Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

Resilience Analysis Protocol to Sustainable Development of Delft Island in Sri Lanka

9th -11th June 2015

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ACRONYMS

BOC	Bank of Ceylon
CC&CRMD	Coast Conservation and Coastal Resource Management Dept.
CEB	Ceylon Electricity Board
DANIDA	Danish International Development Agency
DS	Divisional Secretary
FCS	Fisheries Cooperative Society
FRP	Fiber Reinforced Plastic
GA	Government Agent / District Secretary
GDP	Gross Domestic Product
GPRS	General Packet Radio Device
IOM	International Organization for Migration
ISEA	Integrated Strategic Environmental Assessment
LUPPD	Land Use Policy planning Department
MFF	Mangroves for the Future
MSME	Micro, Small and Medium Enterprise
NAQDA	National Aquaculture Development Authority
NARA	National Aquatic Resources Research and Development Agency
NORAD	Norwegian Agency for Development Cooperation
NCB	National Coordinating Body
PRA	Participatory Rural Appraisal
RAP	Resilience Analysis Protocol
RDA	Road Development Authority
RO	Reverse Osmosis
SGF	Small Grant Facility
SIDA	Swedish International Development Cooperation
UNDP	United Nations Development Program

Resilience Analysis Protocol to Sustainable Development of Delft Island Sri Lanka

EXECUTIVE SUMMARY

Delft (also known as **Neduntheevu** or **Neduntivu**) is an island in the Palk Strait, Northern Sri Lanka. The island's area is 50 km², its length is 8 km and maximum width about 6 km. Delft or “Neduntivu” is a flat island surrounded by shallow waters and beaches of coral mass and sand. The island is home to a small population of people, mostly living in quiet compounds close to the northern coast.

During the past three decades, Delft was affected by the conflict which engulfed the Jaffna peninsula and also by natural disasters. Residents were forced to rebuild their economy as well as their social and environmental assets. During the past years the government and private sector organizations have implemented various projects for infrastructure development in Delft. At present there is a great potential for development in the island. Furthermore, many requirements need to be addressed in order to implement long-term development projects.

MFF has conducted a Resilience Analysis Protocol (RAP) to understand the major issues related to both social and ecological systems in prioritized geographical areas identified by the MFF- National Coordinating Body (NCB). The main objectives of this exercise is to identify the opportunities for harnessing resources of Delft Island with the objective of exploring livelihood options and investment opportunities which could be addressed through the MFF Phase 3 Small Grant Facility.

Delft has been identified by MFF Sri Lanka National Coordinating Body as a priority intervention area, for implementation of SGF in Sri Lanka for the 2015 cycle of projects. This report has been prepared for Delft Island of the Jaffna District. Primary data were collected using different participatory methods and tools. Secondary data were collected from different institutions and from relevant publications. The major issues of the Island were identified and recommendations to address these issues and opportunities were formulated through stakeholder validation meetings.

The issues identified were mainly related to mid and long-term development of Delft Island. Therefore it is vital to conduct an in depth study on the socioeconomic status of Delft Island and provide sustainable solutions to solve the problems identified. Furthermore, it is imperative to introduce a proper land use plan based on the scientific studies prior to implementation of development projects.

1. INTRODUCTION

1.1. Background

MFF is a unique partner-led initiative to promote investment in coastal ecosystem conservation. The mission of MFF is to promote healthy coastal ecosystems through a partnership-based, people-focused, policy-relevant and investment-oriented approach. MFF has adopted mangroves as its flagship ecosystem. However, MFF embraces all coastal ecosystems, including coral reefs, estuaries, lagoons, wetlands, beaches and sea grass beds.

MFF provides a collaborative platform among the many different agencies, sectors and countries who are addressing challenges in the areas of coastal ecosystems and livelihoods. The initiative is funded by Sida, NORAD and Danida and is co-chaired by IUCN and UNDP. Current member countries include Bangladesh, Cambodia, India, Indonesia, Maldives, Myanmar, Pakistan, Seychelles, Sri Lanka, Thailand and Vietnam.

MFF attempts to build coastal community resilience by applying the ecosystem-based approach. In order to implement the Phase 3 Small Grants Facility (SGF), MFF countries are expected to undertake an in-depth resilience analysis to understand the major issues related to both social and ecological systems in their priority geographic area(s). Such analysis is needed to make the grant selection process more strategic. The grants are expected to be in line with the local realities and have tangible impacts beyond the project period. MFF Sri Lanka National Coordinating Body (NCB) recognized Delft Island as one of the priority intervention areas for implementation of SGF in Sri Lanka, for the 2015 cycle of projects. In light of this, MFF Sri Lanka Secretariat based in IUCN carried out a resilience analysis in Delft Island from the 9th – 11th June, 2015 (Annex A- Agenda of RAP).

1.2. Objectives of the Resilience Analysis

1.2.1. General Objective

Identify the opportunities and interventions to build resilience of coastal communities in the Delft Island through promoting sustainable livelihood options and investment opportunities.

1.2.2. Specific Objectives

- Identify the present conditions and vulnerabilities of the Delft Island and its people
- Find strategies and ways to promote Delft Island as a “Sustainable Green Economic Model” based on its ecosystem, biodiversity and heritage
- Develop a plan to improve the income base of the communities towards improved resilience through identified interventions while creating enabling environment to attract local and international interest

1.3. Delft Island

Delft also known as Nedunthivu is a flat island situated in the Palk Strait, to the north of Sri Lanka (figure 1). . History of the island dates back to the Mesolithic period, and evidence of continuous human settlement can be identified in Delft. Delft is the largest island located in Jaffna Peninsula, Sri Lanka which was named by the colonial Dutch rulers. Portuguese called it Illha das Vaka and renamed Delft by the Dutch after the town in Netherlands. Dutch caption in the island started in 17th century and most of the archeological monuments in this island belong to this period. According to the chronicles, both Sinhalese and Tamil rulers ruled this area.

The island possess unique natural features surrounded by the Indian Ocean, abundant with palm trees, green grasslands, beaches of coral chunks and sand, cows and wild horses, etc. Its archeological and historic sites date back past the colonial era, with pigeon houses, Dutch port and hospital, old *stupas* bring evidence of rich history of the past. The island is isolated from the peninsular of about 10 km off the mainland inherent with peace and quiet environment. The total extent of the island is 4763.06 Ha is almost an area of 50 km². Its length is 8 km and its maximum width about 6 km with a shape of oval.

The population living in the island is almost Tamil and the density is considerably low when compared to other divisions in the district. The settlements are mostly concentrated to the north and western parts of the island. The vegetation is of a semi-arid tropical type, with Palmyra palms, dry shrubs and grasses that grow on the pale Grey porous coralline soil. It is a unique feature of the island that most of the houses are fenced by coral-stones piled up or by palmyra leaves.

Figure 1 – Location of Delft Island in the Palk Bay between India and Sri Lanka (Google Maps, 2015)

1.3.1. Climate

The island is located in the dry zone of Sri Lanka and receives mean annual precipitation ranges from 696 mm to 1125 mm. It is evenly spread over the area. The north east monsoon rain (October to January) accounts for more than 90% of the annual rainfall. The temperature ranges from 26˚C to 33˚C. January is the coolest month and May is the hottest month. Relative Humidity varies from 70% during the day to 90% at night.

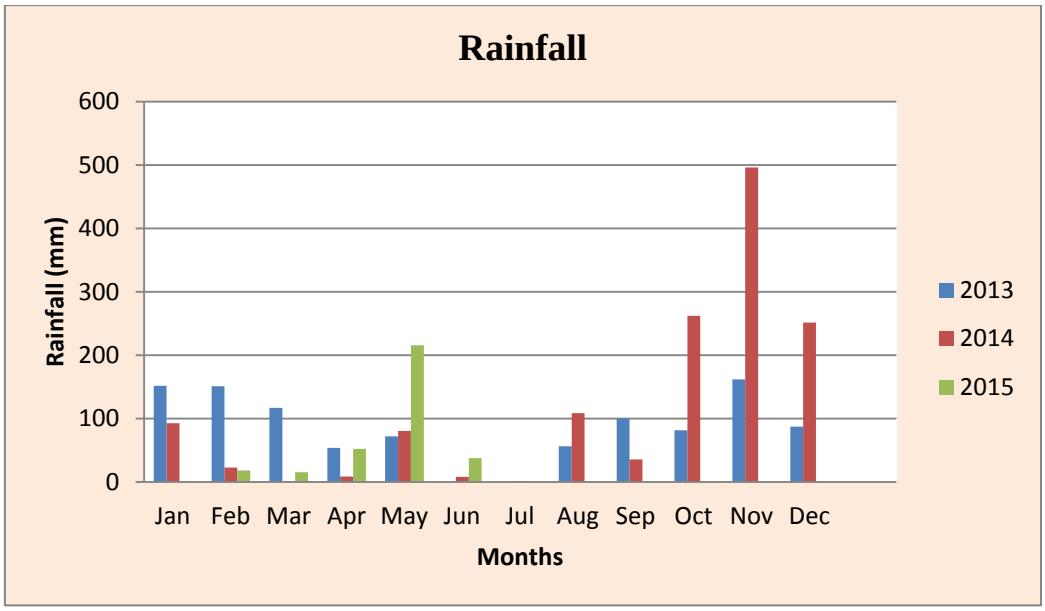


Figure 2 – Average monthly rainfall from 2013 – Jul 2015
(Source; Department of Meteorology)

1.3.2. Soil

As per the ISEA of Northern Province, the type of soil is identified as marine calcareous sediments which are also identified as Solodized Solonetz soil by the Dept of Agriculture. The Calcareous grasslands are largely available in Island. The surface soil of the island is sandy, and overlay weathered coral rock. Since the soil is not very fertile, it is most suitable for grass cultivation, paddy and salt resistant plantation. The Dept of Agriculture has classified Delft Island under the DL4 agro ecological climate zone of Sri Lanka.

1.3.3. Biodiversity

The dominant ecosystems and habitat types in the area can be listed out as follows.

1.3.3.1. Inland Biodiversity

Overall, the island features tropical semi-arid vegetation, dominated by Palmyra palms, Coconut palms, dry shrubs and grasses. There is also a giant baobab (*Adansonia digitata*) tree on the island, which is a local landmark. This tree is native to Africa, and is thought to have been introduced to Delft Island by Arabic traders. A stable population of feral ponies, introduced to Delft Island during the Portuguese period, can also be observed on the island. Habitats of Delft Island

are covered by a mosaic of diverse vegetation types, ranging from natural and semi-natural habitats, to highly anthropogenic habitats. Under terrestrial ecosystems, there are dry pasture lands, wet pasture, mix thorn scrub jungle, home gardens (properly managed/abandoned), Palmyra woodlands, coastal woodlands, coral rocks, sea shore vegetation and sandy sea shore vegetation (Goonatilake et al.,2013).

Flora and Fauna

Flowering plant species of about 209 representing diverse life forms including epiphytes (one species), shrubs (29 species), climbers (42 species), trees (67 species) and herbs (70 species) are present in the island. (Goonatilake et al., 2013).

Presence of fauna is diverse in nature since total of 146 faunal species represented by ten dragonfly species, 15 butterfly species, one amphibian species, eight reptile species, 101 bird species and 11 mammal species, recorded. In addition 37 migratory bird species (Goonatilake *et al.*,2013) were recorded. The categories of one Endangered (EN) species, seven Vulnerable (VU) species and seven Near Threatened (NT) faunal species were recorded. (Goonatilake et al., 2013 & MOE 2012).

Among the total mammals recorded, feral population of Delft ponies or wild horses (*Equus caballus*) is a dominant mammal unique to the island. These Horses were originally introduced to the island by Portuguese. A colony of the bat species also plays a major role as seed dispersal agents within the island.

1.3.3.2. Marine Biodiversity

The coast line of Delft Island contains coral reefs, coral rubble beaches, dead coral outcrops, sea weeds and sea grass, sandy beaches. The marine ecological setting in the island is unique and different to the other marine areas of the country. Water is not clear due to the high sediment level. Since the sea around the island is considerably shallow and water current movement is weak the marine habitats are unique in its nature. (Goonatilake et al.,2013).

Patchy fringing type coral reefs are visible around the coast. Mostly the dead corals present and the turbidity tolerance boulder corals and sediment are the dominating types. The branching coral types are rare in most of the places. The seaweeds such as *Sargassum* sp and *Padina* sp are predominant in reef surfaces. Mostly the sandy substrate with occasional seagrass species cover the bottom substrate in between coral patches. (Goonatilake et al.,2013).

Coastal ecosystems are being degraded with indicative evidence as drivers of severe sea erosion in two locations which has caused damage to coral reef and sea grass of the island. The impact of this to ecosystems is between medium and high in a measuring scale. The other coastal degradation is beach damage through solid waste. Indicative evidence shows solid waste in the beaches with low impact measures.

There is an indication of over fishing/harvesting along with destructive fishing by local fisherman although a monitoring system of local intervention in fishing and the impact analysis is low. Indian trawlers/poachers over fishing in the area contributing immensely to the over exploitation of marine resources have caused immense damage with soaring impacts to the area.

Since most of the population in Delft Island is fishermen, directly dependent on fishing as a livelihood; coastal ecosystem health is extremely important for the survival and resilience of this population.

There are many agencies that are interested and influence coastal resource use and management in Delft Island. They include fisheries society, fisheries federation, Divisional Secretariat, Provincial Council, Department of Fisheries, Central Environment Authority, Disaster Management Center, Coastal Conservation & Coastal Resource Management Department, Sri Lanka Navy, Department of Agrarian , United Nations Development Program (UNDP), International Union for Conservation of Nature (IUCN), Sevalanka Foundation, Department of Agriculture and Department of Animal Production and Health, etc. are some of the key stakeholders.

Marine Flora

Seaweeds and seagrasses are the most dominant marine flora found in the area. Seaweed distributions were found mainly on the dead coral patches. Filamentous seaweeds were found attached to coral boulders located on the sandy bottoms. Seagrasses were found scattered on the sandy sediment bottom between coral patches. Extensive seagrass patches are a rare site and hardly observable. The location, hydrology and the sediment type indicate the possibility of seagrass meadows occurring at the deeper areas around the Delft Island. (Goonatilake *et al.,* 2013).

Marine Fauna

The warm, shallow, sheltered, sediment rich coastal areas of the Island provide habitats for an array of invertebrate and vertebrate marine fauna. However the shallowness and the extreme temperature and water quality changes restrict the development of a high biodiversity in the area. Dead and live coral patches were the most dominant component of the marine diversity. High numbers of both ornamental and food fishes have not been observed along the shallow coastline. Sea cucumbers have been found scattered on the sandy bottom. Soft corals, sea anemones, polychaetes, sponges, tunicates, spiny lobsters and other crustaceans, mollusks and echinoderms are found in very few numbers. (Goonatilake *et al.,*2013).

1.3.4. Archaeology and Tourism

The name Delft originated as a result of Dutch colonization of the island, named after a Dutch city. Ancient temple remains can be seen in the western coast of the island that bears evidence of an early Buddhist civilization. The remains of a Portuguese colonial Fort, a dovecote (a structure intended to house pigeons or doves) and limestone walls are some of the other notable places of archaeological value present on the island.

Some of the tourist attractions in the Delft Island are Baobab tree, Banyan tree, Pigeon holes (house), Queen's tower, Adams foot, Horse stable, Old church, Ancient Buddhist *stupas*, King's tower, Cemetery, Portuguese Fort, Fresh water wells near the beach, Dry pasture lands, Growing stone, the stable and the feral ponies, thorn scrub jungle and Coral rock sea shore vegetation. The opportunity to view both the sunrise and sunset from a single site is another great attraction for tourist.

The culture and the traditional values of local communities and the unique coastal landscapes and habitats of the island add further valve for tourism.

A part of the Delft Island has been declared by the Department of Wildlife Conservation as a National Park under the Gazette notification, 1920/3 on 22nd June 2015. The main purpose to declare the National Park is to protect the Delft ponies or wild horses' population that unique only to Delft in Sri Lanka. The total land area allocated for the National Park is about 568.15Ha. This would be a potential tourist attraction in the island.

There are marine-based recreational opportunities available on the island such as snorkeling, observing wading birds and boating. The island has huge potential for archeological, culture & heritage and eco tourism, etc.

The main restrain for tourism development in Delft is difficulties in accessing the island, insufficient quality water required for tourism and lack of related infrastructure. It was learnt that RDA has started construction work of the new jetty together with passenger boat and new RO plant is being installing in addition to the RO plant managed by the SL Navy.

Inhabitants speculate that tourist arrivals to the island has increased after the end of the conflict, making Delft open for development as a booming tourist destination, with its scenic beauty and archaeological sites.

1.3.5. Livelihood

Delft is an Island associated with traditional fishing industry for many centuries and fishing is the dominating livelihood in the Island (Table 1). Agriculture practices include seasonal paddy, coconut plantations and limited number of home gardening. Apart from that, wild and natural vegetation, Palmyra, wild food plants, medicinal plants and fire wood are harvested from the natural habitat.

Paddy and home gardening are productively grown during rainy seasons of April to May (South-West monsoon) and October to December (North-East monsoon). This is due to availability of good water source due to seasonality. This area has low water availability, infertile soils and irregular rain fall, discouraging the cultivators.

Table 1 – Population by occupation
(Source; Statistical Handbook Delft -2014)

Type of Work	Year 2013
Fishermen	615
Laborers	415
Government Staff	335
Agriculture	253
Self Employment	152
Businessmen	69
Masons	45
Carpenters	22
Toddy tappers	15
Mechanics	07
Robe makers	04
NGO sector	03

1.3.5.1. Agriculture

As per the Delft Profile 2014 published by DS office of the Delft, the following activities were identified to promote the agricultural sector in Delft Island. They include; encouraging complete resettlement, improving water tanks and channels, handing over the cleared mine lands, promotion of extension activities, subsidies and grants to agricultural inputs, promotion of micro-credit facilities, supplying high quality seed varieties and new technologies, ensure good price for agriculture products, encourage to grow suitable crops for this area.

Paddy Production

Paddy cultivation is practiced only during '*maha'* season. There is a notable drop in production since 2011, probably due to water shortage in the island and emigration (Table 2).

Table 2 – Extent of Paddy cultivation during the maha season (Delft Report, 2014)

TYPE	2010	2011	2012	2013
Target(Ha)	70	40	50	48
Achievement Extend (Ha)	25	31	35	31
Total Production (MT)	34.32	43.1	24.49	23.8

Field Crop Production

The soil type in the island is favorable for specific field crops. Field crop production before the onset of the northern conflict was evident in Delft. However, even though there is a potential to grow few filed crops now (Table 3), only onion and chilies are grown in the area at present.

