

Occasional Papers of IUCN Sri Lanka No. 14, January 2013

# Sustainable Development of Delft Island: An ecological, socio-economic and archaeological assessment



S. de A. Goonatilake, S. Ekanayake, T.P. Kumara, D. Liyanapathirana, D.K. Weerakoon and A. Wadugodapitiya

#### **Occasional Papers of IUCN Sri Lanka**

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IUCN, International Union for Conservation of Nature

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### **ABBREVIATIONS**

BrR	-	Breeding Resident Species
CoS	-	Conservation Status
CR	-	Critically Endangered Species
CSR	-	Corporate Social Responsibility
DD	-	Data Deficient Species
EN	-	Endangered Species
EX	-	Exotic Species
GBH	-	Girth at breast height
IAS	-	Invasive Alien Species
IUCN	-	International Union for Conservation of Nature
МІ	-	Migratory Species
NT	-	Near Threatened Species
Pro: endemic	; -	Provisional Endemic Species
SpS	-	Species Status
VES	-	Visual Encounter Survey
VU	-	Vulnerable Species
wv	-	Winter Visitor

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### **1. INTRODUCTION**

Neduntheevu or Neduntivu Island, known more widely by its Dutch name - Delft Island - is an island located in the Palk Strait in the northern region of Sri Lanka. It is the second largest island that occurs within the territorial waters of the country. It is roughly oval in shape, and has a total extent of approximately 50 km<sup>2</sup>. The maximum length of Delft Island is 8 km, while the maximum width of the island is 6 km. At present, the island is inhabited by a small population of Tamil people.

Delft Island is located approximately 10 km off the mainland and can be reached by ferry. The ferry leaves to the island from the Kurikattuwan jetty in Punkudutivu - a town located approximately 46 km from the Jaffna city center. A free ferry service is provided by the Road Development Authority (RDA) for passengers who wish to visit Delft Island. In addition, visitors can use either a privately operated ferry service, or a rented boat, to travel to the island. The duration of the journey varies from between forty-five minutes to an hour, depending on the mode of transport, and the condition of the sea. A bus service is available for travel within the island. In addition, scooter taxis, tractors and bicycles can also be used as modes of transport within Delft Island.

The island features a semi-arid tropical vegetation cover dominated by palmyrah palms, thorny shrubs and grasses that grow on the porous coralline soil of the island. Archaeological remains from the island indicate that Delft has been inhabited by humans permanently, since ancient times. Therefore, its present vegetation has been influenced by its human inhabitants significantly, in addition to influence from its climatic and soil factors. Similarly, some of the unique species present on the island, such as the baobab tree and the feral Delft ponies, were introduced by foreign inhabitants.

It is likely that the first settlers on the island cleared the land for agricultural purposes. The harsh climatic conditions that prevail on the island, and the grazing pressure exerted by the domesticated herbivores introduced by its early settlers, are likely to have then prevented the native trees from regenerating. It appears that these natural and anthropogenic factors have contributed to the total destruction of the native vegetation of the island, as well as many of the indigenous tree species over time. At present, much of the land area of the island is used as pasture land, which is the predominant landscape that can be observed. Developed areas (residential and administrative) occupy about a quarter of the island, and are located in a section of Delft that is less vulnerable to floods, and has soils capable of sustaining better plant growth. The island has a history of occupation by various foreign invaders from time to time. A few remnants from its colonial past, such as ancient buildings believed to be from the South Indian Chola Dynasty, as well as the ruins of a Portuguese fort, can still be seen along the western coast of the island.

Delft Island has the largest human population of all the islands located around the Jaffna Peninsula. It had a population of around 12, 000 in the1960, which declined to around 6, 200 in 1981. During the 1990's, when the northern conflict was at its peak, many people were displaced from the island. In 2007, Delft had an estimated population of 4,124 persons, all of whom were Sri Lankan Tamils. Following the conclusion of the war, people have begun to return to Delft, gradually. Therefore, its current population comprises of approximately 4, 800

persons, belonging to 1, 468 families. Given this backdrop, the government plans to develop the agriculture, livestock and tourism sectors on Delft Island.

The primary aim of the project was to carry out a preliminary study of the island to assess its ecological, archaeological, and socio-economic status, in order to ensure that the proposed development activities occur with a minimal impact on the island, and in a manner that is sustainable and promotes tourism in the future. The study will identify current threats, as well as future threats to the island, along with suitable areas for development and conservation activities. It will also make recommendations for the sustainable development of the island, as well as relevant ecotourism activities.



Figure 1. Map of Delft Island

### 2. OBJECTIVES

The objectives of the project were to conduct a preliminary and rapid investigation of:

- the biodiversity of Delft Island;
- the socio-economic status of Delft Island and its inhabitants; and
- the archaeological monuments on Delft Island;

as well as to make recommendations for the sustainable development of Delft Island.

As such, the primary output of the project is the present report, which includes:

- The findings of the physical, ecological, archaeological and socio-economic assessments of Delft Island;
- A map of Delft Island, illustrating its present land-use patterns, as well as areas that should, potentially, be earmarked for future development and conservation activities; and
- Recommendations for the sustainable development of Delft Island, with a special emphasis on the development of tourism.

#### 3. METHODOLOGY

#### 3.1 Study area

The total area of this isolated island is 4, 034 ha. The island is located in the dry zone of Sri Lanka, and receives a mean annual rainfall of 750 mm, while the 75 percent expectancy value of annual rainfall is approximately 500 mm. The island is classified as belonging to the DL4 agro-ecological climate zone of Sri Lanka, which is only slightly wetter than the driest agro-ecological zone of Sri Lanka (Panabokke, 1996). The rainfall is distinctly seasonal, with two rainfall peaks occurring in the months of April and November (Figure 2). Peak rainfall (exceeding 100 mm per month) occurs due to the northeast monsoon, between October and December, while scattered rains are experienced during the southwest monsoon season, which takes place in the months of April and May (Punyawardena, 2008). The area tends to be hot and dry during the dry season (February to September), and moderately cool and wet during the wet season (October to January). The temperature ranges from 26 °C to 33 °C, with an average temperature of 28.2 °C. January is the coolest month of the year, while May is the hottest month. The relative humidity varies from 70 percent during the day to 90 percent at night on the island. The water on Delft Island is slightly brackish, and is extracted from shallow wells.





Bio-geographically, Delft Island lies within the low country dry zone and is classified under the AI floristic zone (Ashton *et al.*, 1997). The typical natural vegetation formations found in the AI floristic zone (Coastal and marine belt) includes marine mangroves, salt marshes, dunes and strand vegetation.

Geologically, Delft Island consists of deposits that belong to the Eocene, Upper Miocene and Pliocene eras, and are over 2, 000 ft thick. They consist of argillaceous limestone at the base, passing upwards into argillaceous sandstone, indicating a change from deep to shallow water sedimentation (Cooray, 1984). Delft Island is separated from rest of the Jaffna island cluster by a channel approximately 12 m deep, and is girded by limestone shores and

low cliffs. Sand sheets and dunes, blown in by the southwest monsoon, can be seen on some exposed southwest-facing sectors of the island (Swan, 1983). The magnitude of the tide level is relatively low around the coastline of the island, when compared to rest of the beaches in Sri Lanka (Swan, 1983). The shoreline of the island stretches to approximately 30 km. The island has been isolated since the last ice age.

Most of Delft Island is covered by skeletal coralline based soils. The main types of soils identified on the island are Solodized Solonetz and Grumusols, which are highly salinized, making the land less suitable for the cultivation of crops (De Alwis and Panabokke, 1972; Punyawardena, 2008). The plant life of the island is vulnerable to water shortages and can be affected by droughts easily due to the shallow depth of the soil. The surface soils of the island tend to be sandy, and overlay weathered coral rock. The sandy soils of Delft Island are poorly developed, generally coarse in texture, and non-structured, comprising mainly of coral and foraminifera.

The island has a low relief, which is predominantly less than 5 m above mean sea level (msl), and is generally flat. Surface freshwater resources on the island are very few, with no rivers or lakes. Based on field observations, it is clear that Delft Island is an elevated seabed, consisting primarily of coralline material. The surface of the island is covered mainly with coral reef rubble, interspersed with other marine deposits, such as calcareous mudstone, siltstone and sandstone. The belt of sharp coral rocks on the seashore, fringing most of the island, makes it almost impenetrable.

The coralline seabed, once exposed, has eroded and degraded due to natural forces. The erosion and degradation of the coralline seabed has resulted in the accumulation of unconsolidated sand on the open ground. Soil development has been facilitated by the establishment of pioneer plant species, where organic leaf litter from these plants have contributed to the humus content, and the richness of the soil, thus supporting the establishment of other plant species.

#### 3.2 Assessment methods

#### 3.2.1 Overall methodological approach

The study was conducted in October, 2011. A five day field visit was carried out in order to gather the necessary data.

The preliminary assessment of Delft Island comprised of the following activities:

Activity 1 - Rapid assessment of the biodiversity and archaeology of Delft Island

A baseline biodiversity survey was carried out to document the flora and fauna of both the marine, and terrestrial, habitats of Delft Island. The natural vegetation was classified under two major categories - forests (tree dominated vegetation types and degraded forests) and non-forest vegetation (scrublands, grasslands and aquatic vegetation dominated by shrubs and herbaceous life forms). All terrestrial groups of vertebrates (amphibians, reptiles, birds and mammals) and selected invertebrate species (dragonflies and butterflies) present in these habitats were identified and documented. Additionally, marine floral and faunal species

were identified and recorded in the marine habitats. The study also identified endemic, migratory, threatened and invasive species present in these habitats.

A literature search and ground survey were used to gather relevant archaeological information on the island and its history.

#### Activity 2 - Mapping of identified sites, including those suitable for conservation

The information collected through the assessments, as detailed in Activity 1, was used to produce maps to aid easy visualization of the biodiversity and archaeological elements of Delft Island. A rapid demarcation of potential conservation areas was done to ensure that these areas will not be degraded due to future development and resettlement activities. All the recorded sites were geo-referenced, in order to produce a GIS database for the preparation of these maps.

Activity 3 - Preparation of a report on the status of the ecological and archaeological elements of the Delft Island, as well as recommendations for sustainable development and ecotourism activities

This report includes the detailed results of the assessments carried out under Activity 1, as well as the socio-economic aspects of the island. This baseline data will be useful for development planning, and the preparation of suitable management plans for the development of sustainable tourism initiatives on Delft Island.

#### 3.2.2 Selection of sample sites and sampling frequency

Sample sites were selected based on the findings of several rapid reconnaissance surveys that have been conducted on Delft Island in the past (De Silva, 1957; CBC, 2001; Somaweera, 2006; Somaweera and Somaweera, 2009; FOGSL, 2010; Weerakoon, 2011), taking into consideration criteria such as accessibility, habitat quality, extent and spatial distribution within the island (Appendix 1). In order to determine the spatial variation and the distribution of biodiversity on the island, both aquatic and terrestrial habitats were surveyed during a three day sampling session.

#### 3.2.3 Methodology - inland floral survey

The main vegetation types and land-use patterns of the island, as well as their extents, were determined using land-use maps, topographic sheets and satellite images of the area. These findings were confirmed through a reconnaissance survey. Belt transects of the dimensions 50 x 5 m were used to identify and record the number of plant species present in each of the identified vegetation and land-use types. The number of plots used per vegetation type was determined based on the extent and the floral diversity of the given vegetation type. In addition to the data collected from the sampling plots, opportunistic observations were also used for the compilation of a floral inventory for the island.

#### 3.2.4 Methodology - inland faunal survey

All groups of vertebrates (amphibians, reptiles, birds and mammals), and selected invertebrate taxa (dragonflies and butterflies), were identified and documented within each of the vegetation types defined through the floral survey. Each of these faunal groups was sampled within the plots used for the floral survey, using standard scientific sampling

techniques based on Visual Encounter Survey (VES) methods (Table 1). Both direct, and indirect observations (animal signs such as pellets, tracks and food remains), were recorded within each sample site. In addition to the data collected from the sample sites, opportunistic observations were also used for the compilation of a faunal inventory for the island. Information on the fauna present on the island was also collected through direct interviews with Navy personnel and local communities, and verified through relevant field guides (Table 2) and photographs. Night sampling was also conducted along the road network within the island to record the nocturnal species present, including reptiles, birds and mammals.

Group/ Taxa	Method	Technique
Dragonflies	Direct	Transects and visual encounter survey
Butterflies	Direct	Transects and visual encounter survey
Amphibians	Direct	Transects and visual encounter survey
Reptiles Direct Transects and visual encounter survey		Transects and visual encounter survey
Birds	Direct and Transects (visual and auditory observations were variable circular plot counting method at the beg end of each transect)	
Mammals	Direct and	Transects, visual encounter survey, and indirect signs such as
	Indirect	tracks, tecal matter, teeding signs, and calls

#### Table 1. Summary of faunal sampling techniques

#### 3.2.5 Identification of inland flora and fauna

The identification of inland plants and animals on Delft Island was based on latest standard published field guides and keys available in Sri Lanka. In addition, specimens deposited in the National Herbarium and the National Museum were referred to for the authentication of species that could not be identified using standard guides or keys. The key references used for the identification of flora and fauna are listed in Table 2. Nomenclature for the floral species present on the island was based on MOE (2012) and Senaratne (2000) for fauna and flora, respectively. The conservation statuses of the species recorded were determined according to MOE (2012).

Table 2. Key references	used for species	identification ar	nd nomenclature
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Group	Source		
Flora	Ashton et al. (1997); Dassanayake, M. D. and Fossberg, F. R. (eds) (1980		
	- 1991); Dassanayake, M. D., Fossberg, F. R. and Clayton, W. D. (eds)		
	(1994 - 1995); Dassanayake, M. D., Fossberg, F. R. and Clayton, W. D.		
	(eds) (1995 - 1996); de Vlas-de Jong, J. and de Vlas, J. (2008)		
Flora nomenclature	Senaratna, L. K. (2000)		
Fauna nomenclature	MOE (2012)		
Freshwater fish	Pethiyagoda, R. (1991); Goonatilake, S de A (2007)		
Amphibians	Manamendraarachchi and Pethiyagoda (2006), De Silva (2009)		
Reptiles	Somaweera, R (2006), Somaweera, R. and Somaweera, N. (2009)		
Birds	Harrison, J. (1999); Kotagama, S. and Ratnavira, G. (2010); Warakagoda,		
	D. and Hettige, U. (2008)		
Mammals	Phillips, W.W.A. (1935); Wijeyratne, G de S (2008)		

Group	Source
Butterflies	D' Abrera, B. (1998)
Dragonflies	Fonseka, T. de (2000); Bedjanic, M., Conniff, K. and Wijeyratne, G de S (2007)
Invasive species	Marambe et al.(2010)
Threatened species	MOE (2012)

#### 3.2.6 Methodology - marine biodiversity survey

Line transect surveys were carried out to identify and document the fauna and flora present in the marine habitats of the island. In addition, opportunistic data was collected, where possible, for the compilation of comprehensive species checklists.

