easily accessible due to being forcefully occupied by the Navy. • As a solution, OP7 focuses on mangrove restoration and zero-plastic waste projects
Marshes and grasslands are invaded by invasive P. juliflora and reducing the extent of productive lands.	• Under GEF 6 the Ecological Association of Sri Lanka (EASL) prepared the first map atlas of the sand dunes, salt marshes and mangroves, IAS P. juliflora of the coastal plain of the area. • OP7 will focus on this problem by replacing the high-quality native forage that would be an alternative for cattle feeding as well and efficient utilization of P. juliflora resources
Gender inequality.	• A gender focal point is designated within the SGP National Steering Committee to ensure a review of gender considerations in project selection. • Gender Analysis and Action Plan will be adhered in OP7. • Women led and women focussed projects in each landscape will be focused for selection criterion in OP7.

	• However, as it has been reported that increased cases of drugs and alcohol usages have resulted in increase of GBV, OP7 focuses on this pillar while women participation and leadership are mandatory in each of the implementation.

The above-mentioned gaps and challenges lead to the community to struggle for their livelihood and leave them with no-choice of exploiting the coastal protection and environment. Therefore, prioritising the listed problems is anticipated to be considered in order to find the harmony of human well-being and environmental protection.

Problem 1. Increased number of abandoned paddy lands and significantly less crop productivity.

As the government failed to increase domestic production of organic pesticides, fertilisers with a sudden policy change and not to provide farmers with subsidies with the current crisis, have wrecked the crop yield. In addition, the lack of water for irrigation especially at the end of the Maha season and drought during the *Yala* season and the reduced capacities of the tanks due to siltation and encroachments, poor condition of the channel systems and wastage of water, no adequate means of storing excess run-off water including the saline water intrusion, wild animal conflicts and damages, sedimentation and pollution of tanks due to cultivation tank bed area during *Yala*, increased cost of fuel and electricity and the labour scarcity due to outmigration of young people has led the farmers to abandon the paddy lands and less agricultural productivity.

Problem 2. Lack of sustainable management of fisheries.

Due to Illegal fishing practices with the take net, dynamite, trawlers, small net sizes, light trapping overfishing, intrusion of Indian fisheries, lack of knowledge on modern technology in the fishing industry, poor waste management practices significantly impact on the sea-food security, and livelihood opportunities in the fisheries community. Furthermore, several requests for a 'Vadi' to park their boats are delayed still and the parking area has been forcefully occupied by the military/ Navy. Thus, fishermen have to park them in the coastal land that leads to marine pollution. Therefore, in order to meet the highest domestic demand for fish, sustainable management should be considered and implemented.

Problem 3. Lack of economic opportunity and increased unemployment.

Though there are capacities and demand for locally produced food products such as palmyrah food productions, local cashew nuts, due to a Lack of infrastructural development to attract investors, lack of source / fund to initiate small scale business, lack of marketing opportunities and skilled labours, lack of advanced technologies and marketing avenues, lack of interest and underestimated demand for local entrepreneurs, the natural resources are undermined. Thus, providing training and opportunities for youth and women entrepreneurs and promoting marketing opportunities would sustain the community economically and free from unemployment. Lack of trained people and lack of interest especially among the youth due to poor social recognition.

Problem 4. Undermined Eco-tourism spots.

Though the region is a unique tourist spot with migratory birds, rich in biodiversity, attractive landscape and seascape, due to lack of investors, stakeholder engagement, lack of consideration of tourism boards, lack trained staff and

incentives for tour guides in this region, the eco- tourism concept is not being valued.

Problem 5. Salinity in drinking water and degraded drinking water quality that could increase water-borne diseases in Poonakary area.

Due to the chemicals and fertilisers contaminated with the water, sea intrusion due to land mining, hardness of water and rich of Ca^{2+} and Zn^{2+} ions in water, the drinking water quality has degraded and become saline that lead, Chronic Kidney Diseases (CKD).

Problem 6. Increase of GBV, drugs and/or alcohol usage and negligence of social responsibility among youth

With the current crisis, as most of them in the community do not have job opportunities and are finding alternative and easy ways of income earning opportunities, they are being trapped in drug/alcohol usage that leads to GBV and domestic violence.