Table 3 – Potential Field crops and current production

(Source; Statistical Handbook Delft -2014)

Crops	2011(Mt)	2012(Mt)	2013(Mt)
Kurakkan	-	-	-
Finger Millet	-	-	-
Sorghum	-	-	-
Fox Tail Millet	-	-	-
Gingelly	-	-	-
Green Gram	-	-	-
Cowpea	-	-	-
Black Gram	-	-	-
Onions	40	50	72
Tobacco	-	-	-
Chilies	03	3.5	3.1

Perennial crops

i. ***Cashew Cultivation***

Even though the soil is suitable for cashew cultivation, it was not properly established due to unavailability of fresh water.

ii. *Palmyra plantation*

Palmyra is naturally abundant in this area, found especially in the coastal belt. Most of the parts of the Palmyra tree are used to produce various products by the local community. The seedlings (underground and tube-like) are sometimes grown for use as starchy food. Further, the growing point of the palm, pulp of the ripe fruits, young endosperm of the seeds, and toddy is used as a source of food and drink. The fibers obtained from young leaves and the petioles are often used for weaving and mat making. The leaves are also used as thatching material, to weaving baskets and mats and to construct fences. The wood and leaves are also used as a source of fuel for cooking. The trunk of the mature tree is hard and strong and is used for house construction. Palmyra palms very often provide shelter to many animals (birds, bats, rats and squirrels) and plants (orchids, figs and other epiphytes). Thick stands of Palmyra also act as good wind breaks. (Goonatilake *et al.,*2013).

iii. *Kotta Killangu (Palm seeds)*

Cultivation of sprouts of palm seeds (Kotta Killangu / Panna Killangai) is a thriving agricultural activity in Delft, as soil types and the climate favors this processing. More than 100 famers are engaged in this activity in the cultivation season. On average farmers engaged in Palm seed cultivation, harvests the produce in four months and fetch about LKR 40,000 to 60,000 sprouts per season. This is sold to Jaffna in raw or processed form.

iv. *Coconut Plantation*

East, West and Centre West parts of Delft are used for Coconut cultivation. In 1990 Coconut was cultivated in 1380 ha of the island. Economically and ecologically, coconut is a highly valued plant, especially in a small island like Delft. Coconut is used as a source of food, oil, fiber, fuel wood, timber and thatching material. Many utensils and handicrafts are made using the coconut tree. It is also a good soil improver, as burnt Coconut husks are a good source of Potash that is used as fertilizer in vegetable plots. The husks also make valuable mulch for moisture conservation during the dry season and help to suppress weeds. The fibrous root system of the Coconut palm has good soil binding properties, minimizing erosion. Many pollinator insects depend on Coconut flowers as a source of food.

v. Forest Resources

East and South of Delft are rich in shrub vegetation. Food plants and wild food plants growing in different habitats of the island are harvested for human consumption and for medicinal purposes. They play an important role in the household food availability and nutrition. Food plants are an inexpensive and easy food source, often requiring low labour input. Sometimes they are considered a major source of food, especially during periods of food shortage. In some cases, wild food plants have economic value in the respective local markets. However, very little attention is given to wild food plants by the officials in Delft.

Some of the commonly used wild food plants include *Acalypha indica* (kuppameniya), *Aerva lanata* (Pol Pala*), Borassus flabellifer* (Tal), *Canthium coromandelicum* (Kara), *Carissa spinarum* (Heen Karamba)*), Limonia acidissima* (Divul), *Madhuca longifolia* (Mi), *Manilkara hexandra* (Palu), *Muntingia calabura* (jam), *Tamarindus indica* (Siyambala), *Wattakaka volubilis* (Aguna Kola) and *Ziziphus mauritiana* (Masan).

vi. *Home Gardening*

Due to the scarcity of water and unfertile soil conditions home gardening is not that popular in the Island. Even though there are well maintained home gardens located in the southern part of the island. Coconut found to be the dominant specie in almost all the home gardens which exist as an extension of home gardens. Some of the other common tree and shrub species in the home gardens include *Borassus flabellifer, Carica papaya, Casalpinia pulcherrima, Chukrasia tabularis, Citrus aurantifolia, Cocos nucifera, Codiaeum variagatum, Erythrina variegate, Gliricidia sepium, Hibiscus rosa-sinensis, Lannea coromandelica, Mangifera indica, Moringa oleifera, Musa x.paradisiaca, Plumeria obtuse, Sesbania grandiflora, Tecoma stans, Thespesia populnea and Thevetia peruviana*. (Goonatilake *et al.,*2013).

Apart from providing the fruits and vegetables, etc home gardens plays an important role to enrich biodiversity of the island through providing animals with feeding and nesting sites and helps to reduce the pressure on natural vegetation cover with a closed canopy vegetation system, functions as a valuable land cover and thereby contributes to maintaining good microclimatic conditions, conservation of soil and ground vegetation. It sets the right conditions for diverse livelihoods; mainly animal husbandry (goat, cattle and poultry) and coconut based income generation activities.

vii. *Abandoned home gardens*

There are many homesteads abandoned during the war that lasted nearly 3 decades in the region. They also have similar floristic structure and composition as managed home gardens except that lower vegetation layers are enriched with weedy and wild plants like *Cassia tora, Cyperus compressus, Desmodium triflorum, Euphorbia hirta, Flueggea leucopyrus, Sida acuta, Sporobolus maderaspatanus, Sporobolus spicatus* and *Toddalia asiatica*. (Goonatilake et al*.,* 2013).

The unmanaged situation has made it possible for *Ficus benghalensisis* (Maha Nuga) and *Ficus amplissima* two semi-parasitic trees to thrive on these lands. If this unmanaged condition continues for years to come, the vegetation system will be dominated by Palmyra trees and the semi-parasitic *Ficus* species, as these plants are not subjected to herbivore pressure. (Goonatilake et al.,2013).

1.3.5.2. Livestock

Engaging in Livestock usually is an important livelihood in the local subsistence economy. Animals graze in dry and wet pasture lands, home gardens, sea shore habitats and scrub jungles for food. Cattle and goats are the main types of livestock in the island (Table 4). Scarcity of water and pasture has hindered cattle farming in the area. The supply of goats and cattle to the mainland was one of the livelihoods in Delft.

However, due to increased theft of cattle this was banned. Almost all the households on the island have a few cattle. However, it has been declared that the environment of Delft is not suitable for rearing of Buffaloes.

Table 4 – Livestock population as at 2014
(source; Statistical Handbook Delft -2014)

Live stock	Numbers
Cattle	3720
Goat	2850
Sheep (Jaffna Local)	88
Hen	2850
Farm Birds	150

1.3.5.3. Fisheries

More than 15% of the population (525 fishermen) in the island is directly employed in this sector. Delft North the center for all the fishing activities in the island and there are nearly 4 landing sites (anchor points) along the northern coast of Delft. The main coastal and marine foods can be noted as coastal fishery, shellfish such as lobsters, crabs, shrimps and low salt dry fish.

The fishermen practice normal fishing technologies and they do not have access to modern equipment including GPS technology for fishing. All the fish harvested by the fishermen is purchased by the Fisheries Cooperative Society (FCS), which has a chiller (cool) room (unserviceable and dysfunctional as at now), and transport facilities.

The members of the FCS are benefited from the society through several extensions services such as supply of fishing nets and gear, kerosene, savings and credit facilities.

The FCS also owns and operates a passenger vessel that is used to transport passengers, goods and fish into the mainland. The FCS is involved in the development of roads and constructing houses in Delft too.

FCS has the necessary organizational capability to influence the political authorities to improve the infrastructure of the Island. On the request of the FCS, the government has aided the construction of 5 small anchor points and a fishery harbor in the Delft Island. Furthermore, FCS in collaboration with NADA aims to establish an inland fishing operation using the existing ponds in the area. The FCS has also shown their willingness to get involved with the proposed tourism development in the island.

Strong Cooperative societies have been formed by fisherman and they have been protected to a certain extent form the society with respect to input sourcing and marketing of fish (Table 5).

Table 5 – Details of Co-operative societies
(Source; Statistical Handbook Delft -2014)

Name of Co-operative Society	No. of members	GN Division
Uthathyu Fisherman Co operative Society	94	Delft Centre
Allaiyosai Fisherman Co operative Society	123	Delft Center West
Allaikadal Fisherman Co operative Society	141	Delft Center
Vallampuri Fisherman Co operative Society	97	Delft Center East
Kulanthaijesu Fisherman Co operative Society	76	Delft East
Fisherman Co operative Society; Federation	531	Delft

Fishing gear used for fishing are *Ma-Del* and small fishing boats (plastic boat – catamarans). In addition, the fishing fleet of Delft Island comprises of small FRP boats of various size classes and traditional fishing crafts. There is a one craft belonging to 28-32' size class, eighty 17-23' FRP boats and forty five non-motorized log rafts operating from the Island.

The main fishing grounds of these crafts are shallow coastal waters around the Island, Palk bay and Palk Strait. They use poles and lines, cast nets and gill nets as their fishing gear. However, there were no signs of Delft Island fishing groups using single or pair trawling methods. Their main target fishing populations are shrimps, lobsters, sea cucumbers, pelagic and demersal fish species. There is no evidence of using illegal fishing gear in and around the island; as many strong fishing societies exist for monitoring such calamities. Highly productive period for fishing covers the months from March to July. Fish catch is affected due to windy climate conditions prevailing during the months from September to February.

There is evidence of coastal ecosystems being degraded and severe sea erosion in two places causing damage to the coral reef and seagrass. The other coastal degradation is through damages caused by solid waste. There is no indication of over fishing/harvesting or destructive fishing by local fisherman but, there is a need for proper studies to be carried out in the area related to this aspect.

Over fishing by Indian trawlers/poachers in around Delft shows exploitation causing severe impact on marine habitats. Complaints made by people engaged in the fishing industry indicate that regular encroachment of their traditional fishing grounds by the Indian fishing trawlers has increased after the end of the war.

Livelihood improvements of at least 30% in income terms among targeted coastal resource dependent households, which benefit both men and women, and particularly female-headed households.

The MFF Cycle 4 Small Grant Facility project which was implemented in the Delft Island (MFF/135) assisted 40 women of fisher families in preparation of dry fish with low salt content using a hygienic method.

The project was completed on 31 May 2015. The produce is purchased by Jaffna Dry fish businessmen who travel to Delft Island. Attempts by the grantee to link with southern market have not been successful due to logistic problems – about 8 hour drive to Colombo.

Though the project aimed to increase the income of the 40 beneficiary families by 60%, the average increase recorded is 31%; range 19%-52%.

1.3.5.4. Industries

The garment factory run by the Sri Lanka Navy to produce Navy uniforms is the only major industrial employment generating venture in the island. Started in August 2011, the factory continues to supply jobs for nearly 50 youth in the delft island. Delft was once famous for its handloom and coir industries especially palmyra based products.

1.3.6. Land use

1.3.6.1. Existing land use

A dominant area of land is occupied by grass lands 2594.84 ha (Table 5, Figure 3). The total extent of the Home gardens is at 981.57 ha. Part of the remaining area is Scrub Lands 652.39 ha, Palmyra 166.78 Ha, Natural Ponds 185.84 ha, Rock Out Crops 46.61 ha and Field Crops 27.40 Ha (Statistical handbook, 2014).

Table 6 – Major land uses and their extents (LUPPD, 2015)

Land use	Extent (Ha)	Percentage
Home Garden	981.57	20.61
Paddy	24.42	0.51
Coconut	11.71	0.25
Field Crops	27.40	0.58
Palmyra	166.78	3.50
Other	9.85	0.21
Other Service Centers	3.90	0.08
Recreational	6.04	0.13
Scrub Lands	652.39	13.70
Grass Lands	2594.84	54.48
Marshy Lands	26.40	0.55
Natural Ponds	185.84	3.90
Rock Out Crops	46.61	0.98
Sand Areas	25.31	0.53
Total	**4763.06**	**100**

1.3.7. Administration

The island is administratively managed under the Delft Divisional Secretary Division. There are total 6 GN divisions functioning under the Divisional Secretariat namely J1 (Delft West), J2 (Delft South), J3 (Delft Centre) J4 (Delft Center East), J5 (Delft East) and J6 (Delft Center West) (Figure 4). The Divisional Secretariat is established in a newly constructed administrative building with necessary facilities in the Delft Centre GN division. Some of the administrative services are provided through the District Secretariat and Divisional Secretary office based in Kayts due to lack of sufficient staff. Further the conflict that prevailed in the North has paralyzed the institutional support services to the island. Pradeshiya Sabha (Delft local government) established in 2011 following the elections held after cessation of conflicts in 2008. The local government consists of nine (9) members.

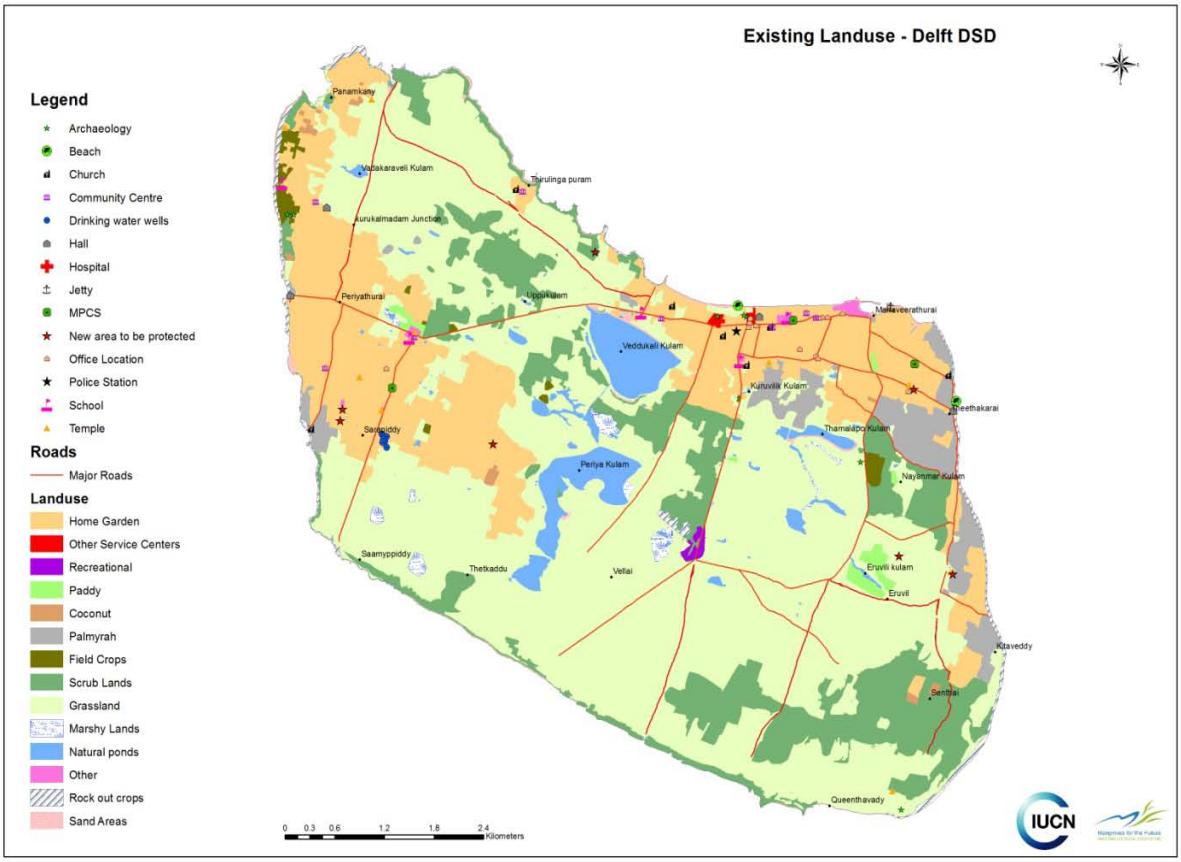


Figure 3 – Present land use of Delft Island (Source- modified LUPPD land use 1:10000)

Figure 4 – GS Divisions of Delft Island (IUCN Sri Lanka, 2013).

1.3.8. Population

The total population of the island is 4502 persons belonging to 1309 families (Divisional Secretariat Delft, 2014). It consists of 2190 (49%) males and 2312 (51%) females (Table 7).

1.3.8.1. Population by Gender

Majority of men play a productive role as bread winner of the family and participate in community activities. The position of both men and women are equally balanced with regard to decision making on social and economic affairs. The women's role is mainly confined to household activities, assisting men in fishing and agriculture etc.

At present, role of women being self-reliant is evident. Women are involved in maintaining home gardens, animal husbandry and preparation of dry fish. Some are employed at a garment factory and a few others represent themselves in village development societies (Woman Rural Development Society) and contribute for local decision making.

Majority of women are not overburdened with household activities since they request opportunities to engage with productive work to increase the family income. There are no significant terms or hindrance for women to access and control resources such as land ownership and obtaining loans from a financial institute.

Table 7 – Population of divisions by gender

(Source; Statistical Handbook Delft -2014)

S/n	G.N Division	G.N Division Number	No of Villages	No. of Families	Total Population	Male	Female
1	Delft West	J/1	4	240	882	439	443
2	Delft South	J/2	7	169	509	234	275
3	Delft Centre West	J/3	5	302	1028	487	541
4	Delft Centre	J/4	3	203	679	324	355
5	Delft Centre East	J/5	2	195	710	322	388
6	Delft East	J/6	4	205	694	384	310
	Total	**06**	**25**	**1309**	**4502**	**2190**	**2312**

1.3.8.2. Population by Age

Among the populations grouped, the highest population (27.8 %) was recorded under the age group of 25-44 years (Table 8). However the lowest population (6.1%) was recorded under the group of 1-4 years.

Table 8 – Population by age

(Source; Statistical Handbook Delft -2014)

No	G.N Division	Age Group								
		All Ages	1-4 Years	5-9 Years	10-14 Years	15-19 Years	20-24 Years	25-44 Years	45-64 Years	65 Over
1	Delft West	882	72	78	74	84	78	200	165	131
2	Delft South	506	28	38	34	47	33	155	110	64
3	Delft Centre West	1025	56	76	65	71	69	322	290	79
4	Delft Centre	690	48	40	56	45	34	175	138	143
5	Delft Centre East	713	30	31	61	57	79	220	156	76
6	Delft East	692	41	49	51	82	74	180	134	83
Total		**4502**	**275**	**312**	**341**	**386**	**367**	**1252**	**993**	**576**
Percentage			**6.11**	**6.93**	**7.57**	**8.57**	**8.15**	**27.81**	**22.06**	**12.79**

1.3.8.3. Population by Occupation

Eleven employment categories have been identified in the division (Figure 5). Majority of the families are engaging in fishing. Secondly, are people engaged in labour work, which accounts to 415. The number of families engaged in government sector jobs is 335. The number of families belonging to the agriculture sector is 253. 152 families were engaged in self employment which includes production of milk, bread production, mechanics, beauticians and painters. There were 69 recorded entrepreneurial families engaging in Businesses.

Furthermore, it is evident (Figure 5) that 45 families as masons, 22 families as carpenters, 15 families as toddy tappers, 07 families as mechanics, 04 families as robe makers and 03 families engaged in NGOs are present in Delft.