#### 3.2.7 Methodology - socioeconomic survey

Secondary information on Delft Island was collected from published and unpublished sources, as well as from various government agencies, such as the Department of Census and Statistics, the office of the Divisional Secretary, Grama Niladharis, and the District Medical Officer. In addition, an interview survey was carried out on Delft Island to collect information from community leaders, and local and national government officers.

#### 3.2.8 Methodology - archaeological survey

Information available on the archaeology of Delft Island was collected through a lliterature survey. This information was supplemented by data gathered during the field survey. The literature review included materials such as books, journal articles, reports produced by the Department of Archaeology, and information collected from the one-inch topographic maps (1:63,000) published by the Survey Department. During the field survey, archaeological sites that have been recorded previously were revisited wherever possible. A field survey was carried out to identify new archaeologically significant sites, simultaneous with the biodiversity survey. Further information was collected through interviews with local communities and government officials. All the sites visited were photographed, documented and geo-referenced.

### 4. **RESULTS**

#### 4.1 Inland biodiversity

Overall, the island features tropical semi-arid vegetation, dominated by palmyrah 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.

#### 4.1.1 Habitats

Delft Island is covered by a mosaic of diverse vegetation types, ranging from natural and semi-natural habitats, to highly anthropogenic habitats. A description of the key vegetation types observed, and the dominant plant species present in each of these habitats, is given below. A complete list of the sampled habitats, along with their relevant use values and threats is provided in Annex 1.



Figure 3. Distribution of habitats within Delft Island

#### **Dry pasture lands**

The dry pasture lands of Delft Island are characterized by the dense growth of short grasses (up to 5 cm in height) forming a green carpet that spreads over large areas of the island landscape. The structure and floristic composition of the grassland system is influenced considerably by grazing pressure, trampling, high salinity and drought. The dominant grass species observed in this habitat include *Bulbostylis barbata, Cressa critica, Cyperus iria, Eragrostis maderaspatana, Fimbristylis argentea, Fimbristylis feruginea, Peplidium maritimum, Sporobolus tremulus* and *Zoysia martella*. Species dominance and species composition appear to be determined by site specific moisture levels. Dry pastures are indispensable, given the important role they play in sustaining the wild pony and cattle populations of the island. Many graminivorous birds can also be seen feeding in these grasslands. As with other open vegetation types, dry pasture lands stabilize the soil, as they produce mat-like vegetation cover, while the roots of these grasses hold the soil together, preventing erosion. The pasture lands also function as efficient filters and trap surface runoff.

#### Wet pasture lands

Structurally, as well as functionally, wet pasture lands are more or less similar to dry pasture lands. However, their species assemblage patterns are slightly different to those of dry pasture lands. Often, short plant species belonging to the Cyperacea family, such as *Bulbostylis barbata, Cyperus arinarius, Cyperus bulbosa, Cyperus conglomaratus, Cyperus pygmaeus, Cyperus rotundus, Fimbristylis argentea* and *Fimbristylis dipsaceai,* are observed commonly in this type of habitat. *Phyla nodiflora* is the dominant plant species that can be seen in the wet pasture lands of the island. Other commonly occurring species in this habitat include *Cressa critica, Cynadon dactylon, Eragrostis maderaspatana, Peplidium maritimum, Sphaeranthus indicus, Sporobolus spicatus* and *Zoysia martella.* Wet pasture lands can be observed as isolated patches within the turf grass community, where there are slight depressions in the land that hold water. These depressions can retain rain water during the rainy season, during which they become shallow water bodies. According to reports from local people, two-thirds of the flat grasslands of the island are inundated during northeast monsoon season.

#### Mixed thorn scrub jungles

Thorn scrub jungles are characterized by three distinct aerial strata. The upper most layer (5 – 8 m) is composed of scattered and isolated tree species, such as *Limonia acidissima* (divul), *Cassia auriculata* (ranawara) and *Salvadora persica* (maliththan). The continuous shrub layer (2 – 3 m) is composed mainly of *Flueggea leucopyros*, *Toddalia asiatica* (kudumiris), *Dichrostachys cinerea* (andara), *Carissa spinarum* (karamba), *Catunaregam spinosa, Flueggea leucopyrus* (katupila), *Randia* spp., *Zizyphus* spp. (eraminiya) and *Capparis* spp. The plants present in this habitat show stunted growth as they are exposed to strong desiccating winds. Further, the crowns of *Limonia acidissima* (divul), *Azadirachta indica* and *Salvadora persica* were observed to be influenced heavily by the wind. Climbers, such as *Cissus quadrangularis* (heeressa) and *Tylophora indica* (bimnuga), are found commonly associated with thorn scrubs. The lower strata consists of a herbaceous layer (up to 25 cm in height) comprising of plant species, such as *Hemidesmus indicus, Cynadon dactylon, Cyperus iria, Eragrostis ciliaris, Eragrostis riparia, Fimbristylis feruginea* and *Zoysia martella.* Dense vegetation present in this habitat makes it excellent cover against erosion or 'desertification' caused by the strong winds prevailing in the area. Thorn scrubs can trap finer

particles of soil, and sand blown away from the habitats that occur towards the sea, which contributes to the building up of the soil layer. The seeds that are carried by the wind to this habitat help to convert it into a late succession ecosystem (thorn forest). Thorn scrub jungles provide a complex habitat with many niches that support a diverse assemblage of fauna through the provision of feeding, breeding and resting areas.

#### Phoenix dominant thorn scrub jungles

*Phoenix pusilla* dominant thorn scrub jungles are a slight variation from the scrub jungles that exist commonly. They are dominated by *Phoenix pusilla*, which occupies approximately half of the shrub layer. Apart from *Phoenix pusilla*, the shrub layer (2 - 3 m) is composed of *Cassia auriculata, Catunaregam spinosa, Phyllanthus reticulates, Toddalia asiatica, Azima tetracantha, Flueggea leucopyrus, Salvadora persicacopyros* and *Toddalia asiatica*. Unlike in the typical thorn scrub jungles observed on the island, trees grow rarely in this habitat, apart from *Phoenix pusilla*. However, small patches of dry pasture lands  $(25 - 50 \text{ m}^2)$ , can be seen interspersed within the scrub community. It appears that *Phoenix pusilla* is a strong competitor in the shrub community, and prevents other broad-leaf plant species from becoming established near *Phoenix pusilla* bushes. Generally, this vegetation type performs a similar role to that of mixed thorn scrub jungles.

#### Managed home gardens

Home gardens are the vegetation type found immediately around homesteads, and are the result of long-term human manipulation. Home gardens are dominated by multi-purpose tree species that are arranged into different vertical levels. Well developed multi-storey home gardens are located in the southern part of the island. Generally, home gardens consist of three layers: a coconut dominated canopy (20 – 35 m); a sub-canopy (10 m) made up of broad leaf plants; and a shrub or herb layer (2 m). Often, this structure changes rapidly, both temporally and spatially, due to agricultural practices such as weeding, pruning, fencing and digging. Many exotic and agricultural crop species are found in this habitat type. Common tree and shrub species observed 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.* 

Coconut is the dominant species found in almost all the home gardens on the island. Home gardens are important habitats for fauna as they provide animals with feeding and nesting sites. Further, home gardens provide people with resources such as fruits, nuts, yams, flowers, vegetables, medicines, firewood, and timber throughout the year. This helps to reduce the anthropogenic pressures on the natural vegetation cover of the island. Moreover, home gardens with a closed canopy vegetation system provide valuable land cover, and thereby, contribute to maintaining good micro-climatic conditions, as well as to the conservation of soil and ground vegetation. Similarly, home gardens create opportunities for diverse livelihoods - mainly animal husbandry (goats, cattle and poultry), and coconut-based income generation activities.

Coconut plantations, which can be considered as an extension of home gardens, are also found in the area. Traditional tall coconut varieties are cultivated in the area commonly. Usually, they can grow up to a height of 20 - 35 m. However, dwarf varieties also exist in

some home gardens and coconut plantations, but are not very common. The trees are planted with a spacing of approximately  $7 \times 7 \text{ m} - 10 \times 10 \text{ m}$ , resulting in an estimated 48 to 70 trees per acre. Ground vegetation in these coconut plantations is composed primarily of grass species sustaining livestock farming. These coconut plantations are the main source of income in the area.

#### Abandoned home gardens

Many homesteads on the island were abandoned during the civil war, which spanned three decades. The associated abandoned home gardens have a similar floristic structure and composition to managed home gardens, except that the lower vegetation layers are enriched with weeds and wild plants, such as *Cassia tora, Cyperus compressus, Desmodium triflorum, Euphorbia hirta, Flueggea leucopyrus, Sida acuta, Sporobolus maderaspatanus, Sporobolus spicatus* and *Toddalia asiatica*. As these habitats are unmanaged, it has become possible for *Ficus benghalensisis* (maha nuga) and *Ficus amplissima* - two semi-parasitic trees - to thrive in these areas. If these habitats continue to remain unmanaged, the vegetation is likely to become dominated by palmyrah trees and the semi-parasitic *Ficus species, as these plants are not vulnerable to grazing and browsing pressure from herbivores*.

#### Palmyrah woodlands

The arid climatic conditions of the area have enabled the successful spread of palmyrah in some vegetation pockets. Borassus flabellifer (palmyrah) is a robust, 25 - 40 m tall, solitary, dioecious palm tree. It has a relatively large stem, which is straight, and grows up to 1 m in diameter at the base. The stem is conical up to approximately 4 m high, and thereafter assumes a cylindrical shape with a diameter between 40 and 50 cm. The stem of this species is covered by leaf bases when young, and many animal species, particularly reptiles, find safe abode there. More than half of these trees are infested with epiphytic Ficus benghalensis and Ficus amplissima. Among the palmyrah trees, are some other scattered trees species (up to 10 - 15 m in height), such as Azadirachta indica, Canthium coromandelicum, Lepisanthes tetraphylla, Salvadora persica and Tamarindus indica, which form a second strata. Below this layer, small shrubs and herbaceous species (1 - 3 m), such as Boerhavia diffusa, Bulbostylis barbata, Calotropis gigantean, Carissa spinarum, Cassia tora, Cissus quadrangularis, Cyperus bulbosa, Dichrostachys cinerea, Flueggea leucopyrus, Phoenix pusilla, Phyllanthus niriuri, Sporobolus spicatus, Toddalia asiatica and Tylophora indica, can be observed. Generally, palmyrah also exists as thorny vegetation in most places, except where grazing animals have destroyed the short bushes.

#### **Coastal woodlands**

Some coastal areas, towards the western part of the island, are covered by vegetation that comprises of an assemblage of dwarf trees (4 - 6 m). This type of vegetation was observed on higher ground, just behind the seashore vegetation and has a simple structure, consisting of a dense growth of dwarf trees, creating continuous canopy cover, with dry pasture lands beneath it. The tree canopy is heavily branched, gnarled and shaped aerodynamically to withstand the strong winds from the sea side. The incessant strong winds and salt spray do not support tall vegetation in such locations. The woodland floor is a favoured site for grazing cattle as it provides suitable shade for animals to rest under in the scorching mid-day sun. *Gyrocarpus americarnus* is the dominant tree species observed in this habitat type. Other common tree species observed include *Azadirachta indica, Cassine glauca* and *Salvadora* 

persica, and bushes (2 - 3 m), such as *Capparis brevispina*, *Catunaregam spinosa*, *Cissus quadrangularis*, *Flueggea leucopyrus*, *Indigofera* sp., *Jatropha glandulifera*, *Opuntia dillenii*, *Phoenix pusilla*, *Tylophora indica* and *Zoysia martella*, which are found scattered within the area. The natural beauty created by this habitat contributes to the aesthetic value of the island landscape.

#### Coral rock and seashore vegetation

Although coral rock and seashore areas appear to be barren at first sight, they support several species of plants, such as *Spinifex littoreous, Aloe vera, Clerodendrum inerme* and *Toddalia asiatica* that grow as isolated clumps. However, high temperatures during the day, incessant salt spray, and the lack of fertile substrate make it impossible to sustain good plant life in these habitats. Beach sediment and organic debris are continually flushed by sea water into the spaces within these rocky habitats. This creates an ideal environment for some marine faunal species. The rocky areas are also occupied by burrowing animals, such as crabs and worms. These animals hide among coralline rocks to avoid detection by predators, and escape the strong wave action. The belt of coral rocks seen along the seashore is a unique feature of Delft Island, and is effective in dissipating wave energy and minimizing erosion.

#### Sandy seashore vegetation

Sandy seashore vegetation, unlike coral rock seashore vegetation, is confined to just a few locations around the island. This vegetation type has a very simple structure and species composition. Only salt tolerant herbaceous species (up to 30 cm in height), such as Citrullus colocynthis, Ipomoea pes-capre, Launaea sarmentosa and Spinifex littoreus, were observed scattered in these areas. Often, pure populations of Spinifex littoreous provide shelter in the highly unstable seashore, which is exposed to a heavy blowing. Occasionally, other creepers occur in small patches between the clumps of Spinifex littoreous. Much of the seashore exists as exposed sand. Beach sediments are continually flushed by the sea water, which carries oxygen and animal and plant debris into the pores between the sand grains, making it a favourable environment for microscopic organisms. These sandy areas attract a host of burrowing animals, such as bivalves, crabs and other marine invertebrates. These animals hide in the sand in order to escape from predators and strong waves. Many avian species that prey on these invertebrate species can be seen feeding in this habitat type. Towards the landward areas, the poorly vegetated seashore develops into an area with better plant cover due to the edaphic changes brought about by accumulated organic matter, and reduced disturbance from wave action. This can be seen as a sequence of plant colonization and stabilization of assemblages of different plants. Shrub-like plant forms in such areas include Capparis brevispina, Flueggea leucopyrus, Phoenix pusilla, Salvadora persica and Toddalia asiatica. Even though plant cover is sparse in the sandy seashore habitats of the island, the existing plant life allows for the accumulation of some organic debris and humus, increasing the water holding capacity of the soil, as well as soil fertility, favouring more luxuriant growth of vegetation cover. The more stabilized older seashore vegetation occurring away from the sea is characterized by a more complex woody vegetation structure comprising of species such as Clerodendrum inerme, Thespesia populnea, Cassine glauca, Azima tetracantha and Salvadora persica.