Problem 7. Degradation of mangrove plantation and its ecosystem services

Due to poor knowledge and awareness of mangrove plantations, though it is a carbon sink and habitats of marine organisms, the mangroves have been destroyed and extracted for fire woods, construction, fish traps, and sadly for landfill. Additionally, the practice of chemical aqua culture has been a threat to the mangrove ecosystem.

Problem 8. Sea intrusion

Due to Illegal sand mining, wind turbine projects, Extraction of timber and firewood, farming, and construction, the land has been excavated and damaged. Adding to

that negligence of the community, stakeholders, and the government authorities, the EIA and monitoring plans are not subjected before any projects in this region that lead to sea intrusion and there is no mitigation or adaptation has been implemented though the community is subjected to internal-migration during the extreme weather events.

Problem 9. Marshy lands and grazing lands are invaded by Invasive *Prosopis juliflora* and reduction of productive lands

As reported, *P. juliflora* is an invasive plant that reduces the productivity of soil and water absorption. Therefore, the land has been invaded by this plant and abandoned by the community.

Problem 10. Poor Solid waste management practices and accumulated plastic waste in the coastal and marine environment

Lack of funds for beach cleaning, lack of awareness of the community, and not having proper solid waste management and disposal systems. It has been stated that the school children segregate the waste and give it to the waste collectors, however, the waste collectors put them together as they do have the proper knowledge on this matter.

3. Landscape strategy (Outcomes and impact indicators)

3.1 General premises

The Landscape Approach grounded on the Satoyama Initiative provides the basic foundation for increasing the resilient capacity of the communities that are aligned with ecosystem services and conservation. Being on this premise as the fundamental value, the Mannar landscape and seascape baseline assessment focus on addressing the identified key challenges of the landscape *via* community-based and participatory accomplishments in sustainable management of the socio-ecological production landscapes and seascape in the Mannar and Poonakary region.

3.2 The goal

Initiating a Landscape/seascape Level Approach to Networking all relevant Stakeholders into Community-Based Sustainable Management interventions could simultaneously sustain the community's livelihood and well-being.

3.3 The logical framework

To Facilitate Enhancement of the Socio-Economic Production Landscape Performance of the Mannar landscape/ seascape based on the key priority aspects of

1. Landscape/ Seascape diversity & ecosystem Protection
2. Biodiversity (Including Agricultural Biodiversity)
3. Knowledge & Innovation
4. Governance & Social Equity
5. Livelihoods & Well-being

In achieving the prospecting Goal and the Objectives it required high-level of attention from every scale in order to address these challenges in an effective manner.

3.4 Outcomes and Impact Indicators

Table 8: Outcomes and Impact Indicators

Outcome	Indicator	Possible interventions
To encourage farmers in cultivating and farming to increase crop productivity with efficient resource management	• Number of renovated village tanks • Capacity of tanks (acre ft.) • Cultivate extent (acres) of paddy in both *Maha* and *Yala* • Number of crops cultivation/year • Yield/ harvest and productivity • Net income • Number of home gardens • Increase of agro-biodiversity • Emergence of new farmers • Number of storage rooms constructed/ renovated	• Capacity increase of existing village tanks • Improve the channel systems • Introduce efficient water and nutrient use techniques and cropping systems introduce more economical crops/fruit trees for home gardens. • Marketing opportunities • Minimise the loss and maintain the quality of grains through storage room drying spaces • Networking with insurance companies for the loss and damage

	• Number of spaces renovated/ constructed for drying the paddy harvest • Tons of rice exported • Policies / Number of farmers obtained insurance for farmers to cover up their loss • Number of farmer training on water management, intercropping, integrated nutrient management, integrated pest management, and organic farming • Number of farmers adopted micro-irrigation techniques • Marketing network/supply chain. • Number of salinity bunds	cover for farmers • Renovating ponds • Construction of salinity bunds
To increase and sustain the income	• Number of workshops/awareness	• Capacity building of fishing communities on the

generation through safe and sound modern fishery technologies that would maintain the harmony of the marine environment	programs conducted for fishing communities on effective and eco-friendly fishing technologies • Number of awareness training on the negative impacts of illegal fishing that harm the environment • Number of awareness and legal workshops on enlightening the community that could be punished for damaging the marine eco-system • Number of reduced illegal fishing in the seascape (number of events reduce over time) • Number of fishermen use the correct fishing net with an appropriate mesh size • Number of fishing societies formed and aware of the conservation of	short/medium/long term impacts of illegal fishing practices • Training on good fishing practices use of GPS technology to locate the fish population • Exposure visits • Identify community leaders to form grassroot level community to address the issues and guide the community • Strengthen networks/linkages with stakeholder institutes for better marketing • Establish a monitoring mechanism (state sector in collaboration with communities and related organizations) • Declare no fishing zones in