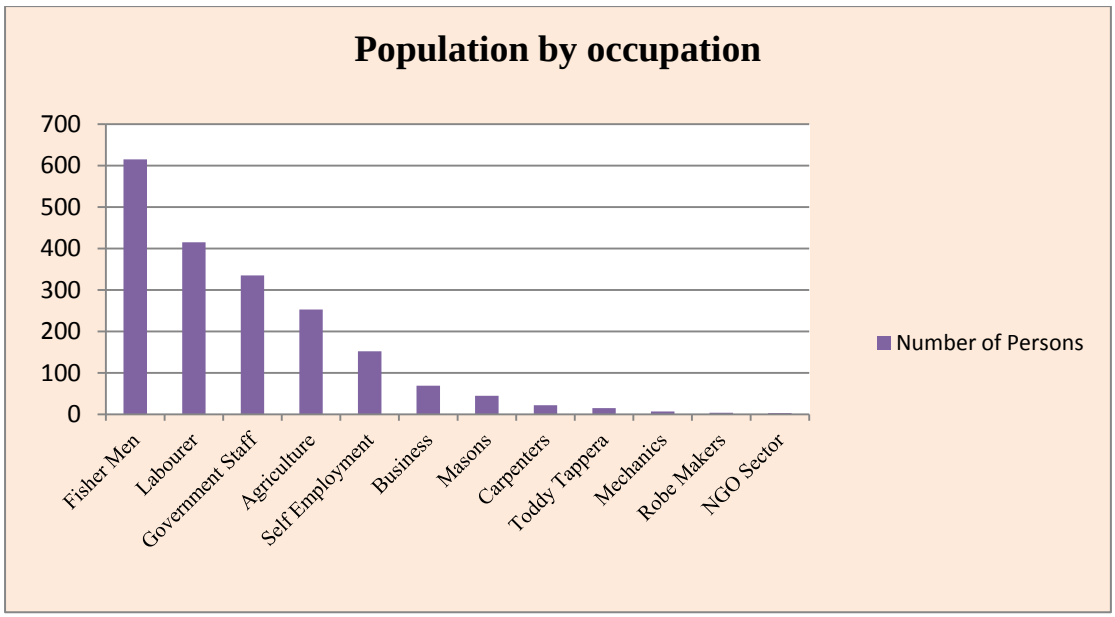


Figure 5 – Population by occupation

1.3.9. Housing

As per a survey carried out by DS Delft, 2013 only 1239 houses were available to accommodate 1309 families. The remaining families live sharing with other families.

1.3.9.1. Type of Houses

Three types of houses, i.e. permanent, semi permanent and improvised houses are available in the island. Number of permanent houses are 1031. There are 41 semi-permanent and 167 temporary houses with poor living conditions exposed to natural disaster and vulnerable to socioeconomic problems (Table 9).

Table 9 – Type of houses
(Source; Statistical Handbook Delft -2014)

No.	G.N. Division	Permanent	House Hold	Semi Permanent	House Hold	Improvised	House Hold	Total Families
1	Delft West	189	197	04	04	10	10	235
2	Delft South	123	131	12	12	28	28	169
3	Delft Centre West	226	241	07	07	51	51	302
4	Delft Centre	177	184	06	06	06	06	203
5	Delft Centre East	169	181	10	10	17	17	195
6	Delft East	147	167	02	02	55	55	205
Total		**1031**	**1101**	**41**	**41**	**167**	**167**	**1309**

Presently 208 families live in temporary and improvised houses. No housing projects have been implemented during last two years. Assistance is required to improve the housing conditions and sanitary facilities. Sea erosion is a recurrent hazard in Delft Island leaving households located close to the sea displaced during monsoons and rough seas.

Electricity is provided by the CEB using a large generator. 502 families use electricity and the rest use kerosene and other lighting sources. Assistance is required to improve their housing conditions. 501 families are entitled for Government's Samurdhi grant scheme.

1.3.10. Water

Delft Divisional Secretariat Division gets very low rainfall and most of the villages have saline water. There are 32 small ponds and a few large ponds (Table 10). During the dry season the ponds dry out while during rainy seasons, floods destroy cultivation area and sea water enters the ponds. In order to prevent this situation the Provincial Agrarian Department has constructed a few irrigation structures.

Most of the villages have insufficient drinking water. Only Sarappiddy village has good drinking water and all the neighboring villages get drinking water from Sarappiddy. The Sri Lanka Navy provides drinking water after filtering using RO technology. There is a threat to the limited water supply of Sarappiddy due to drying out, and also due to the issue of supply of water not being able to meet its demand.

There are no tube wells in the island due to difficulties in constructing them caused by unfavorable soil conditions. As measures to solve the above problem relating to the supply of water, rain water harvesting and construction of ponds have been proposed in the livelihood intervention section.

Table 10 – Water sources – Water Tanks/Ponds
(source; Statistical Handbook Delft -2014)

S/N. of G.S Division	Name of Kulam (pond)
J/01	Veddukulam, Paykalikulam, Neluvinikulam, Neddunkulam, Kalaveraikulam, Angalapeeaikulam, Kakkaiyarkulam Thoddichchiyakulam, Koddanamtheravikulam, poonaisethakulam
J/02	Maneyamkundukkulam, Saddykulam,Vannankulam, periyakaly.
J/03	Veddukkaly, Kuthiraikulam, Nallathanneykulam, Sapperaleykulam, Kunchukkulam
J/04	Uppootharaikulam, Sallykulam, Ramanvilakkulam, KanthanKulam.
J/05	Thamalappukulam, Neyaikulam, Kuthiraikulam, Sannankulam.
J/06	Irawanddakulam, Thondankulam, Nayanmarkulam, SokkarKulam, Sinnakkulam.

1.3.11. Utilities and Community Facilities

1.3.11.1. Transport

Delft Island can be accessed from mainland through the ferry service starting at the Kurukattuwan Jetty. Apart from the bus service, there are limited numbers of vehicles inside the island. The usual means of transport is via mini Lorries and tractors (Table 11). Bullock carts are used by the people to carry goods within the island. The access roads and internal network of roads within the island are in good condition. The main road is about 7-8 kilometers long and has a tarred surface. The road ends at Koddaikadu village located about 9 kilometers away from the main jetty.

Table 11 – Number of motor vehicles registered
(source; Statistical Handbook Delft -2014)

G.N. Division	Cars	Cycle & Motor Cycle	Three Wheeler	Lorries	Dual Purpose	Ambulance	Govt. Vehicle	Tractor	Total
Total	01	219	08	02	10	01	03	22	266

The ferries are owned either by the RDA or private operators. RDA operates two ferries during the weekdays with not more than one private ferry being allowed to carry passengers on a given weekday. They are operated on a time table managed by the SL Navy. RDA owned ferries are used exclusively for passenger transport whilst the private ferries are engaged in passenger and goods transport. RDA manned ferries provide a free services whereas the private ferries charge a nominal fee.

Ferry service merely manages to meet the passenger demands in terms of quantity in a satisfactory manner, the quality of the service provided is poor, due to the little attention is paid to passenger comfort or safety (Figure 6). The boats are old and their interior is quite unpleasant. Further traveling time between Delft to Main Island is more than 45 minutes where community request intervention to reduce the traveling time. There is a vital need to upgrade the quality and safety aspects of the ferry service to the Delft Island. During the RAP and validation meetings it was highly recommend that solutions to sea transport as an important sector of intervention.

Figure 6 – Delft ferry service carrying more than 100 passengers per journey

1.3.11.2. Credit Facilities

A branch office of the Bank of Ceylon, Delft Cooperative Society, Fishery co-operative society and a few farmers' organizations are some of the organized and institutionalized thrift and credit institutions that exist in Delft. These institutions have been operating for a long time in Delft and have faced difficult situations during the conflict period. The BOC branch in Delft, which was established only in the year 2010, already has a clientele of nearly 2000 account holders. In addition to the savings accounts that it is maintained for the customers, BOC also provides loans. The Delft Cooperative society started operating in the island in the year 1972, under the Cooperative Act.

1.3.12. Health and Sanitation

Health facilities to the people in Delft are provided through a Divisional Hospital (Type C) managed by the government equipped with 29 beds. Other than the outpatient department (OPD) it has a male ward, a female ward and a maternity ward. The OPD treats about 50-100 patients a day for common diseases. Most of the patients having major complications including all maternity cases are referred to the hospitals in Kayts.

An ambulance service, including both a vehicle as well as an ambulance ferry (boat) is available to carry passengers to the Jetty and from the Jetty to mainland. Clinics are also held regularly which targets pregnant mothers, babies and diabetic patients. The dental unit is poorly equipped with an old fashioned dental chair and very little facilities.

Table 12 –Types of lavatory facilities in Delft
(source; Statistical Handbook Delft -2014)

No	GN Division	Type of Toilet					
		Flush Toilet		Water seal		Pit	
		Individual	Shared	Individual	Shared	Individual	Shared
1	West	1	0	201	0	7	0
2	South	0	0	121	0	7	0
3	Center West	0	0	272	3	6	0
4	Center	0	0	147	0	5	0
5	Center East	1	0	138	0	4	0
6	East	2	0	149	0	7	0
Total		**4**	**0**	**1028**	**3**	**36**	**0**

Even though majority of families residing in Delft Island use water seal toilets, the number of pit type toilets are limited (Table 12). The condition of all types of toilets is below acceptable standards; therefore hygiene practices should be improved through community awareness programs.

1.3.13. Education

Education in Delft was facilitated through 08 government schools. According to Divisional secretary data, no identified private schools and National schools were present. The distribution of schools by the respective GN divisions is given in the table below (Table 13).

Table 13 – Distribution of schools
(source; Statistical Handbook Delft -2014)

No.	G.N. Division	Total No. of Schools	
		2012	2013
1	Delft West (J/1)	01	01
2	Delft South (J/2)	02	02
3	Delft Centre West (J/3)	01	01
4	Delft Centre (J/4)	02	02
5	Delft East (J/6)	02	02

2. METHODOLOGY

The Resilience Analysis Protocol of Delft Island was conducted in four phases as discussed below;

2.1. Phase 1 – Collection of Baseline Information (Primary and Secondary sources)

Primary data was collected from the villagers mainly by using Participatory Rural Appraisal (PRA) method. PRA was used to identify the issues and development needs of the villagers as well as their social networks with Community Development Societies (Cooperative Society, Fishermen's Society and Women's Rural Development Society), government and NGO's. Furthermore, the core team conducted interviews with Divisional Secretary Delft, in order to familiarize themselves with the area of interest and gather visual inputs.

Figure 7 – Discussion with the Divisional Secretary of the Delft Island and key Govt. staff prior to PRA to better understand the Govt. policy and expectations

In addition, other tools of the participatory approach such as community interviews, participatory mapping, transect walk, historical timelines and Venn diagrams were also used when and where necessary.

Baseline data was collected from reports and maps (1:10000 survey maps of the LUPPD). Secondary data was collected through published documents (list of reference) and from the Divisional Secretary, Delft Island.

2.2. Phase 2 – Synthesis of Baseline Information

The PRA exercise of the RAP was conducted (Figure 8), at the Divisional Secretariat in Delft island on the 9th of June, 2015, with the participation of the Divisional Secretary and his officers, Grama Niladharies, development and social organizations, NGOs, CBOs, religious leaders, groups with different livelihoods, SL Navy and the Delft Fisheries Federation etc (Annex B - participant list of PRA)

Following sectors were given priority for community mapping (Figure 9) and decision making through community participatory mapping exercises (Annex C). Subsequently the identified issues/ needs were ranked by the consensus of majority of people involved in the RAP process. The sectors analyzed were as follows;

- Tourism / Heritage / Wildlife
- Agriculture
- Industries
- Livestock and farming
- Coastal resources

Figure 8 – Divisional Secretary, Delft addressing the participants of the PRA exercise

Figure 9 – Community member explaining the proposed sectoral plans

2.3. Phase 3 - Transect Walk

The facilitators and the community members were given the opportunity to walk across the Island to acquire a realistic picture of its land use, vulnerabilities and the resources available (Figure 10). The RAP core team together with selected representatives from the community visited the locations/areas identified at the PRA.

Figure 10 – Core team engaged in the Transect Walk

2.4. Phase 4 – Consultation and Validation

1. Meeting at Divisional level

Consultative and validation meetings were conducted with the divisional officers with respect to the key issues and priority areas that were identified through Phase 1 and 2.

2. Validation at District level

The key issues and priority areas identified through Phase 1 and 2, together with the comments and decisions made during the divisional meeting were presented and discussed for potential intervention (Figure 11). Furthermore, recent updates of current development initiatives and conservation programs were gathered. Concurrences arrived to indicate appropriate projects in line with identified key thrust areas.

Figure 11 – District Secretary together with district officers at a discussion with the core team validation meeting

3. Validation at Provincial level

Inputs assembled during the previous meetings and phases were discussed and validated further on consultation with the Minister of Agriculture and Agrarian Services, Animal Husbandry, Irrigation and Environment of the Northern Province and related provincial officers. Consensus to work on key trust areas identified during RAP was received (Figure 12).

Figure 12 – Discussion with Hon. Minister of Environment of Northern Province during the RAP validation meetings

3. STRATEGIC INTERVENTIONS

Under this section, proposed needs of the community were identified and ranked accordingly. Furthermore, potential improvements for the respective sectors were proposed in an attempt to increase the resilience of the people of Delft Island.

During the RAP exercise, three key thrust areas were identified for future interventions. They are as follows

1. Agriculture based interventions
2. Tourism based interventions
3. Improvements to support services (water, transport, marketing, technology etc.)

The levels of interventions identified were twofold at policy and sector levels.

a. Policy level

At policy level, water and transportation are the main areas identified, which need policy level programs associated with national and provincial governments. These two areas need huge investments to develop and high level policy intervention for managing and operational purposes.

Addressing drinking water (Reverse osmosis and simple evaporative methods), water for irrigation (restoration of inland water system) and transport (attractive and reliable transport services between mainland and the Delft Island); these tasks need regional/national level intervention in the aspects of technique and investment.

b. Sector level

The sectors identified as potential areas for intervention during the RAP exercise were Agriculture and Tourism. Apart from the government funded development projects, MFF programs have potential to provide technical and financial assistance to implement medium and small scale community resilience programs. The private sector has been identified as potential partner to invest for development opportunities identified in Delft.

3.1. Proposed Priority Actions

Through community consultations a list of activities were recorded and prioritized according to the state of importance, which was later validated by the respective governing bodies (Table 14).

Table 14 – Priority actions identified through community consultations

Community Needs	Ranks	Decisions taken / Actions proposed
Coastal erosion	**1**	Structural mitigations by CC&CRMD in collaboration with people
Sea Transport	**2**	Introduction of high speed passenger boats Renovation of cold storage boats for fish transport
Home gardens	**3**	Promote Compost mix with Coconut husks Introduce Solar water pumping Use tank sediments as top soil layer for home gardening
Palmyra Products	**4**	Efficient extraction of Sap (ITI technology) Introduction of processing methods for juggary, jam, cordial, Kotta kilan (Root of the seedling) Introduce Packing and market links
Sewing	**5**	Small garment industry of 5 machines with building at 2 GN divisions
Drinking water	**6**	Promote simple methods of drinking water collection Rain water harvesting Water Board project
New technology Fishing	**7**	GPRS shipping, linked with NARA program
Tourism development	**8**	Introduce sustainable ecotourism

3.2. Livelihood

The resource potential of the Island, its livelihood options and investment opportunities were researched and documented to support the community, in an attempt to engage them in meaningful livelihood activities and exert pressure on development partners to make necessary facilitations to establish a conducive business environment.

The livelihood assessment is a major component of the RAP and was focused to achieve four aims mentioned below;

a. To study the demography and resources available
b. To determine the livelihood options and investment opportunities
c. To determine direct and indirect employment opportunities from MSME sector
d. To suggest mechanisms to strengthen the MSME Sector

3.2.1. Tourism/Heritage/Wildlife

As revealed during the study, there are opportunities for developing Tourism in the area by taking the advantageous of Coast, Beaches, Heritage sites of the island and wildlife.

Issues that hinder the processes of harnessing the opportunities in tourism / heritage/ and wildlife and proposed solutions were discussed. It was identified that there are opportunities to promote tourism in the Island which are as follows-

Opportunities for Interventions

The present tourism market consists of diverse groups from various cultures. In this context tourists demand Home stay facilities, Natural Huts & resorts, Coastal Tourist activities, Wildlife, Swimming, Water sports, Recreational fishing, Agro tourism, Traditional food culture, Organic food, Boat tours, Eco tourism, and Archeological sites, etc. Tourists interested in ecological locations as they prefer to be away from tedious urban life styles. Calm and quiet sea beaches welcome water sports activities. Since delft is an island enriched with unique biodiversity and rural culture, island has great potential for tourism.

Issue

In promoting the above mentioned opportunities there is a need of capital. The tourist attraction sites should be rehabilitated, kept clean, neat and tidy. Inadequate knowledge among the population about tourism is an issue. No visibility board, no guide service, no brochures and information, no promotion and publicity are some of the other constrains for tourism. Sand mining is a disadvantageous when promoting coastal tourism activities. Inadequate fresh water and access to the island are main issues of Delft.

Recommended Solutions

A comprehensive study has to be carried out and the need to prepare an integrated tourism development master plan for the island is predictable. Extra care should be executed in harnessing the tourism potential of the Island as any tourism development intervention should not exceed the environmental carrying capacity of the Island; as the Island has to absorb the threats caused due to such interventions (effluents; solid waste, sewerage & waste water) and strike a balance between effluents and there degradation. Hence, rather than promoting tourism activities for long stay in the Island, it is advisable to promote short stay opportunities and to maintain a flow of tourists.

There is a need to identify areas suitable for different tourism activities such as Home stay, Natural Huts & resorts, Coastal Tourism, Wildlife, Swimming, Water sports, Recreational fishing, Agro tourism, Traditional food culture, Organic food, Boat tours, Eco tourism, and Archaeological sites (Appendix “E”) etc. Those sites should be marketed in government and national level to attract potential investors and also promote the destination among the private sector to secure investments.

Since the island is to be promoted as a green island, introduction of renewable energy sources such as wind power, solar power, bio gas etc. need to be promoted and popularized immediately.

Community awareness about tourism is of paramount importance before embarking on a tourism development project in the Island. Programs should be carried out with the support of government and non-governmental organizations and build awareness within communities about tourism and capacity building.

Training of the local unemployed youth as English-speaking guides, or in the skills required to undertake small enterprises of traditional products that will have tourism attraction.

Developing the existing archaeological sites with patronage from the Department of Archaeology has to be executed and establishment of a museum on the island to preserve the natural and cultural history of Delft is important in order to display the cultural monuments discovered during the excavations. This would be another potential tourism attraction for the Island. It also important to developed archaeological site interpretation guide in all three languages.

Top level discussions and interventions need to be taken for accessing restricted coastal areas that has potential for tourism activities.

Tourists are expected to attract towards the local transportation systems (Bullock and Horse cart), model home gardens, home stay facilities, natural huts, cabanas and small resorts, horse riding etc. Therefore these activities should be promoted with a unique Delft label.

There are lots of pilgrims visiting the historic Buddhist temple Nagadeepa an island in close proximity to Delft. There should be a strategy to attract those pilgrims towards Delft. Ferry service connecting Nagadeepa and Delft Island will motivate these pilgrims to stop at the Island. A luxury ferry service should be introduced for the convenience of local and foreign tourists.

Local visitors are attracted to the wild horses and archaeological sites. They also contribute to the economy by purchasing Palmyra products, dry fish etc. Those products must be given publicity and marketed at a dedicated centre in the Island.

As recommended in the Strategic Environmental Assessment (SEA) for Northern Province, part of Delft Island to be declared and maintained as a National Park. Special attention to be given to develop the areas identified for snorkeling, observing wading birds, boating and surfing.

As per the former Governor G.A. Chandrasri, government is planning to introduce a mini-golf ground and a mini race course which is a suitable intervention.

Necessary to introduce set of guidelines for tourism development and management especially for the environment protection and infrastructure development.