#### 4.1.2 Species

#### 4.1.2a Flora

A total of 209 species of flowering plant species representing diverse life forms including epiphytes (one species), shrubs (29 species), climbers (42 species), trees (67 species) and herbs (70 species), were observed during the floristic survey. Although no endemic plants were recorded, the rich plant life of the island is a good repository for the indigenous arid zone flora of Sri Lanka. A complete list of flora observed on the island is provided in Annex 2, and includes species recorded both within and outside sample plots. Details of the floral composition of the different habitats observed on the island are provided in Annex 3. Among the plant species observed on Delft Island were two species of particular social relevance to Sri Lanka – Adansonia digitata (baobab) and Ficus benghalensis (banyan).

Baobab: The baobab or monkey-bread tree (*Adansonia digitata*) was introduced to Sri Lanka by Arab traders, who came to Indian region from tropical Africa, where the tree is native. It is a strange looking tree, and its trunk can attain a large diameter that no other tree in the world can reach. In the parts of tropical Africa, where the tree is indigenous, the trunk is reported to reach 10 m or more in diameter, making the trunk about 30 m in girth. It has been observed that it would take 14 or 15 tall men spreading their arms to full-length to encircle the trunk of this tree (*Santapau, 1966*).

Banyan: Several banyan trees (*Ficus benghalensis*) were observed on the island. These trees grow up to 20 to 25 m in height, while their canopy extends over an area of nearly one acre, making a large 'roof'. These trees send down roots from their branches, which enter the ground and form trunks, thus extending the growth of the tree almost exponentially. The roots coming out of the branches are at first slender and thread-like. However, gradually, they become anchored to the ground, and grow into sturdy pillars that support the weight of the heavy branches.

Among the floral species recorded were one Critically Endangered Possibly Extinct (CR-PE) species - *Fimbristylis dipsacea;* three Endangered (EN) species - *Ipomoea coptica, Cocculus hirsutus* and *Peplidium maritimum;* five Vulnerable (VU) species - *Citrullus colocynthis, Tinospora cordifolia, Sporobolus maderaspatanus, Colubrina asiatica* and *Manilkara hexandra;* and 11 Near Threatened (NT) species - *Amorphophallus sylvaticus, Aristolochia bracteolata, Capparis brevispina, Mukia maderaspatana, Erythroxylum monogynum, Jatropha glandulifera, Chukrasia tabularis, Cymodocea serrulata, Salvadora persica, Madhuca longifolia and Cyphostemma setosum.* 

#### 4.1.2b Fauna

A total of 146 faunal species including ten dragonfly species, 15 butterfly species, one amphibian species, eight reptile species, 101 bird species and 11 mammal species, have been recorded from Delft Island. This included one species - *Appias galane* (Lesser albatross) - that is endemic to Sri Lanka. The faunal assemblage of Delft Island also included 37 migratory bird species. Among the faunal species recorded were one Endangered (EN) species, seven Vulnerable (VU) species and seven Near Threatened (NT) species. A complete list of terrestrial faunal species is provided in Annex 4.

Animal	Recorded from Delft Island				Conservation status of the recorded species				
Group	Total	Endemic	Migrant	Feral/Domestic	CR	EN	VU	NT	DD
Dragonflies	10	0	0	0	0	0	1	3	0
Butterflies	15	1	0	0	0	0	1	1	0
Amphibians	1	0	0	0	0	0	0	0	0
Reptiles	8	0	0	0	0	0	1	0	0
Birds	101	0	37	0	0	1	3	4	0
Mammals	11	0	0	3	0	0	1	0	0
Total	146	1	37	3	0	1	7	7	0

#### Table 3. Summary of terrestrial faunal species recorded on Delft Island

#### Dragonflies

Ten dragonfly species were recorded on the island. Among them *Pantala flavescens* (Wandering glider) and *Diplacodes trivialis* (Blue percher) were the most common species observed. The majority of the recorded species occurred around the marshy habitats or water bodies of the island. Among the species recorded were one Vulnerable (VU) species - *Tramea basilaris* (Burmeister's glider) and three Near Threatened (NT) species - *Lathrecista asiatica* (Pruinosed bloodtail), *Orthetrum luzonicum* (Marsh skimmer) and *Neurothemis intermedia* (Paddyfield parasol).

#### **Butterflies**

Fifteen butterfly species were recorded on the island, including one endemic species - *Appias galane* (Lesser albatross). Among the species recorded was one Vulnerable (VU) species - *Colotis aurora* (Plain orange tip), which was recorded primarily in grassland habitats with shrubs.

#### Amphibians

No amphibian species were recorded from the island during the field survey. However in 1957, De Silva reported collecting a specimen belonging to the species, *Sphaerotheca breviceps* (Banded sand frog), from the island.

#### Reptiles

A total of eight reptile species were recorded on the island. Among the species recorded was one Vulnerable (VU) species - *Echis carinatus* (Saw-scale viper). The snake-bite rate of this species is relatively high on the island. *Echis carinatus* (Saw-scale viper) and *Ptyas mucosa* (Rat snake) were the only snake species recorded from the island. However, a higher richness of tetrapod reptiles was observed on Delft Island. The most common reptile species observed on the island was *Calotes versicolor* (Common garden lizard).

#### Birds

Birds were the most species rich taxon of the surveyed fauna, with a total of 101 species recorded during the study. The island serves as a resting place for many migratory bird species that cross the Palk Strait. During the study, a total of 37 migratory species were recorded, a majority of which were waders. Many of these waders were recorded from the southern coastal belt of the island, and the adjacent grassland habitats that also support a

large number of grassland and grassland associate species. Among the species recorded were one Endangered (EN) species - *Falco tinnunculus* (Common kestrel); three Vulnerable (VU) species - *Charadrius dubius* (Little ringed plover), *Charadrius alexandrinus* (Kentish plover) and *Lonchura malabarica* (Silverbill); and four Near Threatened (NT) species - *Francolinus pondicerianus* (Grey francolin), *Streptopelia decaocto* (Eurasian collared dove), *Sterna bergii* (Great crested tern) and *Nycticorax nycticorax* (Black crowned night heron).

#### Mammals

A total of 11 mammal species were recorded on the island. Of the mammals recorded on Delft, only the small mammal species are indigenous to the island. This includes two small carnivorous mongoose species - *Herpestes brachyurus* (Brown mongoose) and *Herpestes edwardsii* (Grey mongoose). *Herpestes brachyurus* (Brown mongoose) was recorded on the island by De Silva (1957), who collected specimens for the National Museum in Colombo. However, during the present field survey only *Herpestes edwardsii* (Grey mongoose) was observed throughout the island. A colony of the bat species, *Pteropus giganteus* (Flying fox), was recorded near the baobab tree. This bat population plays a major role in seed dispersal within the island. Further studies are necessary to investigate whether this colony migrates to the island from mainland India, or whether it is restricted to Delft Island.

A feral population of *Equus caballus* (Delft pony or wild horse) was also recorded in the grassland habitats of the island. These ponies were introduced to the island originally by the Portuguese, who at the same time trained local inhabitants on how to use a lasso. In 1672, Philip Baldeus visited Delft Island, and observed that "these horses that were brought into the Delft, which, multiplying in time, produced a certain kind of horses that are very small but hardy and fit to travel on stony and rocky ground... they live in the wilderness and are taken by catching them in snares or ropes". On his tour of Delft Island, US Ambassador Crowe (1954) observed "the stallions appeared to be better types than the mares, and no new blood has been introduced since the British period by Lt. Nolan in 1824".

Among the mammalian species recorded on the island was one Vulnerable (VU) species - *Pipistrellus coromandra* (Indian pipistrel).

#### 4.2 Marine biodiversity around Delft Island

#### 4.2.1 Marine habitats

The coastline of Delft Island includes coral reefs, dead coral outcrops, coral rubble beaches, sandy beaches, scattered seagrasses and seaweeds. The environmental conditions in the area are different from those observed in the rest of the country. Water clarity is low, with a relatively high sediment load. The sea around the island is relatively shallow, with weak water current movements. Therefore, the marine habitats around Delft Island are unique.

The coral reefs that are present around Delft Island are of the patchy fringing type. Living coral cover is low, and the dominating corals species are sediment and turbidity tolerant boulder corals. Branching coral types are rare in most areas around Delft Island. The exposed reef surfaces are covered with seaweeds – particularly *Sargassum* sp. and *Padina* sp. – in most areas. The substrate in between coral patches consists primarily of sand, with some seagrass species.

#### 4.2.2 Marine species

#### 4.2.2a Marine flora

Seaweeds and seagrasses are the most dominant marine flora found in the area. Seaweeds were distributed primarily on patches of dead coral. Filamentous seaweeds were found attached to coral boulders located at the sandy bottom of the marine habitats around the island. *Sargassum* species and *Caulerpa* species were found to be the most abundant algae. Seagrasses were observed to be scattered on the sandy sediment at the bottom of the marine habitats, between coral patches. Extensive seagrass patches were not observed at any of the sampling sites. The *Thalassia* species was found to be the most dominant seagrass species. However the location, hydrology and sediment type indicate the possibility of seagrass meadows occurring in the deeper areas around Delft Island. A list of plants observed in the marine habitats around the Delft Island is provided in Annex 5.

#### 4.2.2b 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 shallow nature and extreme temperature and water quality changes of these areas restricts the development of a high biodiversity. Dead and live coral patches were the most dominant component of the marine diversity observed. High numbers of both ornamental and food fishes were not observed along the shallow coastline. Sea cucumbers were found scattered on the sandy bottom of the marine habitats. Soft corals, sea anemones, polychaetes, sponges, tunicates, spiny lobsters and other crustaceans, molluscs and echinoderms, were found in very small numbers. A list of marine fauna observed around Delft Island is provided in Annex 6.

#### 4.3 Community based natural resource uses

#### 4.3.1 Marine resources

Delft, being an island, has been associated with the traditional fishing industry for many centuries. During the last three decades, fisheries activities were curtailed due to restrictions imposed on fishermen. However, the fishing industry was revived, once again, to its full potential with the relaxation of security restrictions imposed on fishermen after the end of the civil conflict. Fishing is the dominant livelihood observed on Delft Island, with over 15 percent of the population of the island (525 fishermen), being employed directly in the fishing sector. Delft North was noted as the center for all fishing activities on the island, with four fish landing sites (anchor points) along the northern coast of Delft.

The entire fishing fleet of Delft Island comprises of small FRP boats of various size classes, and traditional fishing crafts. There is also a single one-day operating craft belonging to the 28-32' size class, 8017-23' FRP boats and 45 non-motorized log rafts operating from the island. The main fishing grounds of these crafts are the shallow coastal waters around the island, the Palk Bay and the Palk Strait. These fishermen use poles, lines, cast nets and gill nets as their fishing gear. However, there were no signs of fishing groups on Deft Island using single or pair trawling methods. The primary populations targeted are those of shrimps, lobsters, sea cucumbers, and pelagic and demersal fish species (Table 4).

Family/Group	Genus/Species				
Marine Fish					
Ariidae	Arius caelatus				
Carangidae	Carangoides chrysophrys				
	Scomberoides commersonianus				
Clupeidae	Sardinella albella				
Hemiramphidae	Rhynchorhamphus malabaricus				
	Molluscs				
Loliginidae	Loligo duvauceli				
Loliginidae	Sepioteuthis lessoniana				
Sepiidae	Sepia aculeate				
Sepiidae	Sepia pharaonis				
Crustaceans					
Mantis shrimps	<i>Squilla</i> sp.				
	Gonodactylus cf. smithii				
Shrimps	Penaeus latisulcatus				
Crabs	Portunus pelagicus				
	Scylla serrata				
	Thalamita crenata				
E	chinoderms				
Sea cucumbers	Holothuria fuscogilva				
	H. scabra				
	H. atra				
	H. spinifera				
	H. leucospilota				
	H. edulis				
	Thelenota ananas				

#### Table 4. Commercially important marine species captured by fishermen

Apart from the high wind season (September to February), fishermen are able to obtain a good harvest throughout the year. One of primary concerns of local fishermen is the regular encroachment of their traditional fishing grounds by the Indian fishing trawlers – an issue that has been highlighted, but has been difficult to mitigate.

All the fish harvested by the fishermen of the island is purchased by the Fishery Cooperative Society (FCS), which owns a cool room, and is able to purchase and store this fish. Previously, the fishermen of the island would sell their fish at very low prices to the private vendors as payment for the use of loaned fishing gear. The FCS in Delft is a strong, well represented and distributed organization, with a very long history on Delft Island. The organization is represented on the island by five Fishery Cooperative Societies. The members of the Fishery Cooperative Society benefit from the society through several extension services, such as the provision of fishing nets and gear, and kerosene, as well as savings and credit facilities. Under an IOM/UNDP initiative, the FCS has also initiated a micro-lending service, which provides small loans of LKR 10, 000 to local fishermen. The

society also provides basic services such as photo copying, the hiring of a two-wheel tractor, the renting of furniture for family or public events, and the selling of ice cubes to fishermen. In addition, the FCS owns a passenger vessel that is used to transport passengers, goods and fish, to the mainland. The FCS is also involved in the development of roads, the restoration of kerneys (ponds) and the construction of houses.

The FCS has the necessary organizational capability to influence political authorities to improve infrastructure on the island. On the request of the FCS, the government has already helped in the construction of five small anchor points (fish landing sites), and a fishery harbor on Delft Island. In addition, the FCS aims to establish an inland fishing operation using existing ponds, in collaboration with the National Aquatic Resources Research and Development Agency. The FCS has also indicated their willingness to get involved in the development of tourism on the island.

#### 4.3.2 Terrestrial resources

Although the island has a rich faunal and floral assemblage, the local community is highly dependent on the floral species of the island alone. Historically, the Portuguese, Dutch and British used the island as a breeding ground for horses and cattle, and ploughed the land to create grazing areas for these species. At present, the flora of the island is exploited for a number of purposes, as described below.

#### **Economically important plants**

**Palmyrah**: All the parts of the palmyrah tree are used by the local community. The seedlings, which are underground and tuber-like, are sometimes grown for use as a starchy food. Further, the growing point of the palm, the pulp of the ripe fruits and the young endosperm of the seeds, are all used by local communities as a source of food. The fibers obtained from the young leaves and petioles of this species are often used for weaving and in the making of mats. Palmyrah leaves are also used as a thatching material, for weaving baskets and mats, and in the construction of fences. The wood and leaves of this species are also used as a source the seed as a source of fuel for cooking. The trunk of the mature tree has a hard and strong wood that is used in the construction of houses. Palmyrah palms provide shelter for many animals, including birds, bats, rats and squirrels, as well as several plants, such as orchids, figs and other epiphytes. The thick stands of the palmyrah tree also reduce the effects of strong winds.