	coastal ecosystem Declare 'no of fishing zones' (extent) in vulnerable marine eco-systems • Number of spaces constructed and renovated for drying fish • Number of parking plots renovated for boats • Reduced the conflicts between Indian fisherman • Number of fishery communities involved in insurance policies that cover the loss and damage of the fishing equipment/ community • Number of women fishermen engaged • Number of safe disposals that could be recycled/ disposed • Number of farmers who use GPS	vulnerable marine ecosystems • Explore possible alternative income sources/value addition to fishing-related or others to strengthen economic status. • Develop and promote women's fisheries network • Promote insurance policies • Regular meetings and monitoring for impact assessment • Train the fishing community/CBO for canning fish • Establish marketing facilities for canned fish • Expand the storage facility with the expansion of the ice factory • Construction of parking plots

	technology • Number of training sessions for canned fish • Number of youths employed in factories of canned fish, ice	
To initiate the locally produced foods and products that could promote palmyrah/ cashew plantations to find alternative income-earning opportunities and to reduce unemployment .	• Number of workshops/awareness programs conducted in identifying and capacity building on alternative livelihood types, • Number of people interested in getting capacity building on identified livelihood • Construction of parking plots • Number of women/ Youth engaged in the related livelihood opportunities • Number of plants / acres planted • Number of self-help groups that	• Identify possible alternative income sources in the landscape/seascape • Identify and Provide training to initiate alternative income earning opportunities • Establish self-help group • Establish marketing and opportunities with relevant stakeholders/ institutes • Exposure visits to observe and adapt the practices that could benefit the community • Establish marketing spaces for

	promote women/youth entrepreneurs • Varieties of livelihood opportunities initiated • Number of marketing spaces • Number of locations the products are sold out • Number of trained youths involve in cashew plantation and cashew processing technology.	women and youth • Career fair • Encourage the youths to make them involve in cashew plantation by giving some subsidies/ loan • Networking the small holdings of cashew farmers with the cashew processing industry.
To promote eco-tourism in Vankalai, Poonakary , Kowthari Munai and the surrounding that could develop sustainable eco-tourism that could sustain the environment and the economy in the regions	• Number of potential ET sites identified • Number of awareness programs for the community on protecting sustainable resources • Number of sustainable ET management plan developed and trained • Number of Tour guides trained • Number of established Eco-friendly	• Identifying potential ecotourism sites • ET training for youth (men and women) • Capacity building workshops • Establish a grassroot level community and train them to address and aware the community on the importance and need for the conservation of the identified sites

	tourism spots • Number of employees/entrepreneurs engaged • Number of job opportunities initiated • Number of sustainable natural conservation taken place • Number of locations where the industry has been established • Number of networks created • Varieties of migratory birds attracted after the interventions • Number of eco-touristic guided trained	• Develop infrastructure facilities at the community level for homestays and guest houses/hotels etc. • Community awareness program on protecting sustainable resources • Facilitate conducting certificate course on ecotourism for tourist guides
To promote access of potable water that could reduce the health risk and waterborne diseases	• Number of awareness training on access to potable drinking water, water quality parameter testing at the household level, household drinking water treatment practices	• Provide training on access to potable drinking water, water quality parameter testing at the household level, household drinking water treatment practices

	• Number of awareness training on wastewater treatment practices, safe usage, and disposal of chemicals and fertilizers • Number of cases reduced • Number of water filters provided • Number of water collecting spots constructed • Number of households with access to drinking water	• Increase access to potable drinking water. • Provide wastewater treatment practices, safe usage, and disposal of chemicals and fertilizers • Construct water-collecting spots • Provide water filters • Appoint an officer for monitoring water quality and to purify water if the water quality is suspicious /reported as it is harmful to consume • Closely working with the NWSDB and MOH on health check-ups and water quality check-ups
To reduce GBV and empower women financially	• Number of awareness sessions conducted and female participation	• Deliver women empowerment and leadership trainings