Establishment of a central body comprise with community is important to plan, manage and monitor the tourism based activities. Development of ecotourism and nature-based tourism initiatives on the island that include the development of nature trails, the development nature guides and field guides, and the training of tourist guides, to support such initiatives. In conclusion the need for a comprehensive and holistic eco-tourism development plan for Delft is evident.

Identify an attractive theme to market Delft Island for visitors eg. “Most authentic Dutch coastal town in Asia” and develop a central website such as "www.visitdelft.com" are some potential steps to promote tourism in Delft.

3.2.2. Agriculture

The Island for last 30 years has not practiced commercial scale agricultural practices. Hence, it is appropriate to promote organic farming in the Island. Promoting organic farming is complementary to promotion of eco-tourism.

Furthermore, the Delft Profile 2014 indicates the following with regard to increase of productivity of agricultural lands (Table 15).

Table 15 – Analysis for improving productivity of Agricultural land

Problems	Potential Solution
Low Yield	Soil testing Introduce new techniques Introduce high yielding short term varieties Introduce seeds of better qualities Repair the water reservoirs
Low water availability	Improve/rehabilitate existing tanks Introduce Drip irrigation Sprinkler irrigation Increase catchment area Dig new wells
Lack of marketing facilities	Improve marketing facilities Fix Standard price to agriculture products Introduce value adding process

Opportunities for Interventions

There is an opportunity to promote organic, traditional Paddy farming in the area during rainy season.

Issues

Soil is not very fertile for plantation. High cost of land preparation (Un-availability of tractors), unavailability of seeds (drought resistance), lack of extension service, low productivity due to lack of water and salinity of soils, low profit margins in paddy cultivation and lack of irrigation facilities hinders paddy farming in the area.

Recommended Solutions

Since the crops are subjected to stress conditions at various stages of growth due to low rainfall, limited ground water and salinity development due to high evapo-transportation, adaptation of agronomic and other management practices to mitigate the water shortage is important in dry farming situations. Since the soil is not very fertile, salt resistant plantation to be introduced by implementing proper drainage system together with proper soil reformation methods. Study needs to be undertaken to identify the suitable crops for the existing soil type.

There is a niche market for traditional rice varieties due to its beneficial health effects. In addition, there is a growing market for organically grown rice. Rice from Delft can be branded as Delft rice to cater the demand of island especially among tourist. Organically produced traditional rice could be sold at a premium price. With the support of Department of Agriculture, it is required to identify salt tolerant traditional paddy varieties and farmers should be given training on techniques of organic rice farming.

Making tractors available for Agriculture will pave way for reducing the cost of land preparation. Rehabilitation of tanks including the irrigation system is a vital need to resuscitate the agricultural activities of the Island. Salt water intrusion in to the water bodies should be curtailed accordingly. Facilitation by way of technology transfer for paddy processing, packing and marketing is required. Embarking on business activities such as paddy farming, paddy processing and rice processing requires capital. Hence, those businessmen should be facilitated with access to finance. The business approach can be individually focused or a society focused approach.

3.2.3. Home Gardening

Opportunities for Interventions

In order to harness the idling labour at home and to ensure cost effective, healthy and nutritional food supply, home gardening (for women) can be promoted. Water pumping can be done using solar power and wind.

Issues

Infertile soil, lack of a fence, lack of fresh water during drought season and lack of new irrigation technologies have hindered the progression of home gardening in the area.

Recommended Solution

It was understood that most tanks had a layer of silt (tank sediment) which can be used as top soil layer for home gardening.

Introduction of crop livestock integration within home gardens, will resolve most of the issues mentioned above.

Model home gardens should be developed by integrating agriculture and livestock, selectively. A dairy unit of two cows and a biogas unit are components of a dairy farm. Rearing of five goats in a confined environment (separated from dairy unit) should be a part of it. Excess milk will be used to make milk toffee, yoghurt etc.

Rearing of indigenous poultry in moving cages is recommended. The idea of moving cages is to shift the cage from one point to the other and thereby to make available natural feed for poultry and to fertilize the entire home garden with poultry droppings along with the moving of the cage.

Fencing is done with the nitrogen fixing plant *Sesbenia grandiflora* (gliricidia) where soft part of the leaves are used as animal feed and the rest of the tree will be a nitrogenous ingredients of the compost made at site. Crop residues, coconut husk chips, cow dung, goat droppings are mixed to produce compost that will fertilize the home garden and preserve moisture.

Model home gardens should be given a set of micro irrigation (drip & sprinkler) systems together with rain water harvesting tanks (underground and surface). Further, nutritionally balanced crop varieties and livestock animals such as “Vatu Kurulla” should be introduced (figure 13).

In addition, the following crops (Table 16) are recommended for growing at the home gardens or in commercial scale as an income generating activity.

Establishment of solar power unit at every house hold will resolve the problem of lighting and pumping of water through small irrigation system at home gardens. Small irrigation system such as drip irrigation or sprinkler irrigation could be provided with bank facilities.

i.	Wind turbine	vii.	Coconut
ii.	Dairy farm of two cows	viii.	Rainwater harvesting
iii.	Goat shed	ix.	Solar panel
iv.	Poultry fish integration	x.	Gliricidia Fence
v.	Field crops	xi.	Compost bin
vi.	Fruits	xii.	Bio gas unit

Figure 13 – A model home garden and its components

Table 16 – Potential crops for home gardening and commercial cultivation

Opportunity	Issue	Solution
Onion	-	Provide suitable land area and post-harvest processing knowledge
Chilies	-	Provide suitable land area with irrigation
Coconut	Digging holes, Unavailability of good variety	Extension service, Back-hoe for a society, promote suitable variety
Guava	Unawareness	Exposure visit to commercially cultivated area and provide seedlings
Pomegranate	Unawareness	Awareness about cultivation and provide seedlings of good varieties
Dates	Unawareness	Provide seedlings and train on cultivation practices Processing of the fruit is also should be thought
Cashew	Water scarcity & Unawareness	Extension and seedlings
Aloe vera cultivation and drink	Unawareness	Processing technology, machinery, packing and market or contract growing
Palmyra	Unexploited the potential due to lack of market and processing tools	Capacity development in processing technologies and packaging (Tal Hakuru/juggery, Kotta Kilangu and toddy). Access to fiance for processing machineries

Opportunity	Issue	Solution
		Technology transfer for efficient tapping system from Industrial Technology Institute
Herbal	Lack of knowledge, lack of market facilities, no capital	Herbal processing knowledge, packing and market linkages. A special papadam from neem and black gram is produced in the Island will have good demand if it is presented (packed) appealingly.

3.2.4. Livestock

As per the statistics provided by the DS Division of Delft, during the year 2014, it was recorded that there were about 3,720 cows, 2,850 goats, 88 sheep (Jaffna local), 2,850 hens and 150 farm birds. Indigenous verities are reared as they are adapted to the climate. However, there is an immerging demand for eco-friendly livestock products from health conscious customers. Hence, the strategy should be to promote the existing system in an organized manner.

3.2.4.1. Dairy Farming

Opportunities for Interventions

There is an opportunity for Dairy farming in the island as government has taken necessary initiatives to make the country self-sustained by milk. Yet only 50% of the milk requirement is produced nationally.

Issue

Shortage of fresh water during the dry season is a major barrier in the promotion of dairy farming in the area. There is competition among wild animals for grazing and therefore, a lack of grass land. Lack of veterinary services has hindered treatment of livestock. There are inadequate milk collection centers in the island and milk yield of dairy cattle are relatively low as farmers rear indigenous cattle varieties.

Recommended Solutions

Common solution for the water issue is suggested in the water section of this report. Demarcation of areas for grazing and pasture cultivation, introduction of highly productive grasses suitable to the area such as CO 3 and further training to preserve grass and paddy straw to use in dry season as cattle feed are suggested. Small scale Silage preparation from Sorghum should be encouraged

for the same purpose. Adding *Gliricidia* to food up to 10% and providing shelter and adequate water especially during night time for cattle will increase the milk yield.

The supply of excess cattle with a proper monitoring system to the mainland could control over population of cattle.
It is proposed to establish a Veterinary unit for veterinary advices in the island. Promotion of artificial insemination to improve the progeny of cattle and establishment of milk chilling centers, promoting fresh milk consumption and establishment of dedicated dairy marketing centers to sell dairy products to tourist and whole sale buyers is suggested.

Promote processing of yogurt, cottage cheese and milk toffees.

3.2.4.2. Goat Farming

Opportunities for Intervention

Goat manure and urine is very useful material to improve the soil condition of infertile soils prevailing in the area. Goat farming can be done on part time basis as there demand for heavy involvement by rearing of goats is minimal, unless the number increases more than 10 animals. The shrubs scattered in the area can be the main source of food for goats while they sustain with a small quantity of water.

Issues

Since there is no proper veterinary service in the area, the progeny of the animals have not been improved. There are no stud goats of improved varieties. The goats are of indigenous breeds. Goats are being attacked by wild dogs. There is also a lack of facilities to transport excess live animals to the mainland.

Recommended Solutions

Establish a veterinary advisory service to improve the productivity of goat rearing by improving the progeny of goats and feeding.

In order to avoid wild dog attacks, the following strategies are suggested-

a. Use of traditional knowledge to repel wild dogs

b. Demarcation of a 'goat grazing area' by making a thick fence using *Gliricidia* (which in turn can be used up to about 10% as goat diet) in order to protect goats from wild dogs.

c. Wild dogs can be repelled by using Ultra sonic sound devices

Rearing of goats in cages should be introduced which will result in fast growth and accumulation of goat droppings and urine, which can be used for home gardening. The use of organic fertilizers will lead to improved soil conditions favorable for agriculture.

Introduce milking and bottling of flavored goat milk.

3.2.4.3. Poultry farming

Opportunities for Intervention

Poultry eggs have high demand in the market as incentive poultry farming runs on drugs (antibiotics), growth promoters (hormones etc). Rice bran generated in paddy processing can be used as natural feed ingredients. Coconut *poonac* resulting from coconut oil milling can also use as poultry feed. Furthermore, excess low salt dried low value fish which are abundant during season can also be used as poultry feed. Rearing of indigenous poultry in cages will result in the accumulation of poultry droppings which is a high quality organic fertilizer.

Issues

There are no critical issues apart from the transportation of excess eggs and live animals to the mainland. There is a setback when capturing a niche market.

Recommended Solutions

The full potential of indigenous poultry farming has not been utilized yet. Small scale indigenous poultry hatcheries can be introduced to Delft. There is a need to promote, branded Delft Organic Eggs (Delft indigenous poultry eggs) in a hygienically packed, recycle paper boxes which will be attractive to health conscious and educated customers, most probably in the Western Province and metropolitan areas of the country. Introduction of the eggs into supermarket chains should be considered, when adequate and regular quantities of eggs are produced. Farm made animal feed has to be promoted to increase sustainability.

3.2.5. Coastal Fisheries

Coastal and marine fish have high potential in the Island and Inland fish can also be promoted in small ponds and tanks.

Opportunities for Intervention

Availability of coastal resources around the island

High demand for fish and high quality dry fish (normal & low salt)

Since the island is to be promoted as a tourist destination, local tourist will be attracted to the island and they will be seeking for quality dry fish at a reasonable price.

Coastal aquaculture such as crab fattening and oyster culture can be promoted.

Issues

A study carried out by Sevalanka Foundation to identify constraints faced by the fisheries sector and to propose remedial actions as follows-

Constraints

- Lack of availability of fishing equipment
- Fishing harbors are not conducive for landing and keeping boats
- Poor transport facilities
- Lack of marketing facilities
- Price fluctuation
- Lack of financial support

Furthermore, following the RAP study the issues mentioned bellow were also identified

- Lack anchorage places and security
- Lack of fishing harbor
- Poaching from Indian fisherman
- Mal functioning Cold Transport and Cold storage
- Trash fish, low value fish
- Price fluctuation; fish prices fluctuates to a extend that cost of fishing cannot be recovered
- Lack of knowledge on coastal aquaculture

Recommendations for Solutions

Establishment of anchor points (Natural points) and develops them as fishing harbors.

By a UNDP funded project a cold storage facility has been constructed and a vessel having cold transportation facility has been provided, but at the moment both the facilities are not functional. Revitalization of the existing cold storage and cold transportation (boat) is a timely requirement.

The country requires fishmeal for processing of animal feed. Presently, a major portion of fishmeal is imported. Hence, promotion of a fishmeal factory to utilize trash fish is recommended.

Delft is in need of a state of art modern Mechanical service centre is recommended.

During the workshop, fisherman voiced the need of using high technology for fishing to improve on the productivity of catch. They requested, high tech fishing technology such as GPRS devices which enable them to locate areas where fishing gear has been mounted.

Introduction of an insurance and pension scheme to increase social security among the fisherman, which was found to be insecure as majority of them are involved with self-employment or labour.

Under the proposed land use section, areas suitable for lobster, crab fattening and prawn farming have been identified.

3.2.6. Dry Fish

Opportunities for Interventions

- Dry wheather prevailing in the island
- Availability of fresh fish

Over the years, fishing has been practiced in the island and dry fish processing exists. Hence, there is availability of traditional knowledge.

Delft is proposed as a tourist destination and there will be local and foreign tourist arrivals. Dry fish will be in demand by local tourists and expatriate Sri Lankans who will visit their relatives.

Existing knowledge and experience of 40 women of fisher families who were supported through the MFF Cycle 4 Small Grant Facility project in preparation of dry fish using a hygienic method.

Issues

They practiced traditional ways of handling fish during drying process because they have not had opportunities to get proper training on hygienic aspects of food handling.

There is no propaganda to promote dry fish of Delft.

Recommended Solutions

Conduct capacity development program on hygienic aspects of food preparation

Increase the production of high quality, low salt dry fish (good for patients having high blood pressure) by capitalizing on the dry climate prevailing in the area.

Introduce low cost solar powered dryers (a dryer is available at University of Wayamba at present) for uninterrupted supply of dry fish even during the rainy season.

Introduce high tech packing systems such as vacuum packing, while promoting attractive labeling and branding of Delft Dry fish as low cost, high quality dry fish as well as low salt dry fish for health conscious customer groups.

3.2.7. Inland Fisheries

There are inland water bodies in the Delft Island.

Opportunities for Intervention

Delft Island consists of 37 small water bodies (Table 17). The tanks get empty when the island does not get rain in proper intervals. Therefore, inland fishery is not a popular livelihood in the island.

Table 17 – Number of tanks by GN Division
(Source; Statistical Handbook Delft -2014)

No	G.N. Division	Total Number of Tanks
1	Delft West	5
2	Delft South	3
3	Delft Centre West	5
4	Delft Centre	4
5	Delft Centre East	7
6	Delft East	13
Total		37

Issue

Unawareness about their potential and the state of tanks (sediment). Lack of appropriate sluice gates has hindered water storage.

Recommended Solution

Rehabilitate fresh water tanks and stock with fingerlings of native fish varieties such as Milkfish which has much demand among tourist. Formation of community-based societies responsible for long-term tank management and sustainable use of water source.

3.2.8. Industries

Since the island is to be promoted as an eco friendly tourist destination, introduction of large scale industries is impractical. A zone has been demarcated in the Land Use Zoning Plan which will promote eco friendly small scale industries.

3.2.8.1. Coir Production

Opportunities for Intervention

Coconut is grown in the Island and therefore, Coir production is possible due to the excess availability of raw materials. Coir pith a byproduct of coir milling is a good source of natural soil conditioner that helps improving water holding capacity of soils. Coir ropes have a demand in island and mainland for agricultural, livestock and coastal industry purposes. Mats and other coir based products also have a growing market in Delft Island and Jaffna peninsula.

Issue

No knowledge, lack of capital, lack of access to machineries

Recommended Solutions

Capacity building on coir extraction processes and machineries should be introduced among interested beneficiaries. Exposure to small scale machinery and facilitation of access to finance is recommended. Coir pith a byproduct of coir extraction is used in compost manufacturing due to its water retaining ability.

3.2.8.2. Food products from Palmyra and Coconut

Opportunities for Intervention

Favorable climatic and soil conditions for Palmyra plantation. There are food products that can be based on Coconut and Palmyra

Issues

Lack of knowledge, tools and markets has resulted in a lack of interest among people.

Recommended Solution

People in the area should be given training on hygienic food processing techniques. Facilitation to access finance for procuring tools and equipment is required. Marketing center (common to all) should be established in the Island where traders and customers can negotiate business. Marketing and package training, access to services of Palmyra Development Board, Food Processing Division of Department of Agriculture should be provided.

3.2.8.3. Ayurvedic Mud Spas and Herbal Packing

Opportunities for Intervention

Herbal plants with Ayurvedic value are grown in the Island. The ponds in Delft have a bottom silt layer composed of minerals that can be used for naturopathy mud therapy after testing the mineral suitability and toxicity for cosmetic use.

Issues

Lack of knowledge about uses, packing, and the potential market for herbal plants.

Lack of knowledge on naturopathy and unavailability of detailed information on soil type and composition of silt.

Recommended Solution

A selected group of women should be trained to prepare Ayurvedic Beverages in packet form (sachet packets). Further, at the proposed marketing centre and along the road side, clean and hygienically prepared herbs should be sold.

Surveys and data collection on silt availability and composition of the tanks at Delft Island should be arranged for. Furthermore, expert knowledge should be sought to market and harness the niche market growing for naturopathy is recommended.

3.3. Flora and Fauna

Following important recommendations were proposed by the Occasional Papers of IUCN Sri Lanka No. 14, January 2013;

The collection of adequate baseline data on species diversity, richness and dominance, to allow thorough analysis of the status of the biodiversity and natural resources of the island, and development of a suitable management plan for the utilization of these resources, based on such analyses.

Enhance ecological value of the island, through coral transplanting, seagrass bed restoration, beach nourishment, sand dune restoration and coastal vegetation restoration.

Establish Environment Management Committee which consist of CBO's , INGO's, NGO's, government and private sector stakeholders.

Create community education and awareness on the importance of conserving ecosystems in Delft and the community role in sustainable management and conservation of existing ecosystems.

3.4. Water

As per the ISEA conducted in 2010, availability of ground water is recorded as high and the salinity in groundwater aquifers also recorded as high (> 3500 µmho/cm). Therefore the freshwater in Delft found to be invaluable natural resource. This indicates that water availability could become a major issue in future development work. As the availability of water in the island is seasonal, the Sri Lanka Navy plays an active role in making water available for the inhabitants of the island during the drought season. Most of the inhabitants of the island depend on a single water source.

Therefore, conservation areas/buffer zones of water tank to be demarcated in in an attempt to allow the water body to expand naturally. De-silting tanks and provides an engineering solution to construct related infrastructure to retaining the water is a requirement. Water management plan together with public awareness on water conservation applications is essential to be introduced for household, commercial and agricultural activities.

Furthermore, a 50m buffer zone around all water bodies has been introduced through the zoning plan to ensure the protection of water sources and to prevent encroachments by settlements.

3.5. Utilities and Community facilities

Community awareness programs are to be carried out in broad themes including tourism and sustainability. Harbors and infrastructure is to be improved though government intervention in an attempt to promote tourism, which in turn is expected to benefit the society.

3.5.1. Transport

Since the city is to be declared as Green Eco City, Eco friendly transportation modes are promoted.