**Coconut**: Economically, and ecologically, coconut is a highly valued plant - especially on a small island such as Delft. The coconut is used as a source of food, oil, fibre, fuel wood, timber and thatching material. Many utensils and handicrafts are made from the coconut tree. Additionally, coconut can contribute to the quality of the soil, as burnt coconut husks are a good source of potash, which is used as a fertilizer in vegetable plots. The husks also make valuable mulch for moisture conservation during the dry season, as well as contribute to the suppression of weeds. The fibrous root system of the coconut palm has great potential to bind soil, which serves to minimize erosion. Futhermore, many pollinator insect species depend on coconut flowers as a source of food.

#### **Food plants**

Wild food plants growing in different habitats of the island are harvested for various human food preparations, and are used as a source of nutrition and medicine. These plants play an important role in household food security and nutrition. They are an inexpensive and easy to access source of food, and often require a relatively low input of labour. Sometimes, these food plants become the primarily source of food, especially during periods of food shortage. In some cases, wild food plants also have an economic value in the local markets. However, very little attention is paid to wild food plants by officials promoting agricultural programmes. During the survey, several wild food plant species were recorded on the island, in natural habitats, as well as in home gardens. Wild food plants used most commonly include *Acalypha indica* (kuppameniya), *Aerva lanata* (pol pala), *Borassus flabellifer* (tal), *Canthium coromandelicum* (kara), *Carissa spinarum* (heen karamba), *Cymodocea serrulata* (seaweed), *Limonia acidissima* (divul), *Madhuca longifolia* (mi), *Manilkara hexandra* (palu), *Muntingia calabura* (jam), *Tamarindus indica* (siyambala), *Wattakaka volubilis* (aguna kola) and *Ziziphus mauritiana* (masan).

#### **Medicinal plants**

Medicinal plants are also important to local communities, in addition to being a valuable part of the ecosystem. The use of plants for medicinal purpose is one of a number of practices developed by the traditional local people of Delft Island. These plants have played a key role in health care system of the island for a very long time. The interest in medicinal plants is reemerging 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 medicines are harvested from the wild. During the field survey, important medicinal plants used by the community, 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 on the island.

#### Fire wood and timber

Fire wood is the main source of energy for cooking in almost all the house-holds on the island. The traditional sources of fire wood in the area include tree dominated home gardens, palmyrah wood lands and scrub jungles. Timber is harvested from home gardens and palmyrah woodlands. Sawn timber, as well as pole wood, is utilized heavily in the construction of houses, furniture and fences. A selection of widely used fire wood and timber species recorded on the island include *Azadirachta indica, Borassus flabellifer, Cocos nucifera, Gliricidia sepium, Leucaena leucocephala* and *Thespesia populnea.* 

#### Fodder plants

The rearing of livestock is an important component of the local subsistence economy. People require livestock for the provision of milk, meat and manure. In addition, the pulling of bullock carts by cattle can still be observed on the island. Wild horses, cattle and goats are the main types of grazing species requiring fodder plants. Free grazing is the most common practice method feeding livestock, while stall feeding is not practiced at all on the island. Usually, animals on the island graze on the dry and wet pasture lands, home gardens, seashore habitats and scrub jungles, where overgrazing has become a serious concern. Some of the favoured fodder plants observed include *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.

# 4.4 Threats to the biodiversity and areas identified for development and conservation

The pony population on the island is threatened due to overgrazing of pasture lands by the large population of cattle. During the height of the dry season, a high incidence of cattle and pony mortality has been reported due to the lack of adequate food and water. Further, some people capture and mark the calves of the ponies using improper branding methods, which can result in infections. This is a major cause of death among calves.

Several nuisance plant species have been observed in the natural habitats of Delft Island. These nuisance plants interfere with the ecology, and economy, of the area. These plants can be sub-categorized as alien invasive species, agricultural weeds and poisonous plants. Some of the commonly occurring nuisance plants on the island include:

- 1. Alien invasive plants: Lantana camara, Leucaena leucocephala, Antigonon leptopus, Opuntia dillenii and Prosopis juliflora
- 2. Weeds: Boerhavia diffusa, Euphorbia hirta, Murdannia spirata, Passiflora foetida and Sida acuta.
- 3. Poisonous plants (veterinary poisons): Lantana camara, Nerium oleander, Ricinus communis and Thevetia peruviana.

A Strategic Environmental Assessment (SEA) has been carried out in Jaffna and its associated islands following the conclusion of the war. The SEA was conducted using a multi-agency approach coordinated by the Central Environmental Authority (CEA) and the Disaster Management Centre, and supported by the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). This assessment focused on the physical and biological environment of the island, as well as the archaeological and social aspects of the area, including development, the resettlement of displaces persons, and areas that need to be set aside for conservation. The entire area of Delft Island has been marked as a site for resettlement. However, the SEA also identified a number of areas that should be used for development activities, as well as high priority wildlife conservation areas on Delft Island.

Freshwater is an invaluable resource on Delft, as it is a small island with limited water resources. The main aquifer type of the island is limestone with some unconsolidated brown and grey coastal sand. The presence of one main tank has also been identified in the SEA, along with other surface water bodies and tanks. The potential for the extraction of groundwater has been identified as high for most areas of Delft in the assessment, while this potential has been classified high-medium in other areas. However, the potential salinity of groundwater aquifers is high for the entire island. This indicates that water availability could become a major issue in future development work.

In the SEA, it is proposed that part of Delft Island be declared a National Park. However, no archaeological sites have been identified in the map developed for the SEA. The SEA has also identified three sites for coastal fishery, one lobster ground, three boat landing sites, four fishing camps (wadi), three snorkeling sites and three sites for observing wading birds. Further, one site located off the Delft Island has been identified as a boating and surfing location.

A fairly large portion of Delft Island has been identified as being available for development with minimum constraints. However, this area is reduced when areas used as settlements in the past are considered. The SEA has also identified the key stakeholder agencies, prioritized land-use types and a high priority wildlife area on the Delft Island. Additionally, the area identified as the proposed wildlife conservation area has also been identified as a high priority site in the opportunity map developed for the Northern Province. The proposed development projects for Delft Island include a telecommunication tower, three snorkeling sites and two boating and wind surfing sites.

#### 4.5 Socio-economics findings

#### 4.5.1. Demographic profile of Delft Island

Delft Island (Neduntivu) has an extent of 49.5 km<sup>2</sup>, and the largest human population of the islands located off the Jaffna Peninsula. In 1960, the island had a population of approximately 12, 000 people. However, the population dropped to approximately 6, 200 by 1981, according to the 1981 census. During the peak of the civil conflict in 1990, a large number of people left the island. Therefore, by 2009, when the conflict has concluded the island had an estimated population of about 4,124 people - all of them Sri Lankan Tamils. Since then, the population of the island has shown some growth, with the current population estimated to be approximately 4,869 people, belonging to 1468 families, as of 2011. The island is divided into six Grama Niladhari (GN) Divisions (Figure 4). Of these six GN divisions on the island, Delft Central and Delft Central East have the highest population densities (Table 5). These areas also act as a hub for all the economic activities taking place on the island. The land area belonging to the Deft East and Delft Central West divisions are relatively less populated, considering their total land areas.

<b>GN</b> Division	Number of families	Population	%	Samurdhi Recipients
Delft West (J 1)	295	820	17	72
Delft South (J 2)	167	652	13	63
Delft Central (J 3)	315	1072	22	108
Delft Central East (J 4)	206	690	14	81
Delft East (J 5)	277	915	19	84
Delft Central west (J 6)	208	720	15	80
Total	1468	4869	100	488

 Table 5. The population distribution among the six GN divisions and the number of Samurdhi recipients in each of the six GN divisions

Although the population of Delft comprises of Tamil speaking people, their culture and religious affiliations differ from those of the Tamil speaking community in the mainland Jaffna. Almost 95 percent of the people of Delft are Catholic, while the rest are Hindus. This

may be due to the relatively long influence of the Dutch on the island in the period between the fifteenth and seventeenth centuries, until the arrival of the British. Most of the ancient buildings still remaining on the island feature Dutch architecture, which is another unique characteristic of Delft Island.

The Dutch period church on the island still draws large crowds on Sundays for the regular religious services. A few families with Dutch ancestry are also found on the island, with some of these families still retaining Dutch last names. There are approximately eighteen Hindu kovils (temples) on Delft Island. However, only a few of these kovils attract a crowd. However, ancient temples, such as Kaddamman, Iyanar, Pidani Amman, Pukkaddu Vairevar are considered to be very powerful.

Poverty is still very high on the island, with nearly 488 of the families living in the island (over one-third) receiving "Samurdhi" benefits at present (Table 5). Housing is also an issue which is being addressed through various housing schemes and resettlement projects. According to the records available at the DS office, approximately 329 families do not have permanent housing, while 205 families lack proper sanitary facilities. Some of the houses on the island have been abandoned, as the occupants have migrated to other countries.

#### 4.5.2 Administrative structure and land-use patterns

Administratively, the island falls under a single Divisional Secretary Division (DSD), which in turn consists of six GN Divisions: J1 (Delft West), J2 (Delft South), J3 (Delft Centre) J4 (Delft Center East), J5 (Delft East) and J6 (Delft Center West). The entire administrative structure of the island, including the DS office, the office of the Pradeshiya Sabawa, and the Health Center, is located in the Delft Centre GN division, which is accessible through the main road. The existing staff capacity of the Assistant Government Agent (AGA) office is far below the number approved cadre, with nearly two-thirds of positions yet to be filled. Similarly, there are only four Grama Niladharis serving the six GN divisions. Delft Island also has a duly elected local government institution (Pradeshiya Sabawa) with nine elected members. Many of the administrative services of the island, such as housing and planning, forest, wildlife, environment and veterinary services are provided through the Divisional Secretary office based in Kayts.

The land-use of Delft consists of areas of palm and coconut cultivation, areas under seasonal agriculture, a limited extent of shrub forest, grazing land, abandoned homesteads, kerneys (ponds), and some of the Portuguese, Dutch and British ruins. Most of the homesteads are fenced off by walls constructed with lime stone. This creates a unique landscape on the Delft Island, and sets the area apart from rest of the country.



Figure 4 Grama Niladari (GN) divisions of Delft Island

#### 4.5.3 The economy

The local economy in Delft, which is based primarily on fisheries, agriculture and cottage industries, suffered a setback during the civil war. However, traditional agriculture and cottage industry based economic activities are being revived rapidly since the conclusion of the war. However, some traditional livelihoods such as toddy tapping, home gardening, vegetable cultivation, goat rearing and cattle breading, are yet to show signs of improvement. The conflict that prevailed in the North has paralyzed the institutional support services to the island, and therefore, has had a major impact on the economic activities of Delft Island. As such, the restoration of administrative and institutional support services is essential in order to expedite the economic development of the island.

With the dawn of peace, the economy of the island is now showing signs of recovery. The traditional fishing industry, which was restricted for a number of reasons, is now allowed to operate freely. Therefore, more than five hundred fisher families have returned to the island for fishing activities. The agricultural tanks left unattended for many years are also being restored in order to support the agricultural practices of the island.

#### 4.5.4 Livelihoods

**Agriculture:** Delft is still an agricultural area with local farmers engaged in the agricultural activities from September to March (the "Maha" season). The farming communities of the island are based mainly in the J2 GN Division (Delft West), where there is a slight elevation

of the land that is conducive to agricultural activities. The agricultural activities practiced on the island include home gardening, vegetable cultivation, and cultivation of chilies, onions and kotta killangu (palm seeds). Cultivation of the sprouts of palm seeds (kotta killangu or panna killangai), is a thriving agricultural activity, with the soil types and climate of the area being conducive to this activity. More than 100 famers are engaged in this activity in the cultivation season. On average, farmers engaged in this cultivation, harvest the produce in four months, and produce about 40, 000 to 60, 000 sprouts per season. This is sold in Jaffna, in raw or processed form.

**Livestock:** The supply of goats and cattle to the mainland was a traditional activity in Delft. However, this has now been banned due to increased theft of cattle. Almost all the households on the island have a few cattle. However, the lack of fodder is a major setback for the livestock industry, and the cattle are released into wild for grazing, where they compete for resources with wild horses.

**Manufacturing and cottage industries:** Delft was once famous for its handloom and coir industries. These activities provided livelihoods for a large proportion of the Delft population. However, at present, these activities occur only at a basic level, with no manufacturing or large scale industries, which can employ a substantial number of unemployed youths, on the island. The only organized industry established in the recent past is the sewing center run by the Navy, with which approximately 50 women are engaged.

In the past, most of the produce from Delft was sent to Jaffna and the mainland, with the island's economy being an export economy. Palmyrah based products such as mats, boxes, onion sachets, dried seeds (oomal), sprouts of seeds (raw and processed), dried juice (pauaddu) and dried reapers were in considerable demand in the past. However, these products are now in short supply due to the setbacks suffered by these industries during the civil conflict. Fishing gear, including ma-del, produced by local fishermen, was purchased by other fishermen from outside the island. In the Dutch period, Delft was used to breed and distribute imported horses.

Fisheries: Delft is associated with the traditional fishing industry, which is now being revived to its full potential. Fishery is the most popular livelihood among the Delft people, with over 525 fishermen operating in small boats (plastic boats and catamarans). Apart from in the high wind season (September to February), fishermen are able to get a good harvest. Delft North is very much the center of all fishing activities on the island, and there are four fish landing sites (anchor points) along the northern coast of Delft Island. As discussed in the section on fisheries resources, all the fish harvested by the fishermen is purchased by the Fishery Cooperative Society, which has the required cool room and transport facilities The Fishery Cooperative Society in Delft is a strong, well represented well distributed organization, with a very long history on Delft Island. It has the membership of five Fishery Cooperative Societies. The members of the Fishery Cooperative Society are benefit from the society through several extension services, including the provision of fishing nets and gear, and kerosene, as well as through savings and credit facilities. The society also provides basic services such as photo copying, hiring of a two wheel tractor to its members, renting of furniture for personal or public events such as weddings and funerals, selling of ice cubes to local fishermen and the provision of small personal loans. The FCS owns and operates a passenger vessel that is used to transport passengers, goods and fish to the

mainland. The FCS is also involved in the development of roads, restoration of kerneys and construction of houses.

#### 4.5.5 Infrastructure

**Electricity:** Electricity is provided to the island by the Ceylon Electricity Board (CEB). There is no national grid connection to the island, and electricity generation depends on Delft relies on diesel powered generators. Less than 10 percent of the households (115 families) have been connected to electricity supply, the majority of which are in the J4 and J5 GN divisions. In the foreseeable future, providing a grid connection to Delft will not be a possibility. However, the AGA expressed confidence that under the on-going "Uturu Wasanthayam" development programme, electricity will be provided to every household in the future.