	• Number of grass root level action committees established and trained • Number of identified cases • Number of cases assisted • Number of workshops/awareness programs conducted in identifying and capacity building on alternative livelihood types • Number of women engaged in • Number of marketing opportunities/networks created • Number of self-help groups that promote women entrepreneurs • Varieties of livelihood opportunities initiated • Number of marketing spaces • Number of locations the products are sold out	• Establish grass root level action committee that can address the GBV issues and connect the women to empower them financially through livelihood assistance E.g., Identify possible alternative products that could be replaced with plastic products • Provide training to initiate alternative income-earning opportunities • Establish a self-help group • Establish marketing and opportunities with relevant stakeholders/ institutes • Exposure visits to observe and adapt the practices that could benefit the community • Establish marketing spaces for

		women and youth • Career fair • Palmyrah jaggery is in high demand in the market. Palmyrah Jaggery processing technology needs to be given to those involved with jaggery production. • Encourage and facilitate to obtain more jaggery juice (Pathaneer) for jaggery production having discussed with palmyrah cooperatives • Promote and ease the acquisition of *P. juliflora* resources.
To restore degraded mangrove ecosystems, and introduce sustainable mangrove-based income generation	• Number of workshops/awareness programs conducted on ecosystems services of mangrove vegetation and mangrove conservation measures	• Capacity building of communities on ecosystem services from mangrove ecosystems • Develop mangrove conservation

avenues that would restore the ecosystem as a carbon sink.	• Extent of the restored mangrove forested area (replanted) • Number of value-added mangrove-based product types • Developed and established marketing channels. • Developed mangrove-based ET sites • Number of mangrove conservation societies established • Established links with stakeholder institutes for sustainable management of mangrove ecosystems • Type of mangroves planted • Number of awareness programs conducted at the school level • Number of Provided seeds and established mangrove nursery	society networks • Introduce possible sustainable utilization measures • Promote mangrove-based income generation avenues such as ecotourism • Encourage mangrove food products, handicrafts • Make available seeds and incentives to promote mangroves • Facilitate mangrove afforestation and reforestation programs • Provide seeds and established mangrove nursery • Promote networking for marketing the mangrove plants

	• Number of networking opportunities for marketing the mangrove plants	
To reduce and eliminate activities that are illegal and cause sea intrusion	• Number of awareness programs conducted on ecosystems services and the importance of different vegetation types in the region • Extent of the reforested and forest-enriched area (types and number of tree species planted) • Number of vigilances groups formed to protect forests • Number of reduced Illegal activities that cause sea intrusion • Number of salinity bunds	• Provide awareness programs on ecosystems services and importance of different vegetation types in the region • Extent of the reforested and forest enriched area (types and number of tree species planted) • Form vigilances groups to protect forests and biodiversity • Actions to reduce illegal activities that cause sea intrusion • Close monitoring of EIA, evaluation, and reporting • Policies to restrict certain activities that harm the environment

		• Plant mangrove and coastal plants that could prevent soil erosion and sea intrusion • Promote coral reefs • Construction of salinity bunds
To reduce the land that has been invaded by *P. juliflora*	• Acres of *P. juliflora* destroyed • Number of awareness training on the economic benefits and medical benefits of the plants • Number of interventions taken place to utilize the plant for medical usage.	• Promote reforestation with native flora species. • Provide a well-planned program that promotes involvement and teamwork among all stakeholders, including universities, research institutions, governments, and non-governmental organizations, for the efficient utilization of *P. juliflora* resources. • Raising awareness of *Prosopis*' impact on ecosystem, human health, and agricultural productivity,

		particularly in pastoral and agro-pastoral areas. • Develop the strategies to produce course flour from *P. juliflora* pods which can be contained within the animal's diet. • Resourceful utilization of Secondary products from *P. juliflora* comprises honey, tannins, foliage for fodder, mulch, edible exudates gums, fibers, wood chips for energy generation, pods for ethanol production, galactomannan gums from the seeds. • Promote the use of *P. juliflora*'s traditional remedies, such as syrup made from pods to cure children who lack weight and boost lactation.