3.5.1.1. Connecting Delft Island to the Mainland

Two types of boats are required to cater ordinary tourist and high end tourists. Hence normal but clean and fast boat service is proposed to ordinary tourists and a luxury boat service is recommended to high end tourist. The sea routes can be via Nagadeepa or direct, as required.

Increase number of ferries together with the safety that are in operation for local community. Travelling time of the journey also needs to be improved. The construction of Jetty in Delft and improve the facilities of the jetty in the mainland is important.

Delft is a part of a cluster of seven small islands (mini archipelago). A transport system connecting the islands will not only provide beneficial for tourists but it will also ensure that products of Delft can be sold to a larger market. The inter island transport facility will ensure that Delft island is not isolated from the development processes carried out on other islands.

3.5.1.2. Inland transport

Bullock carts, horse carts, push bicycles and scooter taxis for inland safaris and sightseeing are recommended.

3.5.2. Marketing Centre

A dedicated marketing centre should be established to display the produce of the Island. The centre should be built using eco-friendly technology (roof with solar power panels, a bio gas unit that absorb the solid and liquid waste from the marketing centre and wind powered water pumping etc.)

A dedicated tourist information centre should be included to educate the tourist about the Island, opportunities for tourist and its aesthetic values together with tourism opportunities in Jaffna and surrounding Islands. A comprehensive marketing web portal should be established that promotes tourism opportunities in the Island and products manufactured in the Island.

In addition to the Information Technology based promotion, a series of brochures should be produced about tourism potential, related services, traditional foods, herbals, etc. The Centre will arrange all the facilities for tourists.

The marketing centre should be fully equipped with restaurants, state of the art toilets and First Aid facilities.

3.5.3. Fair Trading

Handy craft products from Palmyra and Coconut can be introduced in the market as eco-friendly products. Women entrepreneur groups can be formed to manufacture those handicrafts in eco-friendly manner using natural dyes etc. The said women entrepreneur groups could be formed in to business groups such as partnerships or cooperatives. The partnerships or cooperatives should get 'Fair Trading Label' with assistance of Sri Lanka Export Development Board. Initially those products should be marketed to local traders and gradually step in to international markets.

3.5.4. Vehicle Service and Maintenance Centre

There are vehicles in the Island as well as engine boats that need repair and maintenance services. Furthermore, boats engines and the body should be maintained properly to ensure the sea worthiness of the boat. If the society continues to feel that fishing is a risky mode of self-employment, the young generation will not be attracted to the industry. Hence, it is required to establish a boat and vehicle maintenance centre. Technically qualified young entrepreneurs should be assisted to form these vehicle service centers.

3.5.5. Energizing Delft – Green Eco Island

The main focus of this study is to explore the huge potential of the Island to be promoted as a local and foreign tourist destination. The recommended theme of the island is to promote as a Green Eco Island focused on the following factors-

- Clam beaches that will harbor water sports and sea bathing (as an alternative to Arugambay in Eastern province)
- Wild animals and Birds specially wild horses and migratory birds

- Natural eco system
- Archeologically important sites
- Traditional Delft food
- Organic vegetables, herbs, palmyra products and coconut products
- Horse riding
- Bullock carts

To support the energy requirement of the Island, the following strategies are proposed-

Dendro power

Dendro power is the generation of electricity from sustainably grown biomass. Growing *Gliricidia* as a fencing mode has already been discussed in the report. Therefore, use of excess *Gliricidia* for dendro power will ensure sustainable use of the plant.

Bio gas

Cow dung and goat manure-based bio gas units should be promoted at homestead level to power kitchens and lighting. Biogas plants based on solid waste should also be introduced for powering restaurant etc.

- Solar power to electrify homestead and commercial centers. Commercial scale solar power plants are required to power the cool rooms for fishing industry.
- Wind power for irrigation purposes (as homestead level and agriculture purposes)
- Wind power to generate electricity
- Introduce efficient fuel wood hearths to reduce the pressure on the shrubs for fuel wood

3.5.6. Pension schemes

It is proposed to promote a pension scheme implemented by Social Security Board in an assistive manner. The project could bare the initial cost, to make sure that the community will be able to enjoy their retirement with the pension.

3.5.7. Insurance

Insurance schemes should be promoted among people for building security for life, boats and family. This will build confidence to carry out fishing while the young generation will also be attracted to carry forward traditional way of life. The types of insurance are as follows-

- Boat insurance
- Life insurance
- Crop Insurance
- Livestock insurance

3.5.8. Business Promotion

Since, the islanders experience a subsistence level of living; they need attitudinal building toward improving life conditions. Furthermore, business orientation is to be conducted, ensuring the rise of future entrepreneurs to seize business opportunities created through development of tourism. Hence following skill development programs are recommended-

- Attitude building
- Entrepreneurship skills
- Marketing skills
- Customer care
- Business record keeping
- Conflict resolution

3.6. Health and Sanitation

With the steady increase in population of Delft and increase in the number of tourist arrivals which is expected to boom in the near future, health and sanitation infrastructure and facilities are expected to develop. Currently a single hospital with 29 beds is the only access to healthcare.

Since Delft is being promoted as a tourist destination, healthcare and sanitation are of paramount importance in achieving this goal. Introduction of new buildings, better facilities and more beds etc is recommended regarding the healthcare aspect of the island. Furthermore, sanitary facilities are to be improved to accommodate needs of tourists as required.

3.7. Education

Introduction of technical colleges to Delft in order to promote skills in the field of Mechanics is recommended. Since the main livelihood of the island is through fishing, individuals with mechanical knowledge is needed on a daily basis to attend to boats. Furthermore, workshops to improve skills on carpentry, masonry, welding works, AC mechanics, electricians etc would benefit future development needs of the Island.

3.8. Land use

3.8.1. Present Land Use of Delft Island

Grasslands, scrublands, home gardens (settlements) and Palmyra plantations dominate the current land use map of the island (Figure 14). Two main water bodies in the island are the only source of pure water for the inhabitants.

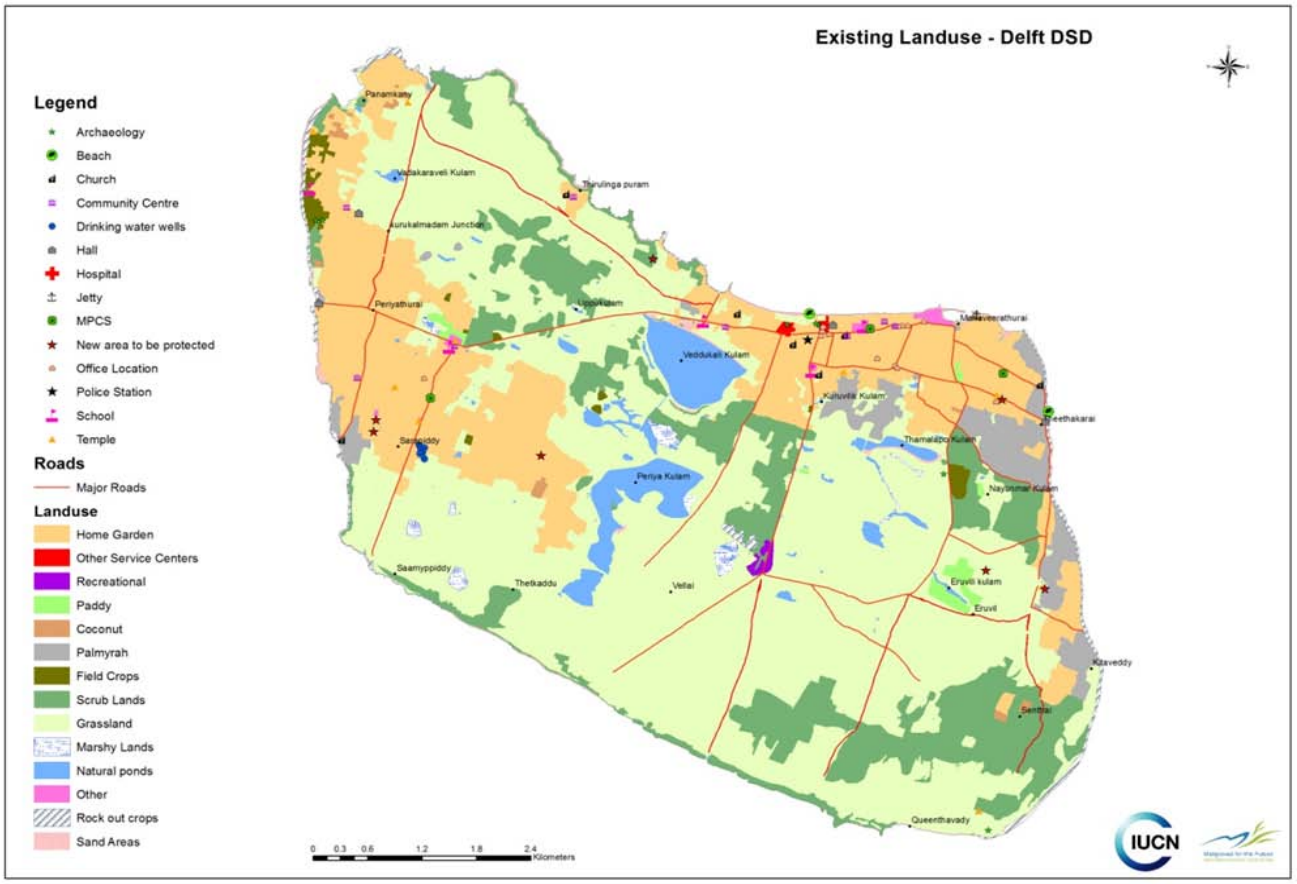
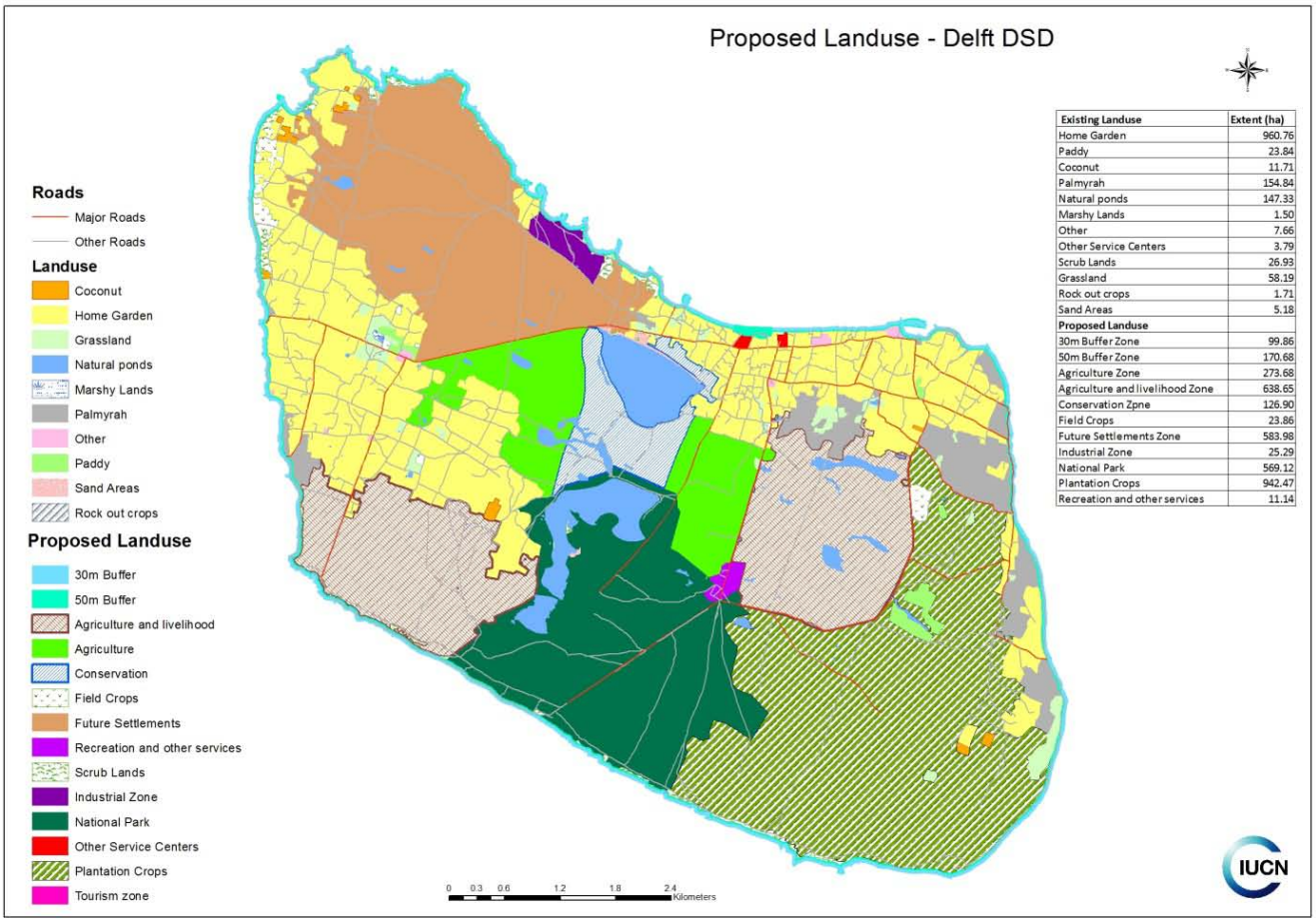


Figure 14 – Current land use map of Delft Island (Source - Modified LUPPD 1:10000 map)

3.8.2. Proposed Land Use of Delft Island

The proposed land use map for Delft Island (figure 15), allocates land for development around the existing settlements, while protecting the habitat of feral horses and giving due importance to the carrying capacity of the study area.



Existing Landuse	Extent (ha)
Home Garden	960.76
Paddy	23.84
Coconut	11.71
Palmyrah	154.84
Natural ponds	147.33
Marshy Lands	1.50
Other	7.66
Other Service Centers	3.79
Scrub Lands	26.93
Grassland	58.19
Rock out crops	1.71
Sand Areas	5.18
Proposed Landuse	
30m Buffer Zone	99.86
50m Buffer Zone	170.68
Agriculture Zone	273.68
Agriculture and livelihood Zone	638.65
Conservation Zone	126.90
Field Crops	23.86
Future Settlements Zone	583.98
Industrial Zone	25.29
National Park	569.12
Plantation Crops	942.47
Recreation and other services	11.14

Figure 15 – Proposed land use map for Delft Island (Source - Modified LUPPD 1:10000 map)

3.8.2.1. Proposed Land Use Changes

With reference to the above maps (Figure 14 and Figure 15), the difference in land use between the existing plan and the proposed plan are tabulated below (Table 18) and represented in a chart (Figure 16).

Table 18 – Land use changes

Category		Present Land use (Ha)	Proposed Land use (Ha)	Change (Ha)
Home Gardens (settlements)		981.57	1,559.52	577.95
Paddy Field Crops	Agriculture and livelihood zone	24.42	913.71	873.60
		27.40		
Coconut Palmyra	Plantation crops	11.71	1,108.83	930.34
		166.78		
Other		9.85	7.66	-2.19
Service centers		3.90	3.79	-0.11
Recreation		6.04	11.14	5.1
Scrubland		652.39	26.57	-598.82
Grassland		2594.84	57.19	-2537.65
Marshland		26.40	1.50	-24.9
Natural Ponds		185.84	185.87	.03
Rock out crops		46.61	1.71	-44.9
Sandy Area		25.42	5.18	-20.13
Proposed 50m Buffer Zone		0	170.34	170.68
Proposed Conservation Zone		0	118.39	118.39
Proposed Industrial Zone		0	23.62	23.62
Proposed National Park		0	568.15	568.15
Total Land Use		**4763.17**	**4763.17**	

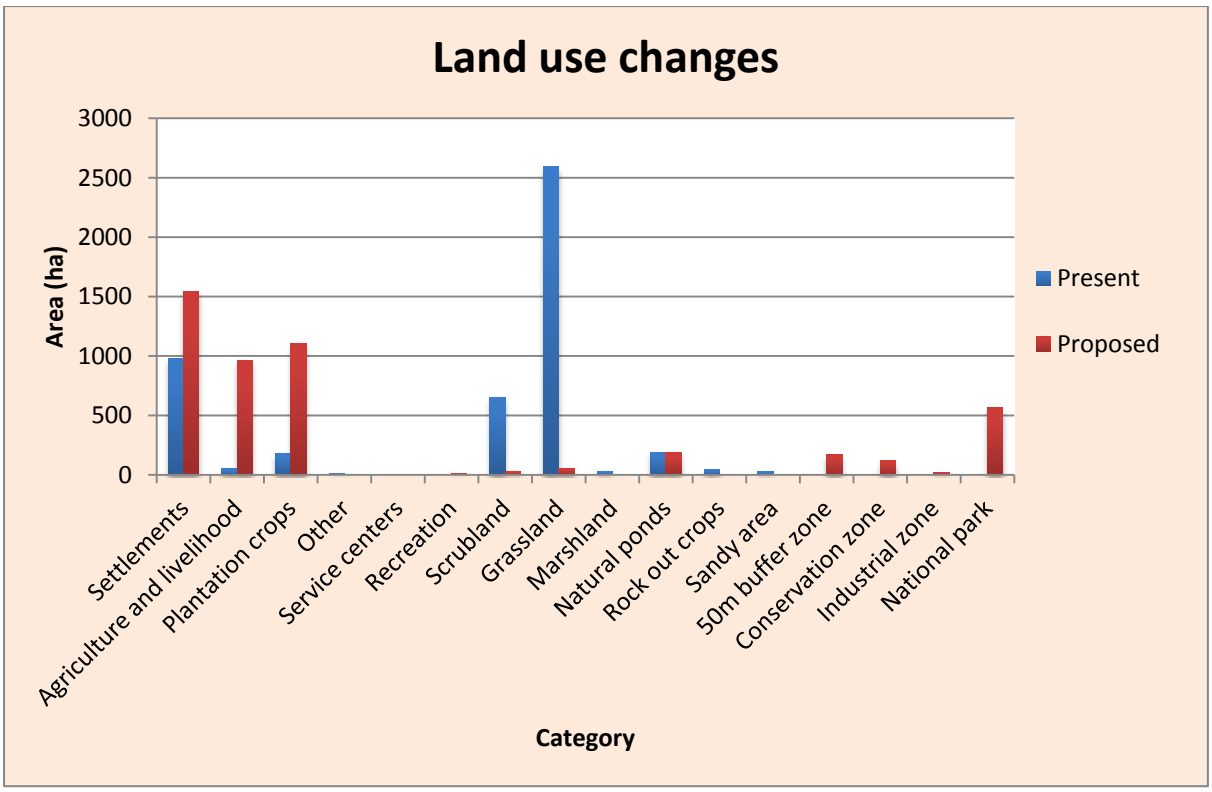


Figure 16 – Present and proposed land use changes of Delft Island

3.8.3. Proposed Zoning Plan

Land use activities of Delft Island (Figure 17) were grouped into six broad zones. They include

a. Agriculture Zone
b. Agriculture and Livelihood Zone
c. Conservation Zone
d. Tourism and Recreation Zone
e. Residential Zone
f. Industrial Zone