**Water:** The availability of water for drinking, and other consumptive purposes, is another main issue on the island. Delft experiences rains during the northeast monsoon, with a prolonged dry season occurring for over six months of the year. Therefore, an acute scarcity of water is experienced during the peak of the dry season. Animals, including livestock, in particular, do not have access to water during this dry period. A large number of kerneys, which were constructed by the early rulers of the island in anticipation of such water shortages, can be found in the interior parts of the island. Most of these kerneys are now abandoned, and in need of restoration. There were, in the past, two large tanks that was used to store water during the rainy season. However, these tanks have also been abandoned at present. Potable water (drinking water) is obtained primarily from dug wells, in addition to a gravity flow water scheme from a complex of shallow wells (Saraapiddy drinking wells) located in Delft South (J2), within the Kali Kovil Adi village.

Health facilities: Health facilities are provided to the people of Delft through a government managed hospital. Apart from its out-patient department (OPD), this hospital has a male ward, a female ward and a maternity ward. Even though the hospital had a cadre of eight MBBS qualified doctors, and several Registered Medical Practitioners (RMOs), at present, the cadre consists of only one retired RMO, one dentist two dispensers, one public health midwife, six attendants, three sanitary labourers, three ordinary laborers, one watcher and an ambulance driver. The OPD treats approximately 50 - 100 patients a day for common diseases, such as coughs, colds, skin diseases including scabies, and snake bites. Patients with major complaints or health issues and all maternity cases, are referred to the hospitals in Kayts. An ambulance and ambulance ferry are available to carry passengers to the jetty, and from the jetty to mainland, respectively. Clinics are also held regularly, targeting the pregnant mothers, babies and diabetic patients. The Dental Unit is of the hospital is poorly equipped, with an old fashioned dental chair and very few facilities. The doctor on duty reported that he performs extractions alone, and refers patients with any other ailments to hospitals outside Delft. In view of the limited facilities, and poor residential facilities for the medical professionals, he observed that the conditions of Delft are not attractive to medical staff. Delft also has several native doctors, who have treated patients effectively for snake bites and common illnesses.

**Education:** Education in Delft is facilitated through several schools. The distribution of these schools is given in

Table 6 according to their respective GN divisions. .

CN Division	Number of	Status			
GN DIVISION	schools	Primary	Secondary		
J 01	02	01	01		
J 02	03	01	01		
J 03	01	00	01 (Grade 1-9)		
J 04	02	00	02		
J 05	00	00	00		
J 06	02	02	00		
Total	10	4	5		

Table 6. Distribution of schools in the six GN divisions of Delft

Several schools on Delft Island have been abandoned due to having inadequate numbers of students. Given that several schools are located close to clusters of houses, there is hardly any need for students to use transport. However, some students travel by bus or push bicycle, while most walk to school. Finding adequate drinking water is a major problem for all institutions on the island, and schools in particular. Although large wells have been constructed on school compounds, they tend to run dry for at least half of the year, during the dry season. Another major issue in all the schools on the island is the inadequate provision of teaching staff, given the number of students. Similarly, there is a shortage of qualified teachers who can teach subjects in the science stream, with no mathematics and biological science teachers in any of the schools in Delft. The prolonged war, the lack of facilities for teachers, the non-availability of teacher quarters, the isolated nature of the island, and the difficulties faced in travelling to the schools on Delft Island, are likely to have contributed to the poor state of the education sector in Delft at present.

Unemployment is on the increase on the island, with large number of youth (both male and female) not being able to find a suitable employment either in Delft, or on the mainland, having completed their secondary education. Young girls and boys complained that it was not possible for them to find paid employment opportunities, even after obtaining graduate or diploma level academic qualifications.

**Sea and road transport:** Delft Island can be accessed from mainland through road transport (from Jaffna to the Kurukattuwan jetty), followed by a one hour ferry journey to the island. It takes nearly one hour to reach the Kurukattuwan jetty by bus from Jaffna city center. Bus services to the jetty and back to Jaffna are very satisfactory, with buses operated by the Ceylon Transport Board (CTB) making 20 turns a day, and the private buses making at least 50 turns a day. The jetty on the mainland (Kurukattuwan) is a busy port, as it is the transit point for people who travel to several islets, including Nagadeepa. The main jetty is crowded and equipped with very limited facilities. The jetty on Delft Island (Punkudutive) is small, and has the capacity to berth no more than two or three ferries. The jetty caters to the transport needs for passengers, goods, and servicemen. The jetties at both ends are manned by the Sri Lanka Navy. On Delft Island, buses are scheduled to coincide with the arrival of the passenger boats from the mainland. In addition, three wheelers and small lorries provide a limited passenger service within the Island. Bicycles are
a popular mode of transport among the general public. However, most people travel by foot. Bullock carts are used extensively by locals to carry goods within the island. The roads within the island are in a good condition. The main road is approximately 7 - 8 km long, and has a tarred surface. This road terminates at the Koddaikadu village, located about 9 km away from the main jetty. Following the conclusion of the war, many roads on the island were restored, or earmarked to be restored, which will improve the road network within the island.

The ferries operated in the area are owned either by the Road Development Authority (RDA) or private operators. The RDA operates two ferries per day on weekdays, and no more than one private ferry is allowed to carry passengers on a given weekday. The ferries are operated according to a timetable managed by the Navy. RDA owned ferries are used exclusively for passenger transport, while private ferries are engaged in the transport of both passengers and goods. They have a limited service during the weekdays and full service during the weekends. RDA manned ferries provide a free service, whereas private ferries charge a nominal fee for transport.

While the ferry service is adequate to meet the passenger demands in a satisfactory manner, the quality of the service provided is unsatisfactory, as very little attention is given to passenger comfort or safety. The boats are relatively old, and the interior of the boats is quite unpleasant. There is an urgent need to upgrade the quality of the ferry service to Delft Island.

Name of the vessel	Owner or operator	Capacity	Fee
Kumudini	RDA	120	Free
Vadathanka	RDA	100	Free
Samudra	Coorperative	150	Yes
Nagarani	Church	160	Yes
Alai arasa	Fishing society	120	Yes
Aquatic	Private		Yes

Table 7. Ferries that are operated to and from Delft Island

#### 4.5.6 Defense and security

The role of the Sri Lanka Navy is very prominent on Delft Island. The presence of the Navy is vital in view of the coastal surveillance that is compulsory and crucial due to Delft's close proximity to other small islands and the southern tip of India. The navy is also involved in manning the jetty, and as well as in the implementation of several development and welfare activities, including the construction of houses, the restoration of tanks and kerneys, the conducting of medical camps and the provision of employment to the people of Delft through its sewing unit.

The Police in Delft consists of a strong force of nearly 100 staff, serving under two high ranking officers. The police force ensures safety and peace on the island, and investigates complaints from local communities.

#### 4.5.7 Credit availability, cooperatives and banks

A branch office of the Bank of Ceylon (BOC), the Delft Cooperative Society, the Fishery Cooperative Society, and a few farmer 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, but have continued to show strong resilience. The BOC branch in Delft, which was established only 2010, already has a clientele of nearly 2, 000 account holders. In additions to the savings accounts that it maintains for its customers, the BOC also provides loans. The Delft Cooperative Society began operating in Delft in 1972, under the Cooperative Act.

#### 4.6 Historical and archaeological findings

The name 'Delft' originates from the Dutch colonization of the island, with the island being named after the Dutch city of the same name. Given its rich history, several sights of historical and archeological importance can be found on Delft Island. Remains of an ancient temple are found on the western coast of the island, bear evidence of an early Buddhist civilization that has existed on the island. 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 found on the island. There is also a local belief that there is a rock that 'grows in size' on Delft Island.

#### 4.6.1 Legends

The people of the island believe that a giant footprint of Adam is engraved on a lime stone formation on Delft Island. However, this is an eroded section of Miocene limestone, which creates the visual image of a giant foot print.

Another legend states that Vediyarasan - a King who once lived on Delft - constructed a canal across Delft Island connecting the two large tanks.

The archaeological remains of a site known as Vetiyaracankottai are believed to be those of a fortress built by another king - Vetyaracan.

#### 4.6.2 Early Anuradhapura Period

Remains of a Buddhist temple belonging to the early Anuradhapura period can be seen at the northern end of the island (Devendra, 1969). These remains include remnants of three "stupas", and several structural remains that are scattered over an area of 15 - 20 acres. The temple appears to be built using chiseled and unchiseled corals. These are the only Buddhist monuments still remaining on the island. The three circular coral stone bases of the 'stupa' were reconstructed by the Department of Archaeology in late 1970s. According to the chronicles, during the early Anuradhapura period, there were a number of Buddhist temples on Delft Island, that were occupied by thousands of Buddhist priests (Bikkhus) that lived in the islands surrounding Nagadeepa (present Jaffna peninsula). This area is known as 'Vetiyaracankottai' by the local inhabitants of the island. The pottery remains of black and red ware, and roulette ware, indicate that the site belonged to the early era and first centuries of the Anuradhapura period (Devendra, 1969; Ragupathy, 1987). In 1987, Ragupathy recorded fragments of copper, iron tools, pestle stones, grooved tiles, carnelian beads, grass beads and copper coins that belonged to *Sahasamall* (12 AD), from this site.

The ruins are in a vulnerable state at present. Most of the raw materials, including socket stones, have been removed to construct fences, wells and other structures. One of the ruins of a stupa is situated in the middle of the main access road, with the SL Navy officials protecting it at present.

#### 4.6.3 Colonial Period

Delft is one of a cluster of islands situated in the Palk Strait between India and Sri Lanka. During Marco Polo's voyage in 12 AD, he has landed on one of the islands in the Palk Strait, and described the inhabitants as 'idolaters, who ate flesh and drank tree wine' (Crowe, 1954).

The earliest records of the island were made by Portuguese and Dutch writers, who sailed through the Palk Strait, or landed on the island itself. However, reliable evidence can be found in the Portuguese notes, '*Ilba das Vacas*', which means '*cow island*' (Baldaeus, 1672). The Portuguese are reported to have ploughed the land and prepared an artificial pasture land for horses and cattle on the island. The horses found on the island were introduced by the Portuguese, who also built a fort on the east coast of the island during this period.

During the Dutch period, the island was colonized in a more systematic manner, and was named '*Delft*' after the Dutch town, Delft, located in Holland (Baldaeus, 1672). In 1905, Katiresu identified the ruins of a building located on the north east coast of island as a Dutch fort. However, this fort was not considered as a Dutch fort by Nelson (1984). This building is listed as a Portuguese fort in the books published later (Fabry-Bewley 2010; Liyanage, 2011). According to the Baldaeus (1672) illustration, the fort is identified as a Portuguese structure (See Annex 6 - Figures 30 and 39).

In 1954, Philip K. Crowe, the ambassador of the United State of America, gave a detailed account of the island based on his experiences on Delft Island. At the time, he was able to document recent British history to clarify the true identity of some of the monuments and archaeological remains on the island. According to Crowe (1954), an Irish Lieutenant named Lt. Nolan, who served in the 4th Ceylon Regiment that ruled the outlying island of Delft during the early part of the nineteenth century, was responsible for the laying of Irish style fences that can be observed, even to the present day, on the island. These fences give the island a unique and characteristic appearance, and even the present inhabitants of the construction of such fences. However, in Delft, corals are used in place of rocks.

In 1811, Lt. Nolan, serving as an officer in the Engineers Division, commanded by the Rt. Hon. John Wilson - Lieutenant Governor and Commander-in-Chief in and over the British settlements in the island of Ceylon in the Indian Seas - was given the task of growing flax (*Linum usitatissimum*) with the aim of supplying the government with canvas. In the following year, he was given the additional task of breeding the horses introduced to the island by Portuguese and Dutch settlers, and introduced several new breed stocks to the island. As the British Empire expanded, the demand for horses by the cavalry increased, and records indicate that horses were shipped to the small island, Iranaitivu, from Delft for pasturage, as sufficient fodder could not be found on the island to support the ever increasing horse population. As such, the island came to be known as 'the Horse Plains'. Lt. Nolan also built three sets of elaborate stone stables and an ingenious series of wells for the provision of

water for his stock. However, at present, the construction of these stables and wells are attributed, by local inhabitants and tourist guides published recently, to the Dutch (Liyanage, 2011; Ranatunga, 2010). The set of wells constructed by Lt. Nolan is the island's main source of pure freshwater at present.

Crowe (1954) also described a mansion that was built by Lt. Nolan, where he held court within its three-foot walls. However, this building cannot be traced at present among the ruins that are standing today due to a lack of information about its exact location by the present inhabitants of the island.

According to the legend, he not only achieved considerable success in breeding horses, but also left his own stamp on the local community as well. Even in the present day there are a number of grey-eyed individuals living on Delft Island. However, Lt. Nolan's interest in the female population of the island was not universally appreciated by the local inhabitants, and in 1819 a petition was drawn up by forty-five persons and sent to the British Resident at Jaffna. Suffice However, the charges were thrown out, and Lt. Nolan continued to rule Delft Island until he retired from the service and returned to Ireland in 1824. Lt. Nolan has also reared around 60 pigeons on the island, which he used to communicate with the contacts in the Jaffna Peninsula (Ranatunga, 2010). The pigeon holes used to house these pigeons, which are made of limestone, can still be observed near the present Divisional Secretariat office premises. Lt. Nolan's official vehicle remained on the island in good working condition until the 1970s (Perera, 2005). However, during the civil conflict, it is reported to have fallen into the sea while LTTE was attempting to transport it to the mainland (*Pers. comm.* with local inhabitants, 2011).

There are also two towers that belong to the British period on the island. These towers were used as light navigation points for diurnally operated ships, as well as a trigonometric point. Of these two towers, the tower known as the 'Queens Tower', is well preserved, while only the basements of the other tower, known as the 'Kings Tower' remain at present.

The baobab tree (*Adansonia digitata*) bears evidence of the fact that ancient Arabian sailors visited the island. This tree is native to East Africa, and was introduced to South and Southeast Asia by Arabic sailors during the seventh century AD (Vandercone *et al.*, 2005).

Recently, the University of Sri Jayawardenapura has developed a project proposal for 'The Conservation of multi-cultural Mutual Heritage in the Jaffna Peninsula'. It has identified the Dutch fort, the ruins of the three "stupas" at Vetiyaracankottai, and the Queens's tower, as sites for future excavation and restoration work (Anon, 2011).

#### 4.7 Tourism on Delft Island

At present, there are very few tourism activities taking place on Delft Island. The infrastructure facilities are in a poor condition, and are insufficient to support an effective tourism operation. The transport facilities from the mainland to the island are sub-standard, with the journey being both uncomfortable and unsafe. Similarly, the transport facilities within the island are limited for tourists given the lack of a good road network and suitable transport facilities. These factors are likely to have prevented tourism development on the island in the past. In addition, there are no permanent establishments to support coastal and marine

tourism. At present, there are very few marine-based recreational opportunities available on the island. Furthermore, only a few tourists or visitors – no more than one to five at a given time - arrive on the island.