		Traditional treatment for wound healing, hoarseness, inflammation, sore throat, diarrhea, dysentery, and the flu. Making *P. juliflora* tea is beneficial for treating skin blemishes and digestive disturbances.
To reduce plastic waste and promote zero plastic schools and community	• Number of disposal bins stored • Number of trainings for waste collectors • Acres/locations that are cleaned and freed from plastic waste • Number of beach cleaning activities • Number of youth and community engaged and trained • Number of zero-plastic schools • Number of competitions and incentives for plastic-zero schools/	• Install disposal bins in public places and schools • Promote zero plastic schools and community • Promote zero plastic group and leaders • Promote the habit of 3R • Promote alternative products that are environmentally friendly • Promote local products and marketing network that could replace plastic usage

	community • Number of Reuse, recycle and reduce practices followed • Number of alternative products in the market • Number of zero plastic campaign • Number of street drama and number of participants engaged	• Provide trainings for school, youth, community and the waste collectors • Awareness on the impact of plastic wastage • Zero plastic campaign and street dramas

3.5 Typology of potential community-based projects and criteria for project selection

General Criteria for Project Selection

1. Baseline assessment and the impacts of conservation on the landscape/ seascape
2. Impact on Livelihoods Improvement of the Community
3. Realistic and innovative initiatives that could sustain the aspects of the proposed project
4. The Scope and Number of Beneficiaries targeted
5. Monitoring and evaluation plan and (advocacy and lobbying for policy reforms would be an added advantage)
6. Prior experiences and the capacity of the organisation in the aspects of implementation
7. Activities/ projects that may lead to environmental conservation and environmental sustainability.

3.6 Monitoring and Evaluation Plan at the Landscape Level

The "Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (SEPLS)" tools are used as the main monitoring and evaluation plan for the Landscape Level progress assessment. The indicators are a tool for engaging local communities in the adaptive management of the landscapes and seascapes in which they live. The Indicators of Resilience in SEPLS consist of a set of 20 indicators designed to capture different aspects under five key categories and assessment is based on a given score, Such as

1. Landscape and seascape diversity and ecosystem protection (landscape and seascape diversity, ecosystem protection, ecological interactions between

different components of the landscape and seascape, recovery, and regeneration of the landscape/seascape)

2. Biodiversity -including agricultural diversity/ crop diversification (diversity of local food system, maintenance, and use of local crop varieties and animal breeds, sustainable management of common resources)
3. Knowledge and innovation (Innovation in agriculture and conservation practices, Traditional knowledge related to biodiversity, documentation of biodiversity-associated knowledge, women's knowledge)
4. Governance and social equity (rights in relation to land/water and other natural resource management, community-based landscape and seascape governance, social capital in the form of cooperation across the landscape/seascape, social equity)
5. Livelihoods and well-being (socio-economic infrastructure, human health, and environmental conditions, income diversity, biodiversity-based livelihoods, socio-ecological mobility.

In addition, it is essentially required to involve the Local Communities that are major/key leaders and formulate a grassroots-level action committee for addressing the issues that arrived in the landscape/community, impact assessment, and monitoring at the grassroots level that could sustain the implementation.

3.7 Knowledge Management Plan at the Landscape level

The project anticipates addressing the knowledge gaps, especially in the traditional and modern practices that could enable a viable environment for both the community and the environmental practices. As it is being observed that there is an undisputed need to reverse the adverse practices into eco-friendly technical aspects that could expand the possibilities for proactive livelihood and economic opportunities, engaging

academics and environmental scientists to engage and enhance methodologies that blend traditional knowledge with scientific bases to generate wider acceptance and interest to act and take collective responsibility for better environmental conservation.

Accordingly, the SGP Country Programs will be able to use the captured knowledge to replicate and up-scale good practices and lessons learned for landscape management to support sustainable socio-ecological production activities at the country, landscape, community, and farmers' levels with the successful implementation of the proposed community level, medium level, and upscale policy level participation.

The project believes that the outcome and lessons learned under the five pillars such as landscape and seascape diversity & Ecosystem Protection, Biodiversity (Including Agricultural Biodiversity), Knowledge & Innovation, Governance & Social Equity, Livelihoods & Well-being will be monitored and assessed at the next level to carry forward the project to the next level that could harmonize and sustain both the community and environment.