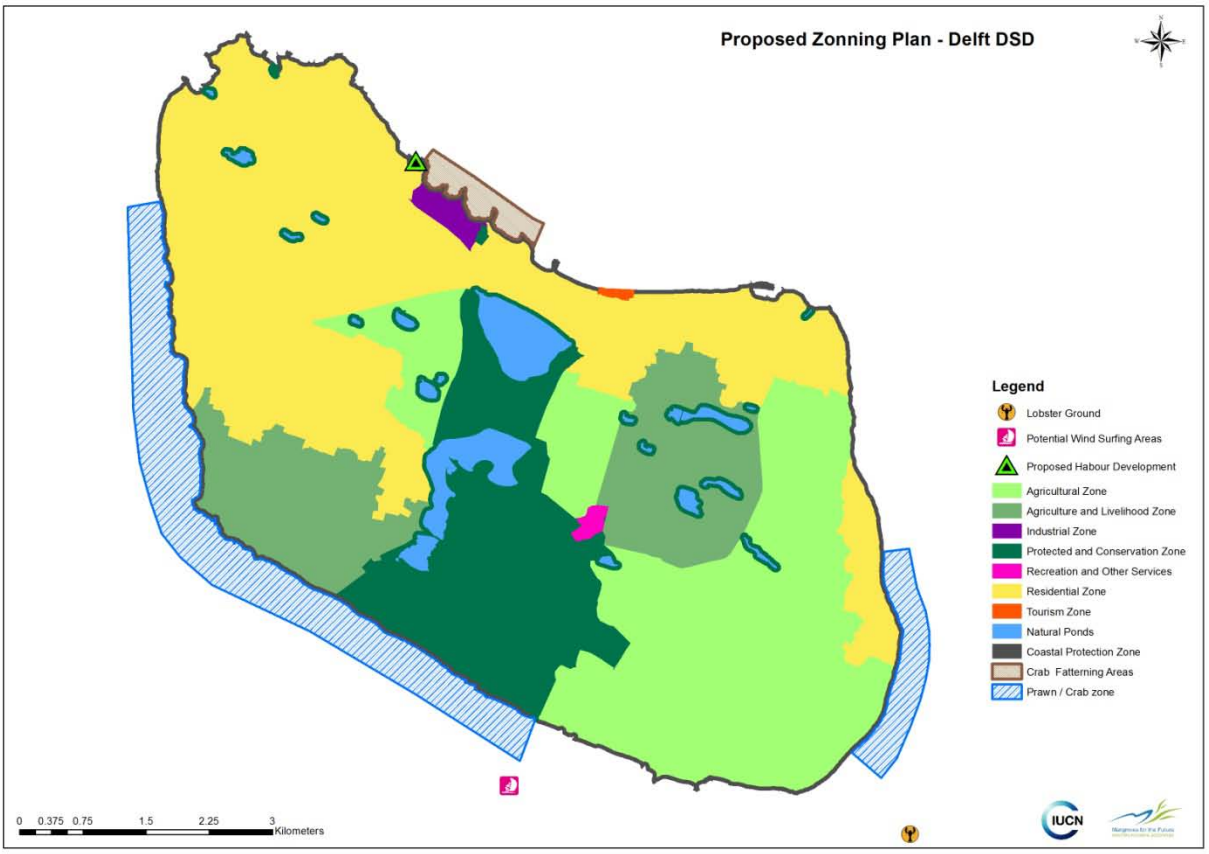


Figure 17 – Proposed zoning plan for Delft Island (Source: Modified LUPPD 1:10000 map)

3.8.3.1. Agriculture Zone

Agriculture and livestock farming account as major contributors to the Delft economy, although agricultural activities are restricted to the 'Maha' Season (September to March). The agricultural activities include home gardening, vegetable cultivation, cultivation of chilies and Onion and Kotta Killangu (Palm seeds) covering an area of 51.82 Ha (Goonatilake et al., 2013). Existing plantation crops in Delft Island include Coconut and a vast area of Palmyra plantations accounting to 11.71 Ha and 166.78 Ha respectively adding up to a total of 178.49 Ha.

The proposed land use zoning plan introduces 930.34 Ha for agriculture and plantation crops in the island (Figure 18). Cultivation of sprouts of palm seeds (Kotta Killangu / Panna Killangai) is a thriving agricultural activity with the types of soil and the climate favoring this activity (Goonatilake et al., 2013). Recommendations for new types of suitable plants (e.g. Dates and Cashew) would have to be introduced after a scientific soil study and climate tolerance survey, which would further contribute towards livelihood generation of the inhabitants.

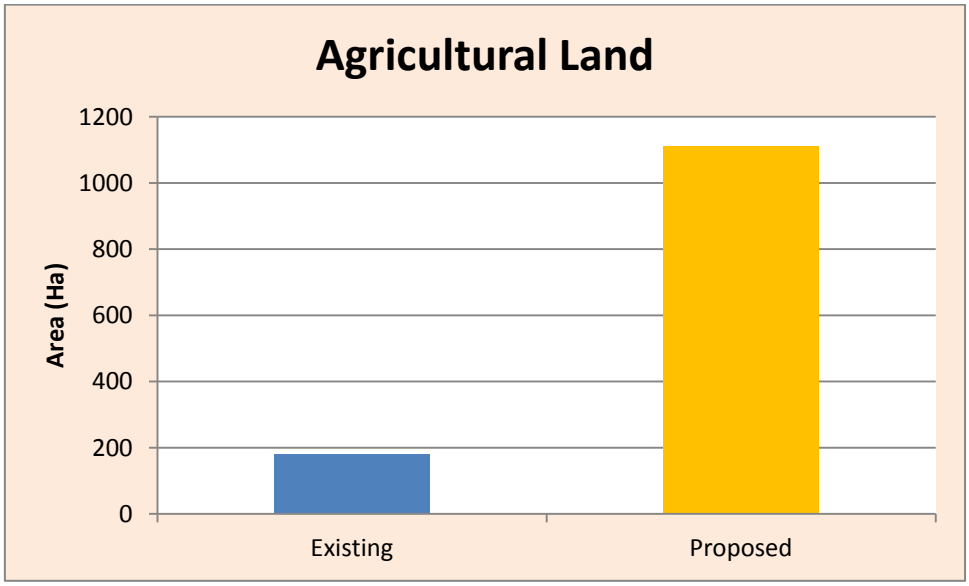


Figure 18 – Existing lands allocated for Agriculture, plantations and proposed land use area

3.8.3.2. Industrial Zone

Deft was once known for its handlooms and choir products. Palmyra based products such as mats, boxes, onion sachets, dried seeds, (oomal), sprouts of seeds (raw and processed), dried juice (Pauaddu) and dried reapers had a considerable demand in the past, but is in short supply at present (Mangroves For the Future, 2014). Due to the vast amount of land allocated for plantation crops, the availability of raw materials for choir products and other Palmyra based products is expected to increase. Therefore, 23.62 Ha of land has been set aside as an Industrial Zone to promote handlooms and other choir and Palmyra based products. This zone is targeted towards providing employment to the unemployed female population of Delft.

Apart from the zone allocated for industries, an existing fishing harbor in the vicinity is proposed to be developed if the need for additional harbors for the transported goods arises (figure 17).

3.8.3.3. Agriculture and Livelihood Zone

In an attempt to encourage farming and agriculture in Delft, an area of 913.71 Ha has been allocated as an Agriculture and Livestock Zone (Figure 17). Delft Island has 1920 milk cows at present. To encourage farmers to pursue livelihood activities in the Dairy Farm Industry, the demarcated area for Agriculture and Livestock can be used to facilitate a Dairy Farm for Delft Island.

Medicinal plants are important components of the local flora as well as valuable parts of the ecosystem. The use of plants for medicinal purpose is one of a number of practices developed by traditional local people and for a long time plants have played a key role in health care systems in the island. Interest in medicinal plants is re-emerging among the local communities inhabiting the island due to the rising cost of western medicine. At present, almost all of the medicinal plant species used in local medicine is harvested from the wild. During the field survey plants such as *Aloe vera* (Komarika), *Asparagus racemosa* (hathawariya), *Azadirachta indica* (Kohomba), *Calotropis gigantea* (Wara), *Cassia auriculata* (Ranawara), *Cyperus rotundus* (kalanduru), *Evolvulus alsinoides* (vishnukranthi), *Flueggea leucopyrus* (Katupila) and *Ricinus communis* (Beheth Endaru) were recorded as important medicinal plants used by the local community. Apart from traditional practices, suitable herbal plant farming is therefore recommended for the area, after a scientific soil study and climate tolerance survey. Sorghum plantations can also be introduced to this zone, which can be used to feed livestock.

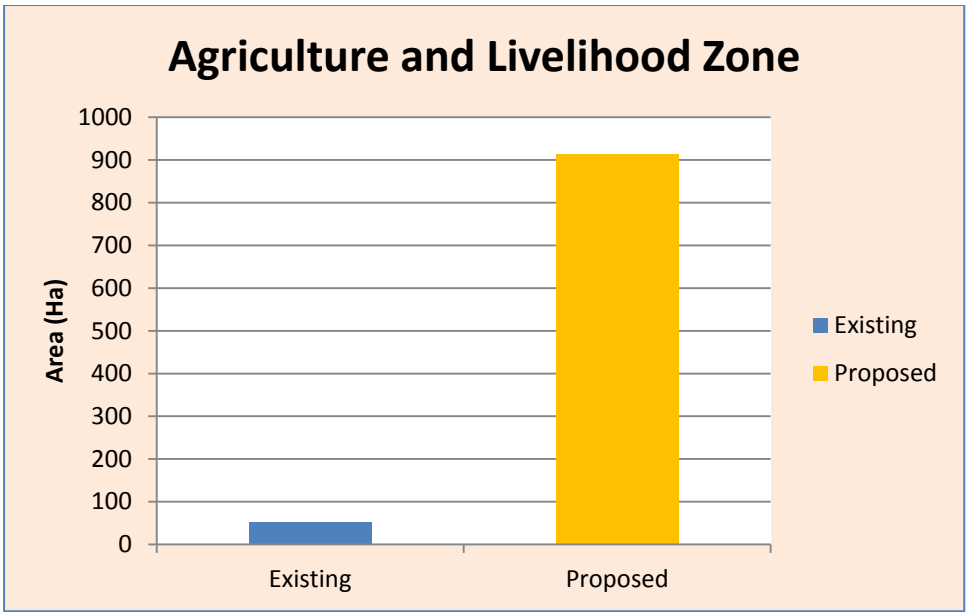


Figure 19 – Proposed land allocated for agriculture and livelihood activities in comparison to existing land use

Livestock farming was a traditional way of life at Delft before the onset of the war. According to the Delft Profile (Divisional Secretariat Delft, n.d.) the numbers of livestock were as follows (Table 19).

Table 19 – Livestock population of Delft 2013
(Source: Statistical Handbook Delft 2014)

No	G.N. Division	Neat Cattle				Goats	
		Milk Cows	Other Cows	Buffs	Calves	He	She
1	Delft West	560	450	-	600	225	295
2	Delft South	360	300	-	320	190	245
3	Delft Centre West	310	350	-	370	98	195
4	Delft Centre	130	140	-	180	69	80
5	Delft Centre East	240	240	-	300	108	195
6	Delft East	320	320	-	400	135	250
	Total	**1920**	**1800**	**-**	**2170**	**825**	**1260**

Two potential areas for livestock farming located in Delft South, Central and Central East Delft have been zoned out to promote animal husbandry and a sustainable dairy industry. This potential area for livestock farming will create common ground for cattle and goat owners to form a union in an attempt to create a sustainable dairy industry (production of milk and yogurt) in the island.

Some of the favoured fodder plants including *Alysicarpus vaginalis, Bulbostylis barbata, Cynodon dactylon, Cyperus bulbosa, Cyperus compressus, Cyperus conglomaratus, Cyperus iria, Cyperus rotundus, Desmodium triflorum, Eragrostis ciliaris, Eragrostis maderaspatana, Fimbristylis argentea, Fimbristylis dipsacea, Gliricidia sepium, Ischeamum indicum, Sporobolus maderaspatanus, Sporobolus spicatus, Sporobolus tremulus and Zoysia martella* are present in the Island. Growing these plants within the allocated area for farming will benefit the people dependent on money generated through livestock.

Introduction of *Aloe vera* yogurt using *Aloe vera* grown in the island itself can be promoted as a unique Delft product.

According to a study done in 2007 by the Humpty Dumpty Institute (HDI), a United States based non-profit organization; it was revealed that many farmers in Delft who grow cash crops could turn easily to dairy farming, which is more profitable in the long term (Senadheera, 2007). Therefore, promotion of dairy farming would especially benefit the women of Delft, who traditionally are the primary caretakers of livestock.

Most modes of livelihood generation in Delft are dependent on coastal resources. They include Fishing, crab and prawn farming, dry fish production etc. A potential zone where crab fattening can be promoted was identified (Figure 17). Apart from crab fattening areas, potential crab and prawn farming areas were also identified (Figure 17). However, a detailed scientific study by experts in the related fields is recommended before embarking on projects.

3.8.3.4. Conservation and Buffer Zones

The land use zoning plan has two conservation zones and three buffer zones (Figure 17)

3.8.3.4.1. Conservation Zones-

National Park for wild horses

Delft Island's feral horses are one of its major tourist attractions. The island is the only habitat in Sri Lanka where wild horses roam. The wild horses of Delft are believed to have come from a breeding stock maintained from the time of Portuguese occupation of the island. The horses in hundreds roam freely over the flat, limestone-rich, windswept plains of Delft. However, during the dry season, the Sri Lanka Navy detachment in the island provides water to the horses.

The area identified for National Park is demarcated as an extent of 568.15 Ha of land for protection of the wild horses of the island, where adequate water and other resources to be provided for the animals.

Conservation zone for water body protection

A conservation zone was proposed between the two main water bodies of the island for conservation purposes and for protection of wading bird habitats in the area. The 118.39 Ha land is the catchment area of the said water bodies. Since the population of Delft is solely dependent on this water for existence, the conservation zone will ensure the sustainability of the shallow water area and allocates land for future expansion of the water bodies.

Delft Island is home to many waders including winter migrants. The water bodies of the area are the main habitats of these waders. The allocated conservation zone covers an area linking the largest water holes in the island, where most waders reside.

3.8.3.4.2. Buffer Zones

50 meter Buffer zone – Coastal protection

A coastal protection area has been demarcated around the island, 50 meters from the coast inland, to ensure that land erosion and other natural coastal changes are accommodated for.

50 meter buffer zone around water bodies

Since water is scarce around the island, protection of water bodies with a buffer zone would prevent encroachments by settlements and ensure sustainable water availability throughout the year for humans and animal

consumption. It will also ensure a steady flow of water to the agricultural areas dependant on the waterholes.

Marine protection area

A marine protection area has been demarcated around the island to protect shallow water biodiversity. This includes coral reefs and lagoons around the island, giving the habitats a chance to grow without disturbances.

3.8.3.5. Tourism Zone

Delft Island has a potential tourist beach identified in the Northern coastline; a small strip of beach and a suitable sea bathing area. The said area is also in close proximity to the islands best coral reef. Apart from the coastline, land is allocated for a 'tourism service center' and 'recreational facility center' in close proximity to the Delft National Park.

Many archeological and historical sites have been identified in Deft Island, dating back from the Anuradapura period to the Colonial era. They have been mapped out below (Figure 20). Areas identified have been protected with a 30 meter buffer zone. Furthermore, the Archeological Department has also constituted a development plan for these sites (Department of Archaeology, Sri Lanka, 2015).

Apart from the archaeological and historic sites, Delft also has the potential to expand its horizons towards water sports. Potential sites for wind surfing and kite surfing has been identified (Figure 17), however a survey done by water sports experts is recommended since the wind directions and sea conditions are dependent on seasonal variations.

Since the island is secluded from the mainland, a tourism development plan focused on eco tourism is recommended for Delft. Transport using bicycles and trained horses within the island, accommodation for tourists with 'home stay' facilities and beach cabanas, promotion of agro tourism during the 'Maha' season and water sports in the selected wind/kite surfing area in the southern coast of the island are to be developed. Apart from water sports, snorkeling in selected reefs around the island should be promoted among tourists.

However, due to the low carrying capacity of Delft Island, short stay tourism should be promoted instead of overnight stay, but a continuous flow of short stay tourism is of paramount importance to the development process of Delft.

Figure 20 – Tourist attractions of Delft Island (IUCN, 2013)

Therefore Delft Island has a good tourism potential, especially ecotourism. However in order for tourism to be developed, wildlife and archaeologically important areas should be preserved, along with the marine and coastal environment. In same time nature trails and field guides has to be developed as an ecotourism promotion tools. Water issues as well as infrastructure development also need to be addressed, along with other issues such as solid waste management and wastewater.

The present occupants of the Delft Island were mostly in favor of tourism development of the island as it will increase economic opportunities for them.

3.8.3.6. Residential Zone

The current population of Delft Island stands around 4,869 (1468 families) and shows a slight growth in comparison to previous years according to the Delft Situation Report (Table 20). Current land allocated for settlements is at 981.57 Ha.

Table 20 – Population of Delft Island from 1981 - 2014
(Statistical Handbook Delft 2014)

No	G.N. Division	1981	2003	2007	2008	2009	2010	2011	2012	2013	2014
1	**Delft West**	1220	1065	907	615	870	827	850	877	864	882
2	**Delft South**	868	908	793	459	607	521	512	511	506	509
3	**Delft Centre West**	1217	1326	1265	1022	1145	1072	1064	1046	1025	028
4	**Delft Centre**	952	765	712	738	803	697	700	694	690	679
5	**Delft Centre East**	777	818	639	702	696	696	722	718	713	710
6	**Delft East**	1133	857	648	648	752	717	702	681	692	694
	Total	**6167**	**5739**	**4964**	**4184**	**4873**	**4530**	**4550**	**4527**	**4490**	**4502**

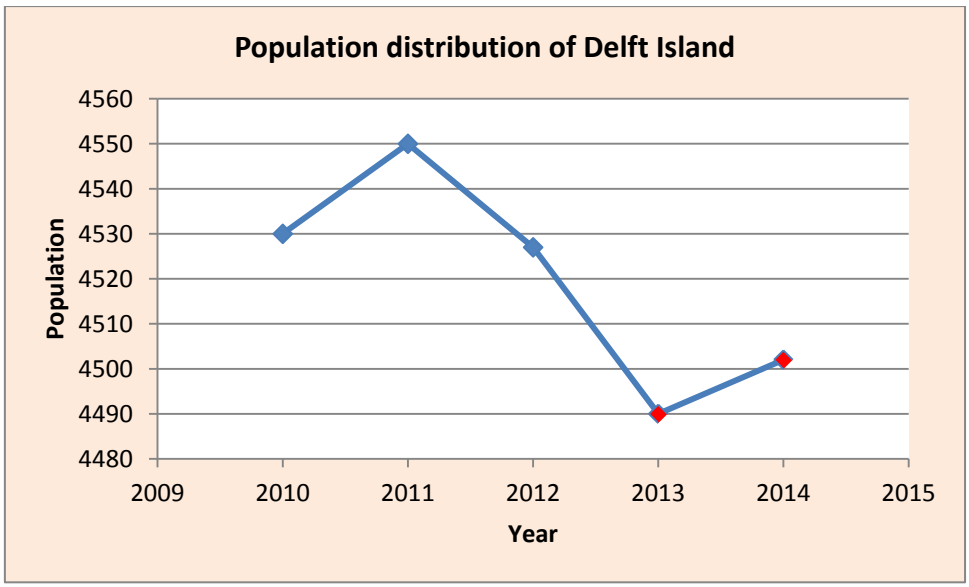


Figure 21 – Population of Delft Island up to 2014

According to the above chart (Figure 21), it is evident that the population of Delft Island is marginally rising since 2013 and it is expected to rise further in 2015. Therefore, an additional area of 577.95 Ha has been allocated for future settlements taking to consideration the growth of population in future years (Figure 22). With the onset of tourism in Delft, the population is speculated to increase further.