#### 4.7.1 Places of interest

Delft Island has a very high aesthetic value and as such, has great potential to attract tourists. In addition, its isolated nature and the extent of ocean frontage in all parts of the island may also attract visitors. The natural wealth of the island has been enhanced considerably by the unique and characteristic presence of wild horses on Delft. The wild horse is estimated to be around 1, 000 at present, and bears evidence of a thriving horse industry that existed on the island during the colonial period. During this time, Delft was used as a breeding center of horses, from which they were distributed to several South Asian countries. Some of the ruins left by the Dutch confirm that there were stables to cage large numbers of horses, as well as areas where the horses were treated. However, except for a few families who have captive horses, there is no commercial value for the wild horses of the island at present. They have been allowed to roam freely at the far end of the island. Therefore, the viewing of these wild horses can be developed into an attractive product for tourists who visit the island. Further, the many remnants from the colonial period, including the ancient ruins of Dutch and British buildings, the fort, the stables that were used to house the horses, the pigeon shelters, the "stupas", the large foot print, the growing stone and the two towers, can be marketed as places of interest to tourists.

Snorkeling in the shallow reefs around the island is also a potential recreational activity that can be developed. However, dive tourism is not viable in this area given the lack of visibility due to the high turbidity of the water. Similarly, the deeper sites that have clear water are devoid of the beautiful underwater seascapes with high biodiversity that generally attract tourists to such sites. However, sport fishing, sailing, kayaking, speed boating and gliding are other possible tourist activities that can be developed to boost marine tourism.

	Location name	Description	GPS location
1	Growing rock	Dead coral stone	9°31'12.69"NL; 79°43'16.50"EL
2	Baobab tree ( <i>Adisonia</i> <i>digitata</i> )	Introduced to Sri Lanka by ancient Arabic sailors during 700 AD	9.512480'NL; 79.715391'EL
3	Banyan tree	One of the largest <i>Ficus</i> trees on the island	9.50062'NL; 79.72562'EL
4	Pigeon holes	Pigeon holes built using lime stone near Lt. Nolan's house	9°31'41.87"NL; 79°42'15.49"EL
5	Queen's tower	One of the remaining lighthouses from the British period	9°28'30.15"NL; 79°43'11.88"EL
6	Adam's foot	Coral depression that is in the shape of a large foot	9.51796'NL; 79.65824'EL
7	Horse stable	Stable that was used for	9.51682'NL; 79.65813'EL

#### Table 8. Places of interest for tourists on Delft Island

	Location name	Description	GPS location
		horses during the Dutch and British periods	
8	Old church	Dutch church	9.51560'NL; 79.65466'EL
9	Ancient Buddhist stupas	Buddhist ruins belonging to the Anuradhapura period	9.53844'NL; 79.65304'EL
10	King's tower	Basement of beacon of one of the lighthouses from the British period	9.55353'NL; 79.65668'EL
11	Cemetery	Old cemetery used by settlers	9.52863'NL; 79.69933'EL
12	Portuguese fort	Originally built by the Portuguese	9°31'39.85"NL; 79°41'59.17"EL
13	Freshwater wells near the beach	Sixteen wells	9.52833'NL; 79.70188'EL
14	Dry pasture lands	Area occupied by the wild	Southern part of the island
15	Thorn scrub jungle	horses	
16	Coral rock seashore vegetation	Dead coral beach	Southern part of the island



Figure 5. Map showing the tourist attractions on Delft Island

#### 4.7.2 Cleanliness and solid waste disposal

The aesthetic beauty of the island is diminished by the occasional bad odors arising from animal carcasses, particularly during the dry period, when horses and cattle die due to lack of drinking water and fodder. There is very little effort on the part of the Pradeshiya Sabawa (PS) to collect and dispose of solid waste, including the animal carcasses, and areas with such waste can be observed along the main road. Most of the solid waste includes plastic bottles, dried leaves, paper and fish that has been disposed of. A discussion with the Chairman of the Pradeshiya Sabawa revealed that waste collection was not identified as a priority action at present. Instead, the PS is focused primarily on the rehabilitation and restoration of the gravity flow water scheme and the kerneys, as well as the construction of fishery anchor points and road development, with their limited resources.

#### 4.7.3 Development of sustainable tourism on Delft Island

There are proposals to develop Delft Island as a major tourist destination, with an emphasis on ecotourism. The journey to the island, alone, is considered to be breath-taking. Potential tourist activities identified on the island include the opportunity to view both the sunrise and sunset from a single site, and sites of interest such as the ancient temple, the fort, the dovecote, the ancient footprint, the Queen's Tower, the baobab tree, the limestone walls, the 'growing' stone, the stable and the feral ponies. As a part of this tourism development initiative, the construction of hotels, the promotion of home stays, improvements to the road network, improvements to the harbour and the establishment of a new jetty, as well as a luxury ferry service to the island, have been proposed.

However, the development of Delft Island as a mass tourism destination is not recommended due to several reasons. The island has a very small carrying capacity for tourists at any given time. The conditions that prevail on the island are not conducive to its development as a mass tourism destination, or the provision of sufficient visitor satisfaction. Visitor facilities such as marine resorts, cottages, small or large hotels and guest houses are not available on the island. The present profile of the island does not allow such large-scale construction as such work has potential to pose a great threat to the island's uniqueness, its traditional values, and its culture. The beach around the island is not suitable for sunbathing, as most of the places are covered with coral rubble. The available beaches are not wide enough to establish sun bathing areas with coastal cabanas and hotel rooms. Therefore, if sunbathing and other beach activities are promoted in the area, beach enhancement may become an essential component of such operations, which require hydrological surveys and sand pumping facilities.

Poaching by Indian fishermen using trawlers may cause irreversible damage, not only to the marine biodiversity and ecosystem, but also to the proposed development of tourism. When several thousands of fishing crafts reach the coastal area of the island, it may hinder almost all the marine tourist activities, directly. In addition, the ecological damage this fishing fleet causes can result in a negative perception of the island among visiting tourists.

Therefore, given the current status of Delft Island, the mega-tourism projects seem to be immensely difficult or even impossible to implement. The main reasons for this conclusion are the water quality and hydrology of the marine environment, the lack of a high biodiversity, the lack of suitable locations and opportunities for the development of marine recreational activities, difficulties in accessing the island, and the need to protect the culture

and the traditional values of local communities and the unique coastal landscapes and habitats of the island. However, ecotourism options can be introduced to the island with a suitable consideration of its environment and communities. Through such ecotourism initiatives, the profile of the island can be preserved, while the tourism industry is developed. Small cottage industries, local cuisine and traditional fishing methods are also sectors that can, potentially, be introduced as tourism initiatives.

While Delft Island has potential as a tourist destination, particularly for ecotourism, the ecologically and archaeologically important areas of the island should be preserved, along with its coastal and marine environment. Similarly, issues relating to water, and other infrastructure issues, will have to be addressed, along with other issues such as solid waste management and wastewater, in the development of tourism activities.

The majority of present occupants of Delft Island were in favor of the development of tourism on the island, as it will increase the economic opportunities available to them. Some of the views expressed by local community leaders are given below:

**AGA** (Assistant Government Agent): ...confident that the required services such as water and electricity can be provided soon to the area. Currently, people do not get any benefit from tourism. Therefore, people will resist tourism, but when they understand the benefits they will change their minds. Foreigners were here in this part of the country before the war, and now they will come back. Ayurvedic doctors, medical treatments and medicinal gardens can make a difference.

**SL Navy official:** Tourism is possible in Delft Island. Once tourists enter the island they are free to move about. We are building water cabanas. We also plan to train some local youth as tourist guides. We have refurbished a house for tourists to stay if they request.

**Mr. K. P. Amirthanathan** (President, Fishery Cooperative Society): Tourists should come here. This is a very beautiful area. If given the opportunity, we would also like to invest in constructing small community based seaside huts and produce local food. Tourists have a good opportunity for bathing and swimming. Hospital and water are facilities that need to be improved.

**Mr. Amala Jayan** (Youth Services Officer): Tourism is a good idea. We can produce palmyrah products such as hats, bags, mats, ropes, pulp and fans. There can be a lot of coral based products (*IUCN will not promote this idea*) and sea weed products which can be used for tourism. Though we have traditional Natyam we have no place to perform them. Language will be a problem when communicating with tourists as we do not know English.

**Grama Niladharis**: Tourism will be a good idea. It will allow the local people to sell their products. Already we see a little increase in tourist arrivals. Transport will be an issue. There are many tourist destinations here. But they are missing in the map.

**Doctor Ms. Mageswari** (RMO Retired): There is no drinking water for the tourists. During the dry season, all the wells run dry. Vegetables and fruits are also not available in the island. But we can provide any emergency medical treatments to the tourists if there is a need.

**Prof. Maruthu Canthaboo** (A Delft dweller presently residing in the UK): There is a large number of Tamils residing in other countries. They wish to make a trip to Sri Lanka and will stay at least one night in Delft. During childrens holidays they plan to come. There are no places to stay here in Delft. I plan to develop a small hotel with 8 rooms to cater to these needs. I will introduce a horse carriage, bullock carts, and trained guides for the other tourists as well.

**Farmers:** Tourists, when they see the horses in the other side, will not come here. Having horses is of no use to us. We do not get any benefits from the tourists. They do not spend money here. Tourists make a round trip in a three wheeler or a van and then go back. There is no way to receive income from them. Tourists can come here only during a season not always. They do not have places to stay.

**Mr. A. W. Ariyanayagam** (President, Delft Cooperative Society): Water is the main problem. There is no good quality water for tourists. But this is a good move as we can provide cement, iron and sand to construct tourist hotels. We can also hire the boat for their transport.

## **5. RECOMMENDATIONS**

It is vital that the island is developed in a sustainable manner to benefit both the current, and future, inhabitants of Delft. Given its small area and isolation, actions taken without the consideration of environmental and physical elements could have devastating impacts on the entire island. Additionally, being located at a considerable distance from the mainland, the island is compelled to solve its environmental issues in isolation, and within its own boundaries. Challenges posed by a growing population contributes additional environmental dimensions, such as a higher demand for water and land, and generation of more solid waste, sewage and wastewater, that also need to be addressed and solved, effectively. Therefore, the following recommendations are made to ensure sustainable development of Delft Island, including tourism development.

- The collection of adequate baseline data on species diversity, richness and dominance, to allow the 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.
- Establishment of an environment management committee with the involvement of community based organizations and government officers, including those from the CEA, the Forest Department and the Department of Wildlife Conservation.
- Development of a management plan to manage the cattle and pony populations effectively, including habitat enrichment, reduction of grazing pressure by cattle, and the establishment of alternate grazing areas. Further, it is recommended that the southern part of the island is declared as a Protected Area for horses, as proposed in the Strategic Environmental Assessment Report for Jaffna.
- Development Implementation of habitat restoration measures in order to enhance the ecological value of the island, through coral transplanting, seagrass bed restoration, beach nourishment, sand dune restoration and coastal vegetation restoration.
- Conducting of soil and water conservation measures for the island.
- Greening of routine processes such as solid waste management, sewage and wastewater treatment to reduce adverse impacts on the environment.
- Initiation and carrying out of activities to maintain the cleanliness of Delft through the Pradeshiya Sabha (PS) as an urgent priority. Development of a garbage and waste collection system based on composting and producing organic manure by the PS following the necessary preliminary studies. It is possible to use the compost together with the large amount of cow-dung and horse dung that are not utilized at present, and export natural fertilizer to the mainland, as done in the past.
- Zonation of Delft Island based on land use, the presence of wildlife, and natural and other resources, in the demarcation of areas for tourism.
- Zonation and declaration of sensitive and important marine habitats as restricted areas, no take zones and buffer zones, protection of key areas as required.
- Development of sustainable tourism on the island with the active involvement of local communities and fishery cooperative societies in the area.

- Development of ecotourism and nature-based tourism initiatives on the island, including the development of nature trails, the development nature guides and field guides, and the training of tourist guides, to support such initiatives.
- Promotion of eco-friendly community-based small industries such as palmyrah and coconut based products, in association with tourism development to improve local livelihoods.
- Conducting of an environmental education and awareness programme to sensitize local inhabitants to the current environmental issues, and future development plans, as well as their role in ensuring environmental sustainability
- The creation of awareness on the importance of the marine ecosystems around Delft, their conservation and management, and the role of local communities in the conservation and management of these ecosystems.
- The construction of a passenger jetty and the establishment a civilian administration to man the passenger jetty for tourists, as the present system where the passengers are handled by the Sri Lanka Navy can create a perception of fear and intimidation in the minds of tourists.
- Increasing the number of ferries that are in operation, as well as improvement of the safety and comfort of passengers on these ferries.
- With respect to road transport within Delft, it is suggested only to improve transport systems to meet the minimum requirements without disturbing the natural setting. The distance between the tourist attraction points, the jetty and any home-stays will not be very far. Therefore, sustainable transport based on horse drawn carts, bullock carts, push bicycles or driven carts (rickshaws) will make a difference.
- Improvement of accessibility to key areas of the island during rain. It is necessary to construct drainage paths based on the existing natural gullies for this purpose. Action should also to be taken to increase the ground water recharge by capturing rainwater.
- The sustainable tourism guidelines provided by the Tourism Development Authority (SLTDA), through the Unit for National Investment in Tourism, should be adapted into a different, and more accessible, form and translated, so as to be of greater use to potential investors, local communities, businesses and organizations.
- Application forms to be submitted to the SLTDA for sustainable tourism enterprises (small scale entrepreneurs) in Delft should be developed in the local languages and to reflect the differences from the conventional application process due to the uniqueness of the island and its status.
- Careful assessment of the fees levied for approvals required from various agencies, and the procedures adopted to involve local businessmen in tourism initiatives, along with a reduction in the complexity of the process, including the number of times a potential investor has to meet with the Unit or National Investment in Tourism.
- Reassessment of the requirements for setback limits (coastal reservation) in the event of the development of small scale tourism in Delft, according to the Coast Conservation Act.
- Surveying and marking of the coastal reservation (set back limit) around the coastal area of Delft for future reference (devoid of the areas that are under Navy sub-units).

- Establishment of an information point at the DS office in Delft for potential investors and tourists.
- Processing of permits required to obtain building materials, and the approval of building plans, should be attended to at this site, given that the majority of investments will be at low investment capacities, and involve the conversion of existing structures to the needs of tourists.
- Development activities should be done with consideration of the livelihoods and culture of local communities, as well as the limited resources available on the island, with the establishment of a large scale hotel industry not being encouraged.
- 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.
- Resolution of the issue of a lack of adequate drinking water of a suitable quality for consumption purposes.
- Excavation and restoration of archaeological sites, such as the old Portuguese Fort, the horse stable, the Queen's tower, the ruins of the stupas and the pigeon holes.
- Establishment of a museum on the island to preserve the natural and cultural history of Delft. Further, cultural monuments discovered during the excavations can be stored within the museum. This can also be used as a tourism attraction as well.
- Establishment of the Sri Lankan Gulf of Mannar region as an UNESCO International Man and Biosphere Reserve.