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Annexures

Annexure A:

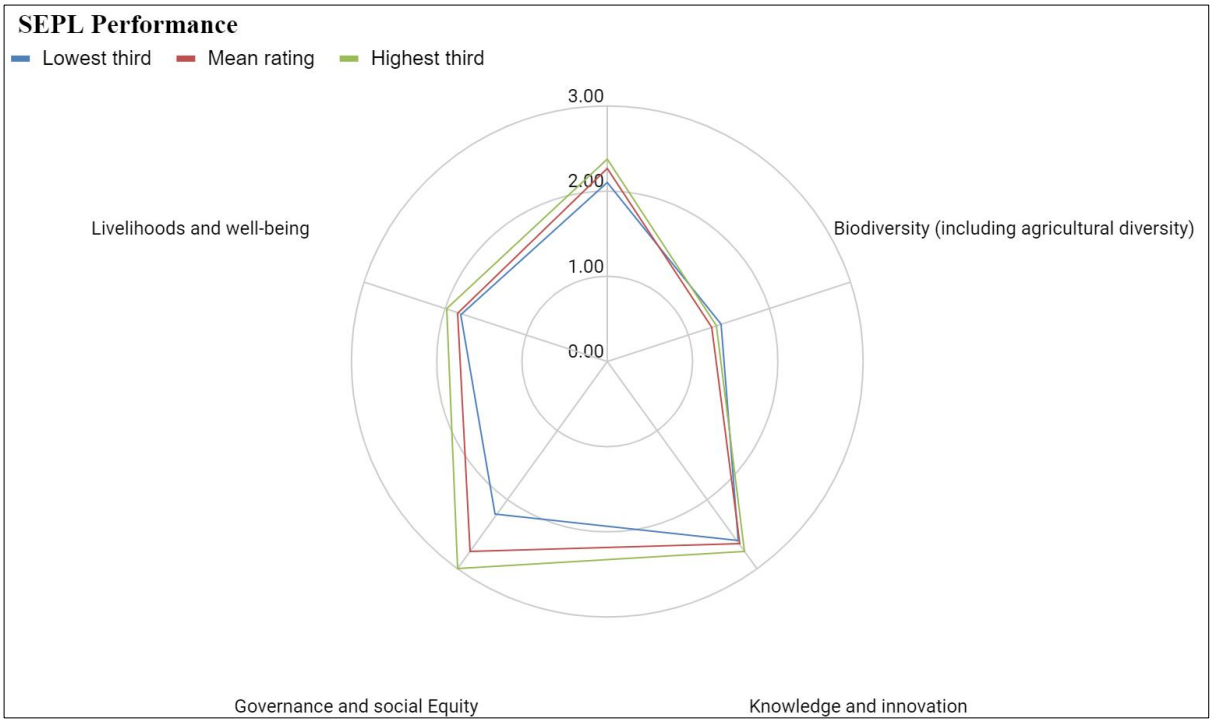

Figure A.1 : SEPL Performance

SEPLS Scoring and Trend analysis as baseline information of communities in the landscape.

The study has been conducted in Mannar and Poonakary district -including 05 DS divisions. There were 20 stakeholders including community leaders, local authorities and NGO and private institutes who are active and engaged in Mannar and Kilinochchi landscape. The sample population includes both the women and men and the age range is between 18- 70 years old.

Major category of Landscape/ seascape diversity and ecosystem protection was measured in following sub criterions.

1. Landscape/seascape diversity Is the landscape/seascape composed of diverse natural ecosystems (terrestrial and aquatic) and land uses?
2. Ecosystem protection Are their areas in the landscape or seascape where

ecosystems are protected under formal or informal forms of protection?

3. Ecological interactions between different components of the landscape/seascape Are ecological interactions between different components of the landscape or seascape considered while managing natural resources?
4. Recovery and regeneration of the landscape/seascape Do the landscape or seascape have the ability to recover and regenerate after extreme environmental shocks?

The overall score for the major category was Medium and the overall trend for the major category was No Change

The second Major category is the biodiversity of the area. It was measured using the following sub-criteria.

5. Diversity of local food system Does the community consume a diversity of locally-produced food?
6. Maintenance and use of local crop varieties and animal breeds Are different local crops, varieties, and animal breeds conserved and used in the community?
7. Sustainable management of common resources Are common resources managed sustainably?

The overall score for the major category was High and the overall trend for the major category was downward.

The third Major category of the study is Knowledge and innovation. It was measured using following sub criterions.

8. Innovation in agriculture and conservation practices Does the community

develop, improve and adopt new agricultural, fisheries, forestry, and conservation practices and/or revitalizes traditional ones to adapt to changing conditions, including climate change?