Figure 22 – Land allocated for Settlements between current and proposed land use zoning plans

Population and Housing

The population of the island is rising marginally according to the Divisional Secretariat Delft (2015). The chart above (Figure 21) shows the increase in population since 2013. Due to the potential development that is expected to engulf the island in the future, the population of Delft is expected to increase further. To accommodate the expected increase in population, an area has been demarcated for settlement expansion in the Delft Island Land Use Zoning Plan (Figure 17).

3.8 Summary of Interventions and Potential Stakeholders

Sector	Product/ Small business unit/SMEs	Stakeholders	
		Government	Private/NGOs
Tourism/ Heritage/ wildlife	Promote Infrastructure	DS Office Delft District Secretariat Jaffna Sri Lanka Tourism Promotion Bureau Ministry of Tourism Sustainable Energy Development Authority National Engineering Research & Development Agency Department of Wildlife Conservation Department of Archaeology	Travel Agents such as Aitken Spence, Hemas, Gabo Travels etc. Sri Lanka Hoteliers' Association Sri Lanka Institute of National Tour Guide IUCN Sri Lanka Jet wing Ecoholidays (Pvt)Ltd Browns Tours (Pvt) Ltd
Agriculture	**Organic Agriculture:** Home Gardening Filed crops Indigenous poultry (Moving Cages) Dairy Goat Bio gas Compost Solar Wind power water pumping Gliricidia fencing Coconut husk chips De-silted soil from tanks	DS Office Delft Department of Agriculture Department of Agrarian Services Department of Animal Production and Health National Livestock Development Board	Lanka Organics Milco Keels Super markets Cargills Food City Food and Agriculture Organization UNDP WFP
Livestock	Dairy Farmers Dairy Processors Bio gas Yoghurt Milk toffee	DS Office Delft Department of Animal Production and Health National Livestock Development Board Sustainable Energy Development Authority National Engineering Research & Development Agency	Keels Super markets Cargills Food City Cathy Rich Memorial Food Processing Training Centre

Sector	Product/ Small business unit/SMEs	Stakeholders	
		Government	Private/NGOs
	Goat Farmers Milk Processors (Bottling of goat milk)	DS Office Delft Department of Animal Production and Health National Livestock Development Board	Keels Super markets Cargills Food City Cathy Rich Memorial Food Processing Training Centre
	Traditional Poultry Farming: Rearing Moving Cages	Department of Animal Production and Health	Keels Super markets Cargills Food City Arpico Super centers
Fish	Fishing in boats Landing sights / Anchorage facilities Cold room Cold Transport	DS Office Delft Department of Fisheries Department Cooperatives Sri Lanka Insurance	Whole sale buyers Keels Super markets Cargills Food City Arpico Super Centre UNDP, FAO
	Solar dryers Dry Fish Processing	DS Office Delft National Aquatic Resources Research and Development Agency Industrial Technology Institute	Whole sale buyers Keels Super markets Cargills Food City Cooperatives
	Inland fishing Fishing gears Stocking of Fingerling	DS Office Delft National Aquaculture Development Authority National Aquatic Resources Research and Development Agency	International Non Government Organizations
	Coastal Aquaculture: Crab Fattening Cages	DS Office Delft National Aquaculture Development Authority National Aquatic Resources Research & Development Agency	Whole sale Buyers
	Oyster culture	DS Office Delft National Aquaculture Development Authority National Aquatic Resources Research	Whole sale Buyers
Coconut	Coir Extraction / Rope weaving Machineries	DS Office Delft Coconut Development Authority	Lakshman Engineering Cooperative Societies
	Coconut Farming	DS Office Delft Coconut Cultivation Board Coconut Research Institute	Non-Governmental Organizations
	Virgin Coconut Oil Milling Coconut toddy Jaggary	DS Office Delft Coconut Research Institute	Marina Oil Company Cargill Food City Keels Super Market
Coconut / Palmyra	Mats and handicrafts	DS Office Delft	

Sector	Product/ Small business unit/SMEs	Stakeholders	
		Government	Private/NGOs
		Palmyra Development Board Coconut Development Authority Department of Small Industries Laksala (National Handicraft Board)	Lakpahana Natures Product Lanka Company
Palmyra	Kotta Kilng Jaggary Treacle Toddy	DS Office Delft Palmyra Development Board Post Harvest Division of Department of Agriculture Industrial Technology Institute	Cathy Rich Memorial Food Processing Training Centre Keels Super Markets Cargills food city Arpico supper
Herbal	Herbal Packing Packaging machineries	DS Office Delft Department of Arurveda Food processing Division of Department of Agriculture Industrial Technology Institutes	Keels Super Markets Cargills food city Arpico supper
	Raw Material (*Aloe vera*) *Aloe vera* Drink	DS Office Delft Department of Aryrveda Department of Agriculture	Janet Group Nature Secrets Pvt. Ltd. Cathy Rich Memorial Food Processing Training Centre Keels Super Markets Cargills food city Arpico supper
	Dried Raw Material	DS Office Delft Department of Aryrveda Department of Agriculture	Spa Ceylon (of Janet group) Siddhalepa Pvt. Ltd. Beem Chemicals Link Natural Products Natures Secrets Vendol Lanka Ltd
Transport	Between Island and mainland Tourist Boat Passenger boats Good transport Cold Transport facilities	DS Office Delft Road Development Authority Private Operators Sri Lanka Navy	Fisheries Cooperative Society of Delft
	Inland Repairing of roads Bullock Carts Horse Carts Tourist Tuk Tuk	Divisional Secretariat Delft Private operators Sri Lanka Tourism Development Authority	Fisheries Cooperative of Delft
Marketing	State of Art Marketing Centre Mini super Delft products Traditional foods	Divisional Secretariat	Fisheries Cooperative of Delft Donors
	Fair Trading to market Handy Craft Products	Divisional Secretariat of Delft Sri Lanka Export Development Board	Fisheries Cooperative of Delft or a Producers Company to be formed
Services	Vehicle Maintenance and Repair Centre	DS Office Delft Vocational training Authority	German Technical Training Institute

Sector	Product/ Small business unit/SMEs	Stakeholders	
		Government	Private/NGOs
		Divisional Secretariat of Delft	
Energizing Delft	Solar Power	DS Office Delft National Engineering Research and Development Agency	J-Lanka Technologies
	Dendro Power	DS Office Delft National Engineering Research and Development Agency	Lanka Gassifires Pvt. Ltd
	Biogas	DS Office Delft National Engineering Research and Development Agency	Bio Fuel Lanka Helpo Eco Green Bio Gas Company Lanka Bio Gas Association
	Wind Power	DS Office Delft National Engineering Research and Development Agency	Senok Group Pvt. Ltd.
	Solar Drying	DS Office Delft National Engineering Research and Development Agency	Saviru Solar Dryers
Social Security	Pension Scheme	DS Office Delft Social Security Board Divisional Secretariat	
	Insurance	DS Office Delft Sri Lanka Insurance Board	
Business Promotion	Attitude building	DS Office Delft Small Business Development Division of District Secretariat Ministry of Youth Affairs	Sevalanka Foundation, Freelance Training Providers
	Entrepreneurship	DS Office Delft Small Business Development Division of District Secretariat	CEFE & Freelance Training Providers
	Marketing	DS Office Delft Small Business Development Division of District Secretariat	CEFE & Freelance Training Providers
	Customer care	DS Office Delft Small Business Development Division of District Secretariat	CEFE and Freelance Training Providers
	Business record keeping	DS Office Delft Small Business Development Division of District Secretariat	CEFE and Free-lance Training Providers
	Conflict resolution	DS Office Delft Small Business Development Division of District Secretariat	National Institute of Social Development
	Tourist guiding	DS Office Delft Wayamba Hotel School	Tour Guide Association Sri Lanka Institute of National

Sector	Product/ Small business unit/SMEs	Stakeholders	
		Government	Private/NGOs
		Tourism Development Authority	Tour Guide
	Strengthening of Cooperatives and Associations	DS Office Delft Department of Cooperatives Divisional Secretariat	Donors

3.9 Theory into Practice

The community PRA process leads to identify six areas of priority for action, in order to make the process operational, the following approach was recommended by the core team.

a. Develop a comprehensive proposal/approach

b. Combine with current and future government led programs

c. Use agency technical experts

d. Revalidate with limited groups (RDS, DS office, GA, Provincial Council)

e. Presentation to larger potential partners/donors – in Colombo, Jaffna or Delft

f. MFF/ IUCN grants to initiate programs

g. Other grants and management support on practices and technologies

Furthermore, the following activities have been identified as entry points to promote a sustainable community centered implementation plan.

a. Green Delft thinking and unique products

b. Fast track Coconut and Palmyra planting

c. Self-sustaining seed production

d. Initiatives to improve the limited water supply through tank renovation, rainwater harvesting and increasing tank volume through expansion

e. Transportation between mainland and Delft

Appendix

Appendix A: Agenda of RAP

Day 1 – 8th June		
Session 1	**Introduction to Resilience Analysis, SES and systems approach.**	
0700 1700	Leave for Jaffna Team meeting (Jaffna)	• Core team (Core team: MFFS, CR, NC, SPO/SGO, NCB member, local consultant)
Day 2 – 9th June		
Session 2	**Stakeholder Consultation and PRA** Venue: DS Office, Delft	
0730 0900 – 1000 1030 – 1700	Travel to Delft Island Meeting with Divisional Secretary, Delft. Mr A. Sri **PRA (resource users, women, youth)** o Mandate and vision (scopes of work) o Role in National Resource Management (NRM), Climate Change (CC) Adaptation, livelihoods development, Disaster Risk management (DRM), tourism, land use planing o Past and ongoing activities, future plans o Constraints, Challenges and Opportunities	• Core team • Grama Niladhari (GN) (6) • Delft Fisheries Federation • CBOs • Religious leaders • Women and Elderly people • SL Navy, Police • NGOs working in Delft • A member each from different livelihood groups • 2 members from each GND
Day 3 – 10th June		
Session 3	**Transect walk/going through detailed Map**	
0800 – 1000 1000 – 1230	Observing landscape, major natural resources, livelihoods activities, business-as-usual, composition/set up of villages, understanding topography, sources of fresh and saline water and routes of navigation, key business points, important points of administration, heritage sites etc. Group discussion & planning for stakeholder validation	• Core team • GNs, and Community members to be identified at the PRA (max. 6) • SL Navy • Etc.. • Core team • LUPPD • DDMCU • GNs, and Community

		members • SL Navy Etc..
Session 4	**Stakeholder Validation Meeting** Venue: DS Office, Delft	
1330 – 1630	o Types of resources and ecosystem services available o Status/trend of resources in use and key drivers of change/sustainability o Resource mapping/land use zonation o Livelihoods options o Hazards & vulnerability (rapid/onset) o Impact of/interaction with past and ongoing projects, programmes, initiatives, companies/business ventures, SME's o Identifying Key players o Needs and potentials o Sustainable development options	• Core team • Divisional Secretary • Planning Officer • Environment Officer • GNs (6 Divisions) • Fisheries Federation • 2 Community members from each GN • Divineguma • Land use Officer • DDMCU • CCD • Fisheries Dept • SL Navy • Agrarian Development, • Agriculture • Aquaculture • Social welfare • School principals • Samurdhi • SME development etc
Day 4- 11th June		
0900 – 1000	Meeting with District Secretary, Jaffna Mr N. Vethanayahan	• Core team • LUPPD • DDMCU
Session 5	**Recap meeting**	
1030 – 1200	o Data compilation and analysis o Developing a draft conceptual model of the SES o Setting up strategy/identifying thematic areas	• Core team

Core Team:

- Dr Ananda Mallawatantri – Country Representative, IUCN Sri Lanka
- Mr Ajith Tennekoon – Member- NCB , Sri Lanka
- Mr Raquib Amin – Senior Operations Manager, MFF Secretariat, BKK
- Mr. Lakshman Wijayawardene – Local Consultant – livelihood Development
- Mr Ganeshanathan Sapeasan – Local Consultant (Sevalanka Foundation, Jaffna)
- Mr Damith Chandrasekera – National Coordinator, MFF Programme
- Mrs Kumudini Ekaratne – Senior Programme Officer/MFF Small Grant Officer

Appendix B: Participation list for PRA

11th June, 2015 (9.00am -10.00 am)

No.	Name	Designation
1	N. Vethanayagam	GA Killinockhchi
2	P. Senthilnanthan	Additional GA Killinochchi
3	K. Sivendran	Environmental officer Central Environmental Authority
4	N. Ramesh	Coordinating Officer Palmyra Development Board
5	V. Satiyakumar	DD(A) Central Environmental Authority
6	N. Sathyauany	Forest Officer, Forest Department
7	G. W. Sarath Kumar	BFO Forest Department
8	G. Sapeasan	P.M Sevalanka Foundation
9	R. Nishanthan	ACAD Department of Agrarian Services
10	Ajith Tennakoon	Senior Program Advisor , Sevalanka Foundation
11	Kumudini Ekaratne	Senior Program Officer, IUCN
12	Raquibul Amin	Senior Operations Manager, MFF Regional Secretariat
13	Ananda Mallawatanthri	Country Representative – IUCN Sri Lanka Country Office
14	S. Nicholoaspillai	Deputy Director, District Planning Secretariat
15	K. Maheswaran	DDP, District Planning Secretariat
16	K. Sibalasundaram	DPDA, Department of Agriculture
17	N. Visnuvartharan	Development Assistant , Coast Conservation Dept
18	Mr. L.Wijayawardene	Local Consultant – livelihood Development

11th June, 2015 (11.00 am – 12.30 pm)

No.	Name	Designation
1.	Ponnudurai Ayngaranesan	Minister
2	M Patrick Diranjan	Secretary
3	G. Sapeasmi	P.M Sevalanka Jaffna
4	Ajith Thennakoon	Senior Program Advisor Sevalanka Foundation
5	Damith Chandrasiri	National coordinator MFF
6	Kumudini Ekaratne	Senior Programme Officer IUCN Sri Lanka
7	A .A.M. Fahim	Document Reporter – Sevalanka Foundation
8	Jarvanathan Jaryaraja	Irrigation Engineer – Irrigation Department Jaffna
9	Krishnapillai Theirathashan	Ministry of Agriculture, NP
10	Thanoja Suthagar	Veterinary Surgeon
11	S. Sivakumar	PDA (NP)
12	Raquibul Amin	Senior Operations Manager, MFF Regional Secretariat
13	Ananda Mallawatanthri	Country Representative IUCN Sri Lanka Country Office
14	Mr. L.Wijayawardene	Local Consultant – livelihood Development

Attendance Sheet

10.06.2015

No	Name	Designation	Gender	Signature
1	Mr. K. Pratheepan	Environmental officer	Male	[signature]
2	Mr. K. Sivadiran	Environmental officer	Male	[signature]
3	MR. T. Thanushan	Grama Niladhari J/01	male	T. K.
4	MR S. Gamini	Development officer	male	S. Gamini
5	Mr. P. Ceeliyan Kurus	D.O (J/02, 03	male	P. L. [signature]
6	K. Shanmugalingam	G.S J/03	Male	[signature]
7	S. Thayaliny	G.S J/06	Female	S. Thayaliny
8	[illegible]	[illegible]	Female	[illegible]
9	[illegible]	D.O (J/61) West	Male	Y. Sabeeupe
10	A. Jebanesan	Do, DS. office	male	A. Jebanesan
11	A. Ajith Sanjeev	D.O. J/04	male	A. Ajith
12	J. Rajan	G.S. N	J/05	J/05 [signature]
13	[illegible]	[illegible] J/04	F	T. Mary [illegible]
14	K. Priyadarshi	W.R.S	Female	K. P. [signature]
15	K. Pushpalatha	D.O	Female	K. Pushpa
16	P. Donbosco	DO (J/05)	Male	P. Don
17	R. Kapilan	D/O	Male	R. Kapi
18	[illegible]	D.O - DMC	Male	[signature]
19	[illegible]	DO	Male	P. [signature]
20	N. Murugathas	ADO Ag/Dept.	[illegible]	[signature]
21	N. Visnuvarthanan	DA - CCD	male	N. [signature]
22	V. Kalistan	DFI Fisheries Dept	Male	V. [signature]
23	Lcdr AKJ Weerasinghe	SLN	Male	[signature]
24	Damith Chandrasekara	Programme Coordinator - MFF	Male	[signature]
25	Ajith Tennakoon	Regional Director SLF	Male	[signature]
26	AM. Fahim			[signature]
27	[illegible]	G.S. N-J/4	Male	[signature]
28	R. Sahaya Niranjini	GSN J/02	Female	[signature]
29	T. Tharshika	D.O	"	T. [signature]
30	[illegible]	[illegible]	Male	A. [illegible]

The allowance sheet will not include Representatives from MFF, SLF, SLN and these particulars.