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### Annex 1: Sampled habitats and relevant uses and threats

Plot Numbers	1HG	2GL	3PL	4SL	5BV	6BV		8GL	9GL	10SL	11BV	12SL	13SL	14SL	15HG	16BV	17SL	18BV	19BV	20SL
Habitats																				
Dry pasture lands		1							1					1			1			
Wet pasture lands								1												
Thorn scrub jungles - mixed				1									1					1		1
Thorn scrub jungles - Phoenix dominant										1		1								
Home gardens - managed															1					
Home gardens - abandoned	1																			
Palmyra woodlands			1																	
Coastal woodlands						1	1													
Coral rock seashore vegetation					1						1					х				
Sandy seashore vegetation																			1	
Uses / Values																				
Food	1		1	1				1				1	1		1		1	1		1
Fishing					1													1		
Construction materials	1		1			1	1						1		1	1				1
Animal husbandry		1				1	1	1	1	1		1		1			1			1
Household tools	1		1							1		1								
Medicinal value	1			1	1	1	1				1	1	1		1		1	1	1	1
Recreation value		1		1	1	1		1	1	1	1	1		1		1	1	1	1	1
Cultural or archaeological value						1	1	1	1	1	1		1	1				1		1
Threats and issues																				
Garbage issues											1								1	
Sand mining																				
Invasive species			1							1	1		1			1				

	Family	Botanical name	Local name	Life form	CoS
1	Acanthaceae	Asystasia gangetica	Puruk	Herb	LC
2	Acanthaceae	Dipterocanthus prostatus		Herb	
3	Agavaceae	Agave sp.	Hana	Herb	
4	Aloaceae	Aloe vera	Komarika	Herb	
5	Amaranthaceae	Achyranthes aspera	Gas Karal Heba	Herb	LC
6	Amaranthaceae	Aerva lanata	Pol Pala	Herb	LC
7	Amaranthaceae	Pupalia lappaceae		Herb	
8	Amarilidaceae	Crinum asiaticum	Tholabo	Herb	LC
9	Anacardiaceae	Lannea coromandelica		Tree	LC
10	Anacardiaceae	Mangifera indica	Mango	Tree	
11	Apocynaceae	Carissa spinarum	Heen Karamba	Shrub	LC
12	Apocynaceae	Catharanthus roceus	Mini Mal	Herb	
13	Apocynaceae	Plumeria obtusa	Araliya	Tree	
14	Apocynaceae	Tabernaemontana divaricata		Shrub	
15	Apocynaceae	Thevetia peruviana	Kaha Kaduru	Tree	
16	Araceae	Amorphophallus sylvaticus	Kidaram	Herb	NT
17	Araceae	Theriophonum minutum		Herb	LC
18	Arecaceae	Borassus flabellifer	Tal	Tree	
19	Arecaceae	Cocos nucifera	Pol	Tree	
20	Arecaceae	Phoenix dactylifera	Date	Shrub	
21	Arecaceae	Phoenix pusilla	Walindi	Tree	LC
22	Aristolochiaceae	Aristolochia bracteolata		Climbers	NT
23	Asclepiadaceae	Aristolochia indica	Madu	Climbers	LC
24	Asclepiadaceae	Calotropis gigantea	Wara	Shrub	LC
25	Asclepiadaceae	Leptadenia reticulata		Climbers	LC
26	Asclepiadaceae	Pentatropis capensis		Climbers	LC
27	Asclepiadaceae	Pergularia daemia		Climbers	LC
28	Asclepiadaceae	Tylophora indica	Bin Nuga	Climbers	LC
29	Asclepiadaceae	Wattakaka volubilis	Aguna Kola	Climbers	LC
30	Asparagaceae	Asparagus racemosa	Hathawariya	Climbers	
31	Asteraceae	Blumea obliqua		Herb	LC
32	Asteraceae	Launaea sarmentosa		Herb	LC
33	Asteraceae	Sphaeranthus indicus		Herb	LC
34	Bignoniaceae	Tecoma stans	Kelani Tissa	Tree	
35	Bombacaceae	Adansonia digitata	Baobab	Tree	
36	Boraginaceae	Carmona retusa	Heen Thambala	Shrub	LC
37	Boraginaceae	Cordia dichotoma		Tree	LC
38	Boraginaceae	Heliotropium scabrum		Herb	LC
39	Burseraceae	Commiphora berryi		Tree	LC
40	Cactaceae	Opuntia dillenii	Pathok	Shrub	

#### Annex 2. Flora checklist for Delft Island

	Family	Botanical name	Local name	Life form	CoS
41	Capparaceae	Maerua oblongifolia		Climbers	
42	Capparidaceae	Cadaba fruiticosa		Climbers	
43	Capparidaceae	Capparis brevispina		Climbers	NT
44	Capparidaceae	Capparis divaricata		Climbers	
45	Capparidaceae	Capparis sepiaria	Balalphuru	Climbers	LC
46	Caricaceae	Carica papaya	Gas Labu	Tree	
47	Casuarinaceae	Casuarina equisetifolia	Kasa	Tree	
48	Celastraceae	Cassine glauca	Neralu	Tree	LC
49	Celastraceae	Maytenus emarginata		Shrub	LC
50	Colchicaceae	Gloriosa superba	Niyangala	Climbers	LC
51	Combretaceae	Terminalia arjuna	Kumbuk	Tree	LC
52	Combretaceae	Terminalia catappa	Kottan	Tree	LC
53	Commelinaceae	Commelina ensifolia		Herb	
54	Commelinaceae	Cynotis cristata	Girapala	Herb	
55	Commelinaceae	Murdannia spirata		Herb	LC
56	Convolvulaceae	Argyreia populifolia	Girithilla	Climbers	LC
57	Convolvulaceae	<i>Argyreia</i> sp.		Climbers	
58	Convolvulaceae	Cressa cretica		Herb	LC
59	Convolvulaceae	Evolvulus alsinoides	Vishnukranthi	Herb	LC
60	Convolvulaceae	Ipomoea coptica		Climbers	EN
61	Convolvulaceae	Ipomoea pes-capre	Bimthamburu	Climbers	LC
62	Convolvulaceae	Ipomoea rumicifolia		Climbers	
63	Convolvulaceae	Ipomoea violacea		Climbers	LC
64	Cucurbitaceae	Citrullus colocynthis	Yak Komadu	Climbers	VU
65	Cucurbitaceae	Coccinia grandis		Climbers	LC
66	Cucurbitaceae	Corallocarpus sp.		Climbers	
67	Cucurbitaceae	Diplocyclos palmatus	Pasegilla	Climbers	LC
68	Cucurbitaceae	Mukia maderaspatana		Climbers	NT
69	Cyperaceae	Bulbostylis barbata		Herb	LC
70	Cyperaceae	Cyperus arinarius		Herb	
71	Cyperaceae	Cyperus bulbosa		Herb	
72	Cyperaceae	Cyperus castaneus		Herb	LC
73	Cyperaceae	Cyperus compressus		Herb	LC
74	Cyperaceae	Cyperus conglomaratus		Herb	
75	Cyperaceae	Cyperus iria		Herb	LC
76	Cyperaceae	Cyperus pygmaeus		Herb	LC
77	Cyperaceae	Cyperus rotundus	Kalanduru	Herb	LC
78	Cyperaceae	Cyperus stoloniferus		Herb	
79	Cyperaceae	Fimbristylis argentea		Herb	
80	Cyperaceae	Fimbristylis dipsacea		Herb	E

	Family	Botanical name	Local name	Life form	CoS
81	Cyperaceae	Fimbristylis feruginea		Herb	
82	Cyperaceae	Rikiliella squarrosa		Herb	
83	Ebenaceae	Diospyros ferrea		Tree	
84	Erythroxylaceae	Erythroxylum monogynum		Shrub	NT
85	Euphorbiaceae	Acalypha indica	Kuppameniya	Herb	LC
86	Euphorbiaceae	Breynia vitis-idea		Shrub	
87	Euphorbiaceae	Codiaeum variagatum	Croton	Shrub	
88	Euphorbiaceae	Euphorbia antiquorum	Daluk	Tree	LC
89	Euphorbiaceae	Euphorbia hirta		Herb	LC
90	Euphorbiaceae	Euphorbia rosea		Herb	LC
91	Euphorbiaceae	Euphorbia tirucalli	Nawahandi	Tree	
92	Euphorbiaceae	Flueggea leucopyrus	Katupila	Shrub	LC
93	Euphorbiaceae	Jatropha curcas	Weta Endaru	Tree	
94	Euphorbiaceae	Jatropha glandulifera		Shrub	NT
95	Euphorbiaceae	Jatropha gossipifolia		Shrub	
96	Euphorbiaceae	Nerium oleander		Shrub	
97	Euphorbiaceae	Phyllanthus niriuri	Pitawakka	Herb	
98	Euphorbiaceae	Phyllanthus reticulatus	Patassa	Shrub	LC
99	Euphorbiaceae	Ricinus communis	Beheth Endaru	Shrub	
100	Euphorbiaceae	<i>Tragia</i> sp.		Herb	
101	Fabaceae	Abrus precatorius	Olinda	Climbers	LC
102	Fabaceae	<i>Albizia</i> sp.		Tree	
103	Fabaceae	Alysicarpus vaginalis	Aswenna	Herb	LC
104	Fabaceae	Caesalpinia bonduc	Kalu Vavulatiya	Climbers	LC
105	Fabaceae	Casalpinia pulcherrima		Climbers	
106	Fabaceae	Cassia auriculata	Ranawara	Tree	LC
107	Fabaceae	Cassia tora	Pani Tora	Shrub	LC
108	Fabaceae	Delonix regia		Tree	
109	Fabaceae	Desmodium triflorum	Undupiyali	Herb	LC
110	Fabaceae	Dichrostachys cinerea	Andara	Shrub	LC
111	Fabaceae	Erythrina variegata	Erabadu	Tree	LC
112	Fabaceae	Gliricidia sepium	Weta Mara	Tree	
113	Fabaceae	<i>Indigofera</i> sp.		Herb	
114	Fabaceae	Leucaena leucocephala	lpil lpil	Tree	
115	Fabaceae	Peltophorum pterocarpum		Tree	
116	Fabaceae	Pithecellobium dulce		Tree	
117	Fabaceae	Pongamia pinnata	Karanda	Tree	LC
118	Fabaceae	Prosopis juliflora	Kalapu Andara	Tree	
119	Fabaceae	Samanea saman	Para Mara	Tree	
120	Fabaceae	Sesbania grandiflora	Kathurumurunga	Tree	
121	Fabaceae	Tamarindus indica	Siyabala	Tree	

	Family	Botanical name	Local name	Life form	CoS
122	Fabaceae	<i>Vigna</i> sp.		Climbers	
123	Flacourtiaceae	Flacourtia indica		Shrub	LC
124	Hernandiaceae	Gyrocarpus americanus		Tree	LC
125	Lauraceae	Cassytha filiformis		Climbers	LC
126	Liliaceae	Scilla hycinthiana	Walluunu	Herb	
127	Lythraceae	Lawsonia inermis	Maruthondiya	Tree	LC
128	Malvaceae	<i>Fioria</i> sp.		Shrub	
129	Malvaceae	Hibiscus rosa-sinensis		Tree	
130	Malvaceae	Sida acuta	Bevila	Herb	LC
131	Malvaceae	Thespesia populnea	Suriya	Tree	LC
132	Meliaceae	Azadirachta indica	Kohomba	Tree	
133	Meliaceae	Chukrasia tabularis	Hik	Tree	NT
134	Meliaceae	Swietenia mahagoni	Mahogani	Tree	
135	Menispermaceae	Cocculus hirsutus		Climbers	EN
136	Menispermaceae	Tinospora cordifolia		Climbers	VU
137	Molluginaceae	Geiskia pharanaceoides		Herb	
138	Molluginaceae	<i>Geiskia</i> sp.		Herb	
139	Molluginaceae	Glinus lotoides		Herb	LC
140	Moraceae	Ficus amplissima		Tree	LC
141	Moraceae	Ficus benghalensis	Nuga	Tree	LC
142	Moraceae	Ficus religiosa	Во	Tree	
143	Moraceae	Ficus sp.	Nuga	Tree	
144	Moringaceae	Moringa oleifer	Murunga	Tree	
145	Musaceae	Musax paradisiaca	Kesel	Tree	
146	Nyctaginaceae	Boerhavia diffusa		Herb	LC
147	Nyctaginaceae	<i>Bogainvillea</i> sp.	Boganvila	Shrub	
148	Orchidaceae	Cymbidium aloifolium	Orchid	Epiphyte	LC
149	Oxalidaceae	Averrhoa bilimbi	Billing	Tree	
150	Oxalidaceae	Averrhoa carambola	Starfruit	Tree	
151	Passfloraceae	Passiflora foetida	Pada-vel	Climbers	
152	Pedaliaceae	Pedalium murex	Ethnerenchi	Herb	LC
153	Poaceae	Chloris barbata		Herb	
154	Poaceae	Cynodon dactylon		Herb	LC
155	Poaceae	Eragrostis ciliaris		Herb	
156	Poaceae	Eragrostis maderaspatana		Herb	
157	Poaceae	Eragrostis riparia		Herb	LC
158	Poaceae	Eragrostis viscosa		Herb	LC
159	Poaceae	Ischeamum indicum		Herb	
160	Poaceae	Saccharum officinarum		Herb	
161	Poaceae	Spinifex littoreus	Maha Ravana Revula	Herb	LC
162	Poaceae	Sporobolus maderaspatanus		Herb	VU