9. Traditional knowledge related to biodiversity Are local knowledge and cultural traditions related to biodiversity transmitted from elders and parents to young people in the community?
10. Documentation of biodiversity-associated knowledge Is agricultural biodiversity, and associated knowledge documented and exchanged?
11. Women's knowledge Are women's knowledge, experiences and skills recognized and respected at household, community and landscape levels?

Overall score for the major category was High and overall trend for the major category was No Change

Fourth Major category is Governance and social Equity. It was measured using following sub criterions.

12. Rights in relation to land/water and other natural resource management Does the community have customary and/or formally recognized rights over land, (seasonal) pastures, water and natural resources?
13. Community-based landscape/seascape governance Is there a multi-stakeholder landscape/seascape platform or institution able to effectively plan and manage landscape resources?
14. Social capital in the form of cooperation across the landscape/seascape Is there connection, coordination and cooperation within and between communities for the management of natural resources?
15. Social equity (including gender equity) Is access to opportunities and resources fair and equitable for all community members, including women, at household, community and landscape level?

Overall score for the major category was Very High and overall trend for the major category was No change

Final major category is Livelihoods and well-being. It was measured using following sub criterions.

16. Socio-economic infrastructure Is the socio-economic infrastructure adequate for the needs of the community?
17. Human health and environmental conditions What is the general health situation of local people also considering the prevailing environmental conditions?
18. Income diversity Are households in the community involved in a variety of sustainable, income-generating activities?
19. Biodiversity-based livelihoods Does the community develop innovative use of the local biodiversity for its livelihoods?
20. Socio-ecological mobility Are households and communities able to move around between different production activities and locations as necessary?

Overall score for the major category was Medium and overall trend for the major category was downward trend

Annexure B:

Table B.1 : Trends of the criteria

Major criteria	Trends	Mean score	Standard score
Landscape/seascape diversity and ecosystem protection	No change	2.27	→ No change (2-3)
Biodiversity (including agricultural diversity)	Downward trend	1.28	↓ Downward trend
Knowledge and innovation	No change	2.64	→ No change (2-3)
Governance and social equity	No change	2.75	→ No change (2-3)
Livelihoods and well-being	Downward trend	1.84	↓ Downward trend (1-2)

Annexure C:

https://drive.google.com/drive/u/1/folders/15es8PWxXtreeaP5-tTMLHIhEXGmbjgT9

Annexure D:

1. Kilinochchi District Level Stakeholders Meeting- Mapping workshop

Figure D.1 : Kilinochchi District Level Stakeholders Meeting- Mapping workshop

2. Mannar District Level Stakeholders Meeting- Mapping workshop

Figure D.2 : Mannar District Level Stakeholders Meeting- Mapping workshop

3. Poonakary Divisional Level workshop – Poonakary Divisional Secretariat

Figure D.3 : Poonakary Divisional Level workshop – Poonakary Divisional Secretariat

4. Nanaddan Divisional Level workshop – Nanaddan Divisional Secretariat

Figure D.4 : Nanaddan Divisional Level workshop – Nanaddan Divisional Secretariat

5. Mannar Town Divisional Level workshop – Mannar Town Divisional Secretariat

Figure D.5 : Mannar Town Divisional Level workshop – Mannar Town Divisional Secretariat

6. Manthai West Divisional Level workshop - Manthai West Divisional Secretariat

Figure D.6 : Manthai West Divisional Level workshop - Manthai West Divisional Secretariat

7. Farmer Association Workshop – Manthai West Agrarian Service Center

Figure D.7 : Farmer Association Workshop – Manthai West Agrarian Service Center

8. Fisheries Federation Workshop - Fisheries Department, Mannar

Figure D.8 : Fisheries Federation Workshop - Fisheries Department, Mannar

9. Fisheries Society FGD – Thevanpitty, Mannar

Figure D.9 : Fisheries Society FGD – Thevanpitty, Mannar

10. Youth Organization FGD – Thevanpitty, Mannar

Figure D.10 : Youth Organization FGD – Thevanpitty, Mannar

11. NGO Meetings – Mannar

Figure D.11 : NGO Meetings - Mannar

12. Children Club – Poonakary

Figure D.12 : Children Club – Poonakary

13. Women Farmer Society FGD – Veddukkadu, Poonakary

Figure D.13 : Women Farmer Society FGD – Veddukkadu, Poonakary

14. Women Rural Development Society – Paramankirai, Poonakary

Figure D.14 : Women Rural Development Society – Paramankirai


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