Attendance Sheet

10.06.2015

No	Name	Designation	Gender	Signature
1	S. Kamalrajh	O.E.S.		
2	J. J. Ravi kumar	O.E.S		
3	K. H. Thiyadduna	D.D.O		
4	A. Sri	D.S.		
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Attendance Sheet

09.06.2015

No	Name	Designation	Gender	Signature
1	[illegible]	G.S.N. J/4	male	[illegible]
2	A. Kandeeban	D.M	male	A.[illegible]
3	S. Gamini	D.O J/06	Male	S. Gamini
4	P. [illegible]	Do, J/05	Male	P. [illegible]
5	P. Leeliyan Kurus	DO, J/02,03	male	P.L. [illegible]
6	[illegible]	DO. J/01 west	Male	Y. [illegible]
7	[illegible]	D.O J/04 (centre)	male	A. Ajith
8	[illegible]	Do. DMC	male	[illegible]
9	J. Ravany	G.S-N	Female	J. Ravany
10	S. Thayaliny	G.S. J/06	female	S. Thayaliny
11	[illegible]	G.S J/01	Male	[illegible]
12	R. Sahayarani ranjini	GSN J/02	Female	[illegible]
13	S. Vimal.	[illegible]	male	S. Vimal.
14	S. Jegaja	[illegible]	male	S. Jegaja
15	[illegible]	[illegible]	Female	T. Mary Biyatrs
16	K. Priyadeji	W.R.S	Femal	K.P.[illegible]
17	P. Vanaja	D.D.O J/04	Female	P.V[illegible]
18	M. Fattimaemelda	D.D.O J/06	Female	M.F. Emelda
19	S. Kisnamokan	D.D.O S/05	male	[illegible]
20	K. Beminy	D.D.O J/03	Fem	K. Beminy
21	N. Kokilavany	DDO J/02	Female	N. Kokilavany
22	F. JUDE RENTON	D.D.O. J/01	male	F.J. Renton
23	[illegible]	G.S. J/03	Male	[illegible]
24	[illegible]	G.M. MPCS Delft	Male	[illegible]
25	[illegible]	[illegible]	Male	[illegible]
26	[illegible]	[illegible] J/01	Fem	[illegible]
27	D. Krishanthiny	[illegible] J/02	Fem	D. Krishan
28	[illegible]	[illegible]	male	D.N. [illegible]
29	[illegible]	[illegible]	male	[illegible]
30	T. Tharshika	Secretary WDS J/02	Female	T. Tharshika

Attendance Sheet

09.06.2015

No	Name	Designation	Gender	Signature
1	[illegible]	[illegible] (J/D) J/01	male	[illegible]
2	[illegible]	[illegible]	Male	[illegible]
3	[illegible]	,,	male	[illegible]
4	[illegible]	[illegible]	MALE	[illegible]
5	[illegible]	[illegible]	male	[illegible]
6	A. Jebamesan	Do, DS office.	male.	[illegible]
7	B. MEGALA	Pradesa - MA	F. male	[illegible]
8	S. Ravi	DMC	Male	[illegible]
9	V. Vijayaneshan.	LUPO	male	[illegible]
10	S. R. Samanthiran	A.D.P	male	[illegible]
11	K. Pushpalatha	D.O.	Female	K. Pushpa
12	P. Pinku	D.O	male	P. Pinn
13	[illegible]	O.E.S	male	[illegible]
14	S. Kamalrajh	O.E.S	"	[illegible]
15	A. Sri	DOS	"	[illegible]
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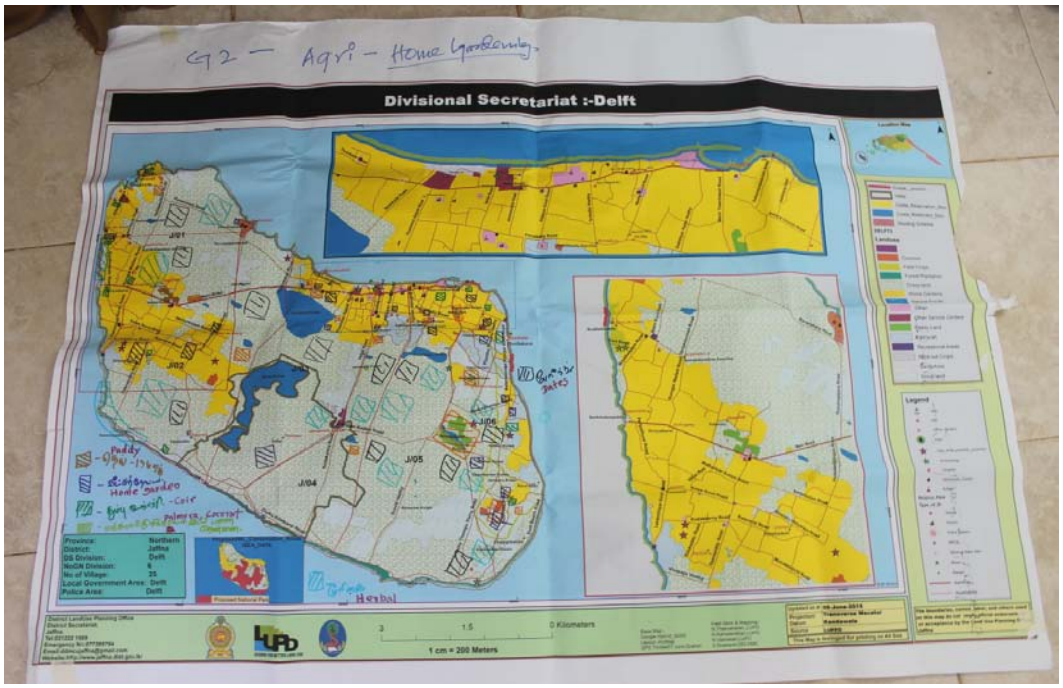
Appendix C: Maps formulated through the community mapping exercise



Community Mapping for Agriculture and Home gardening

Community mapping for Fishing activities and harbors

Community mapping for Livestock

Community Mapping for Tourism

Appendix D: Justification for the Zoning

Proposed Zone	Justification for the zoning		
	Socio-Economic reasons		Technical Reasons
	community acceptance	*Other reasons*	
Zone 1 (Agriculture)	Suggested and Accepted	Compatible with the present land use	***Specific scientific studies are recommended to be carried out in the different zones before embarking on any projects as data acquired from previous studies are not adequate to determine technical reasons***
Zone 2 (Residential)	Suggested and Accepted	Compatible with the present land use	
Zone 3 (Protected/Conservation)	Suggested and Accepted	Identified and demarcated by Dept of Wildlife Conservation / coastal resource protection	
Zone 4 (Tourism)	Suggested and Accepted	• Appropriate sandy beach • Close proximity to services and tourist attractions	
Zone 5 (Industrial)	Suggested	• Promote cottage industry • Close proximity to services, settlements and other infrastructure • Curb unemployment	
Zone 6 (Agriculture and livelihood)	Suggested	Compatible with present land use	

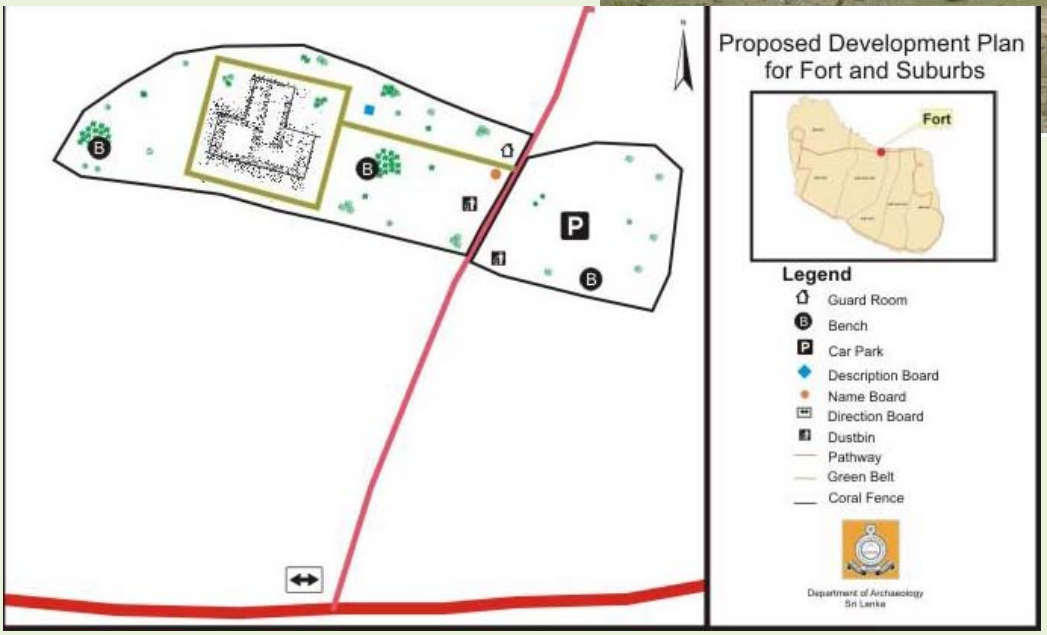
Appendix E – Archaeological sites

Heritage Tourism Development Sites of Delft Island

Dutch Hospital

Courts building

Dutch Fort



Proposed development plan for Fort and suburbs

Hindu Kovil

The Site

Pigeon House

Queen's Tower

Stable

Proposed development plan for Pigeon house complex and

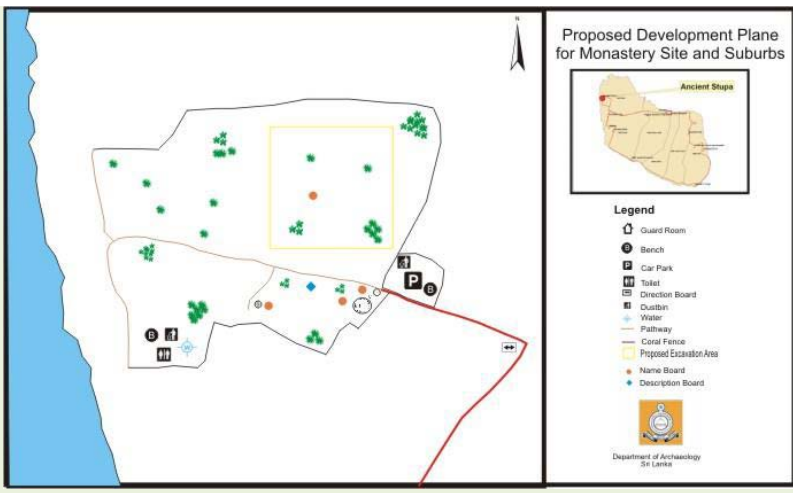
Old Stupa 1

Old Stupa 2

Old Stupa 3

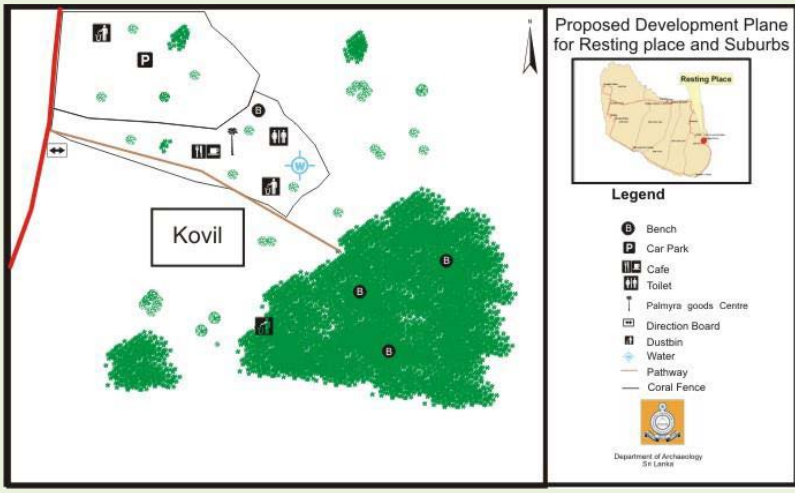
Place which where horses were given medicinal treatments

Monastery site and suburbs



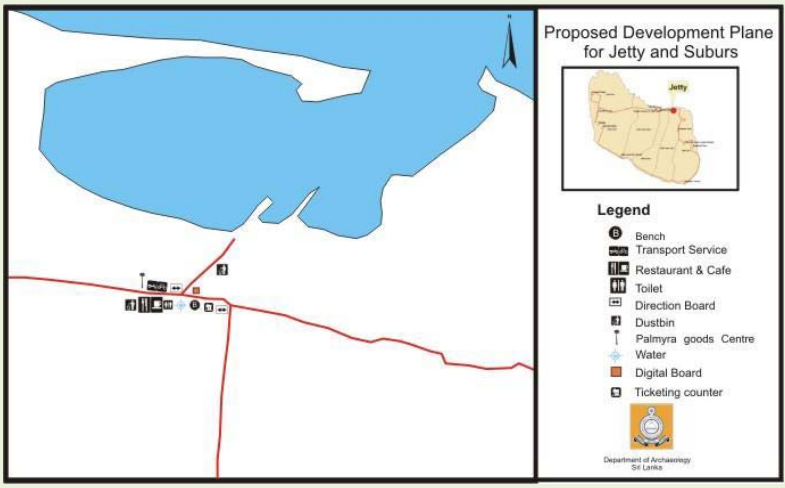
Proposed development plan for Monastery site and suburbs

Resting Place and suburbs

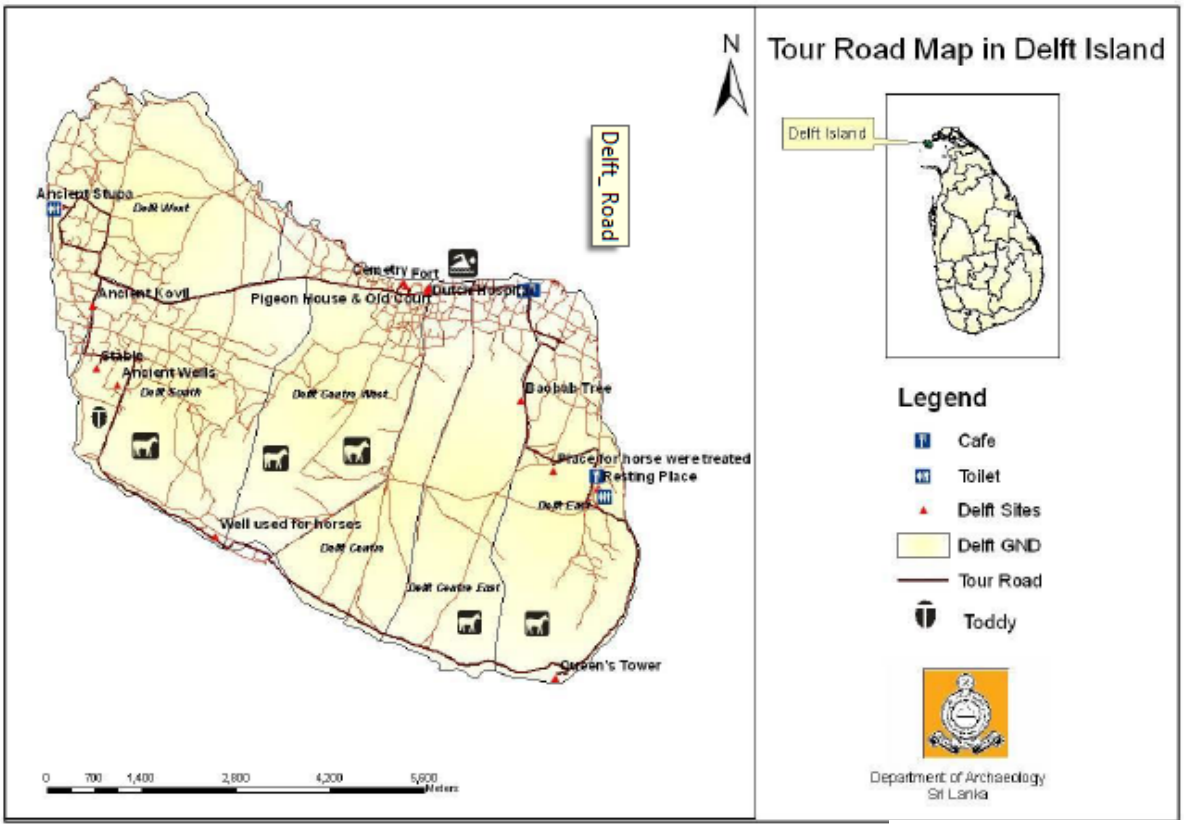


Proposed development plan for Resting place and suburbs

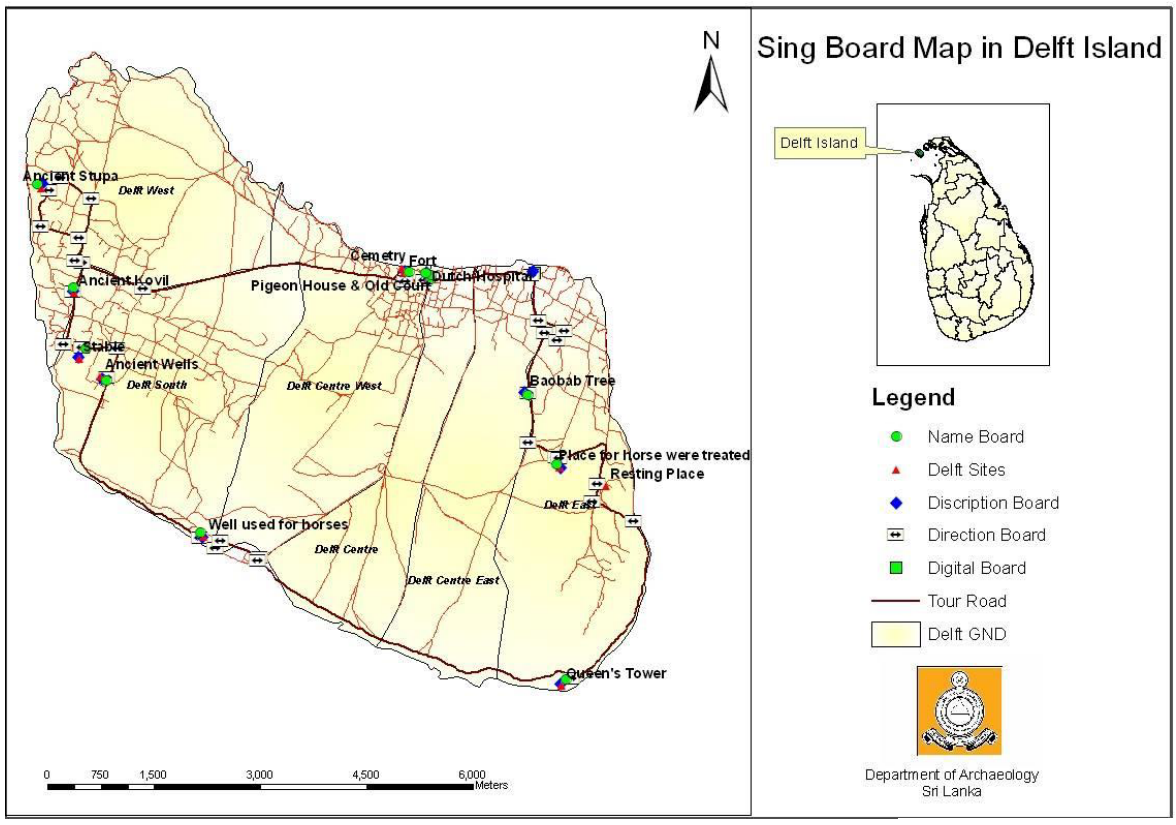
Jetty



Proposed Jetty



Tour Road Map



Sign Board Map

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Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

About Mangroves for the Future

Mangroves for the Future (MFF) is a unique partner-led initiative to promote investment in coastal ecosystem conservation for sustainable development. Co-chaired by IUCN and UNDP, MFF provides a platform for collaboration among the many different agencies, sectors and countries which are addressing challenges to coastal ecosystem and livelihood issues. The goal is to promote an integrated ocean-wide approach to coastal management and to building the resilience of ecosystem-dependent coastal communities.

MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami. It initially focused on the countries that were worst affected by the tsunami -- India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand. More recently it has expanded to include Bangladesh, Cambodia, Myanmar, Pakistan and Viet Nam.

Mangroves are the flagship of the initiative, but MFF is inclusive of all types of coastal ecosystems, such as coral reefs, estuaries, lagoons, sandy beaches, sea grasses and wetlands.

The MFF grants facility offers small, medium and large grants to support initiatives that provide practical, hands-on demonstrations of effective coastal management in action. Each country manages its own MFF programme through a National Coordinating Body which includes representation from government, NGOs and the private sector.

MFF addresses priorities for long-term sustainable coastal ecosystem management which include, among others: climate change adaptation and mitigation, disaster risk reduction, promotion of ecosystem health, development of sustainable livelihoods, and active engagement of the private sector in developing sustainable business practices. The emphasis is on generating knowledge, empowering local communities and advocating for policy solutions that will support best practice in integrated coastal management.

Moving forward, MFF will increasingly focus on building resilience of ecosystem-dependent coastal communities by promoting nature based solutions and by showcasing the climate change adaptation and mitigation benefits that can be achieved with healthy mangrove forests and other types of coastal vegetation.

MFF is funded by Danida, Norad, and Sida.

Learn more at: www.mangrovesforthefuture.org