	Family	Botanical name	Local name	Life form	CoS
163	Poaceae	Sporobolus spicatus		Herb	
164	Poaceae	Sporobolus tremulus		Herb	LC
165	Poaceae	Zoysia martella		Herb	
166	Polygonaceae	Antigonon leptopus	Kadadasimal	Climbers	
167	Portulacaceae	Portulaca sp.		Herb	
168	Potamogetonaceae	Cymodocea serrulata	Sea weed	Herb	NT
169	Punicaceae	Punica granatum	Delum	Tree	
170	Rhamnaceae	Colubrina asiatica	Tel-hiriya	Climbers	VU
171	Rhamnaceae	Scutia myrtina		Shrub	LC
172	Rhamnaceae	Ziziphus mauritiana	Masan	Tree	LC
173	Rhamnaceae	Ziziphus nummularia		Climbers	
174	Rhamnaceae	Ziziphus oenoplia	Heen Eraminiya	Climbers	LC
175	Rubiaceae	Benkara malabarica	Kukurumanna	Shrub	LC
176	Rubiaceae	Canthium coromandelicum	Kara	Tree	LC
177	Rubiaceae	Catunaregam spinosa	Kukurumanna	Tree	LC
178	Rubiaceae	Ixora pavetta	Maha Ratambala	Tree	LC
179	Rubiaceae	Morinda coreia	Ahu	Tree	LC
180	Rubiaceae	Thecagonum biflorum		Herb	
181	Rutaceae	Citrus aurantifolia	Dehi	Tree	
182	Rutaceae	Limonia acidissima	Divul	Tree	LC
183	Rutaceae	Toddalia asiatica	Kudumiris	Climbers	LC
184	Salvadoraceae	Azima tetracantha		Shrub	LC
185	Salvadoraceae	Salvadora persica	Maliththan	Tree	NT
186	Sapindaceae	Allophylus cobbe	Kobbe	Tree	LC
187	Sapindaceae	Dodonaea viscosa	Hupala	Shrub	LC
188	Sapindaceae	Lepisanthes tetraphylla		Tree	LC
189	Sapotaceae	Madhuca longifolia	Mi	Tree	NT
190	Sapotaceae	Manilkara hexandra	Palu	Tree	VU
191	Scrphulariaceae	Peplidium maritimum		Herb	EN
192	Solanaceae	Solanum trilobatum	Welbatu	Herb	LC
193	Solanaceae	Solanum virginianum		Herb	LC
194	Tiliaceae	Berrya cordifolia	Halmilla	Tree	LC
195	Tiliaceae	Grewia carpinifolia	Walkeliya	Tree	LC
196	Tiliaceae	Grewia orientalis		Tree	LC
197	Tiliaceae	Muntingia calabura	Jam	Tree	
198	Turneraceae	Turnera ulmifolia		Shrub	
199	Verbenaceae	Clerodendrum inerme	Burenda	Shrub	LC
200	Verbenaceae	Gmelina asiatica	Demata	Tree	LC
201	Verbenaceae	Lantana camara	Gandapana	Shrub	
202	Verbenaceae	Phyla nodiflora	Hiramanadetta	Herb	LC
203	Verbenaceae	Premna obtusifolia	Maha Midi	Shrub	LC

	Family	Botanical name	Local name	Life form	CoS
204	Verbenaceae	Vitex negundo	Nika	Tree	LC
205	Vitaceae	<i>Cayratia</i> sp.		Climbers	
206	Vitaceae	Cissus quadrangularis	Heressa	Climbers	LC
207	Vitaceae	Cyphostemma setosum		Climbers	NT
208	Vitaceae	Cyratia trifolia		Climbers	
209	Zygophyllaceae	Tribulus terestris		Herb	

## Annex 3. Flora checklist with respect to habitats

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Botanical name																				
1	Acalypha indica	1																			
2	Aerva lanata															1					
3	Agave sp.															1					
4	Albizia sp.	1																			
5	Allophylus cobbe												1								1
6	Aloe vera					1					1	1				1	1	1	1		
7	Alysicarpus vaginalis											1									
	Amorphophallus																				
8	sylvaticus					1		1			1		1		1						
9	Antigonon leptopus															1					
10	Argyreia populifolia															1					
11	Aristolochia bracteolata					1															
12	Aristolochia indica																				1
13	Asparagus racemosa				1						1		1						1		1
14	Averrhoa carambola															1					

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
15	Azadirachta indica	1		1	1	1	1							1	1	1		1		1	
16	Azima tetracantha	1		1	1					1	1		1					1			
17	Benkara malabarica	1													1			1			
18	Berrya cordifolia															1					
19	Boerhavia diffusa			1		1											1			1	
20	Bogainvillea sp.															1					
21	Borassus flabellifer	1		1	1	1								1	1	1			1		
22	Breynia vitis-idea	1																			
23	Bulbostylis barbata		1	1				1	1					1	1						1
24	Cadaba fruiticosa													1							1
25	Caesalpinia bonduc																		1		
26	Calotropis gigantea			1																	
	Canthium																				
27	coromandelicum			1	1									1	1						1
28	Capparis brevispina					1		1										1			
29	Capparis divaricata				1						1										
30	Capparis sepiaria				1						1			1							
31	Cappariscdivaricata												1								

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thom scrub jungles - mixed
32	Carica papaya															1					
33	Carissa spinarum	1		1																	1
34	Carmona retusa											1									
35	Casalpinia pulcherrima															1					
36	Cassia auriculata										1		1	1				1	1		
37	Cassia tora	1		1			1				1		1	1							
38	Cassine glauca	1			1	1		1			1										
39	Cassytha filiformis																		1		
40	Cassytha filiformis																				1
41	Casuarina equisetifolia															1					
42	Catheranthus roseus																			1	
43	Catunaregam spinosa							1			1		1								
44	Cayratia sp.	1																			
45	Chloris barbata			1		1										1					1
46	Chukrasia tabularis															1					
47	Cissus quadrangularis	1		1	1	1	1	1			1		1	1	1			1	1		1
48	Citrullus colocynthis																			1	
49	Citrus aurantifolia															1					

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
50	Clerodendrum inerme			1	1							1									
51	Coccinia grandis												1					1			
52	Cocculus hirsutus			1														1			
53	Cocos nucifera	1												1		1					
54	Codiaeum variagatum															1					
55	Colubrina asiatica				1									1							
56	Commelina ensifolia					1															
57	Commiphora berryi													1							
58	Corallocarpus sp.				1																
59	Cordia dichotoma																				1
60	Cressa critica		1						1	1					1						
61	Crinum defixum										1										
62	Croton variegata															1					
63	Cymbidium aloifolium	1																			
64	Cymodocea serrulata																1				
65	Cynadon dactylon		1	1	1			1	1	1			1	1	1	1			1		
66	Cynotis cristata																1				
67	Cyperus arinarius				1	1	1		1		1	1		1	1	1	1		1	1	

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
68	Cyperus bulbosa		1	1	1	1		1	1	1		1	1		1		1	1			1
69	Cyperus castaneus	1		1		1		1		1			1			1		1		1	1
70	Cyperus compressus	1	1	1	1		1	1		1		1		1	1		1	1		1	
71	Cyperus conglomaratus			1		1			1		1			1			1			1	1
72	Cyperus iria		1		1		1				1				1		1		1		
73	Cyperus pygmaeus		1		1	1	1	1	1	1		1		1	1		1	1	1		1
74	Cyperus rotundus								1												
75	Cyperus stoloniferus							1													
76	Cyphostemma setosum																				1
77	Cyratia trifolia																		1		
78	Delonix regia	1														1					
79	Desmodium triflorum	1				1															
80	Dichrostachys cinerea			1	1																
81	Diplocyclos palmatus													1							1
	Dipterocanthus																				
82	prostatus	1		1																	
83	Dodonaea viscosa																		1		
84	Eragrostis ciliaris			1	1		1		1	1		1		1		1	1	1	1	1	1

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
	Eragrostis																				
85	maderaspatana		1	1		1	1		1				1		1	1		1			1
86	Eragrostis riparia		1		1				1			1				1	1	1		1	1
87	Eragrostis viscosa																				1
88	Erythrina variegata															1					
	Erythroxylum																				
89	monogynum													1					1		
90	Euphorbia antiquorum					1															
91	Euphorbia hirta	1																			
92	Euphorbia rosea									1											
93	Euphorbia tirucalli	1																			
94	Evolvulus alsinoides	1		1																	1
95	Ficus amplissima	1			1	1															
96	Ficus benghalensis	1		1	1	1								1	1	1			1		
97	Ficus religiosa															1					
98	Fimbristylis argentea		1				1		1	1			1	1		1				1	1
99	Fimbristylis dipsacea	1		1		1			1			1		1							
100	Fimbristylis feruginea		1	1	1		1		1			1			1	1			1	1	

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
101	Fioria sp.		1																		
102	Flacourtia indica																				1
103	Flueggea leucopyrus	1		1	1	1	1	1		1	1		1	1	1		1	1			1
104	Geiskia pharanaceoides																				1
105	Glinus lotoides					1															
106	Gliricidia sepium													1		1					
107	Gloriosa superba										1										
108	Grewia orientalis												1								1
109	Gyrocarpus americanus						1	1													
110	Heliotropium scabrum		1				1														
111	Hibiscus rosa-sinensis													1		1					
112	Indigofera sp.						1	1													
113	Ipomoea coptica				1																
114	lpomoea pes-capre																			1	
115	Ipomoea rumicifolia										1										
116	lpomoea violacea																				1
117	Ischeamum indicum		1	1	1		1		1	1		1			1			1	1		1
118	lxora pavetta	1																			1

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
119	Jatropha glandulifera						1	1										1			
120	Jatropha gossipifolia								1												
121	Lannea coromandelica															1					
122	Lantana camara															1					
123	Launaea sarmentosa					1	1	1									1			1	
124	Lawsonia inermis																		1		
125	Lepisanthes tetraphylla			1																	
126	Leptadenia reticulata				1																
127	Leucaena leucocephala													1		1					
128	Limonia acidissima															1		1			
129	Maba buxifolia												1								
130	Madhuca longifolia															1					
131	Maerua sp.										1										
132	Mangifera indica															1					
133	Maytenus emarginata																				1
134	Morinda coreia										1					1				1	
135	Moringa oleifera															1					
136	Mukia maderaspatana							1			1	1									

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
137	Muntingia calabura															1					
138	Murdannia spirata																	1			
139	Musa x.paradisiaca															1					
140	Nerium oleander	1														1					
141	Opuntia dillenii			1		1		1				1		1			1				1
142	Passiflora foetida															1					
143	Pedalium murex																			1	
	Peltophorum																				
144	pterocarpum	1																			
145	Pentatropis capensis				1							1						1			
146	Peplidium maritimum		1						1						1			1			
147	Pergularia daemia										1			1							
148	Phoenix dactylifera																		1		
149	Phoenix pusilla			1	1	1	1	1			1	1	1	1				1	1		1
150	Phyla nodiflora				1				1												
151	Phyllanthus niriuri			1		1	1						1								
152	Phyllanthus reticulatus												1	1	1						
153	Pithecellobium dulce															1					

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
154	Plumeria obtusa															1					
155	Pongamia pinnata					1															
156	Portulaca sp.				1		1				1								1		
157	Punica granatum															1					
158	Pupalia lappaceae												1						1		
159	Rikiliella squarrosa					1			1								1				
160	Saccharum officinarum															1					
161	Salvadora persica			1	1	1	1	1	1	1			1					1			1
162	Samanea saman	1																			
163	Scilla hycinthiana	1												1							
164	Scutia myrtina										1			1					1		
165	Sesbania grandiflora															1					
166	Sida acuta	1																			
167	Solanum trilobatum						1			1			1								
168	Solanum tuburosum																			1	
169	Solanum virginianum				1																
170	Sphaeranthus indicus				1				1	1											
171	Spinifex littoreus						1					1							1	1	

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thorn scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
	Sporobolus		_						_			_	_								
172	maderaspatanus	1	1	1		1	1		1			1	1	1	1			1		1	1
173	Sporobolus spicatus	1	1	1	1		1		1	1	1		1		1			1	1	1	1
174	Sporobolus tremulus		1	1	1	1		1		1	1	1		1	1		1	1		1	
	Tabernaemontana																				
175	divaricata															1					
176	Tamarindus indica			1																	
177	Tecoma stans															1					
178	Terminalia arjuna															1					
179	Terminalia cattapa	1														1					
180	Thecagonum biflorum																				1
181	Theriophonum minutum			1	1	1															
182	Thespesia populnea	1		1					1	1						1		1		1	
183	Thevetia peruviana															1					
184	Tinospora cordifolia			1										1		1					1
185	Toddalia asiatica	1		1		1	1				1	1	1						1		1
186	Tragia sp.							1													
187	Tribulus terestris																			1	

	Plots and habitats >	Home gardens - abandoned	Dry pasture lands	Palmyrah woodlands	Thorn scrub jungles - mixed	Coral rock sea shore vegetation	Coastal woodlands	Coastal woodlands	Wet pasture lands	Dry pasture lands	Thorn scrub jungles - <i>Phoenix</i> dominant	Coral rock sea shore vegetation	Thorn scrub jungles - <i>Phoenix</i> dominant	Thom scrub jungles - mixed	Dry pasture lands	Home gardens - managed	Coral rock sea shore vegetation	Dry pasture lands	Thorn scrub jungles - mixed	Sandy sea shore vegetation	Thorn scrub jungles - mixed
188	Turnera ulmifolia	1																			
189	Tylophora indica	1		1	1		1	1			1			1	1		1		1		1
190	Vigna sp.											1									
191	Vitex negundo															1			1		
192	Wattakara volubilis			1																1	
193	Ziziphus nummularia						1					1									
194	Zoysia martella		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

## Annex 4. Terrestrial fauna checklist with respect to habitats

(Sources : IUCN Sri Lanka, 2011; <sup>1</sup>-Weerakoon, 2011; <sup>2</sup>- Somaweera, 2006, <sup>3</sup>- Somaweera and Somaweera, 2009; <sup>4</sup>- De Silva 1957, <sup>5</sup> - FOGSL 2010; <sup>6</sup>- Ceylon Bird Club Notes, 2001)

## Dragonflies

	Scientific Name	English Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fami	ly - Coenagrionidae																							
	Pseudagrion																							
1	microcephalum	Blue Sprite	ID	LC	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Fami	ly - Libellulidae																							
2	Lathrecista asiatica	Pruinosed Bloodtail	ID	NT	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0
3	Orthetrum luzonicum	Marsh Skimmer	ID	NT	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
4	Potamarcha congener	Blue Pursuer	ID	LC	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
5	Brachythmis contaminata	Asian Groundling	ID		0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
6	Crocothemis servilia <sup>1</sup>	Oriental Scarlet	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Diplacodes trivialis	Blue Percher	ID	LC	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
8	Neurothemis intermedia	Paddyfield Parasol	ID	NT	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
9	Pantala flavescens	Wandering Glider	ID	LC	1	1	1	1	0	0	1	1	0	0	0	1	0	0	1	1	0	1	1	1
10	Tramea basilaris	Burmeister's Glider	ID	VU	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0

## Butterflies

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fam	ily - Papilionidae																								
1	Pachliopta hector	Crimson rose	Maha rosa papilia	ID	LC	1	0	1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	0	1	1
2	Papilio polytes	Common mormon	Kalu papilia	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fam	ily - Pieridae																								
3	Leptosia nina	Psyche	Kalu-thith sudda	ID	LC	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Podu Punduru-																						
4	Cepora nerissa	Common gull	sudana	ID	LC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5	Appias galene <sup>1</sup>	Lesser albatross	Kuda sudana	End	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Thith-piya																						
6	Catopsilia pyranthe	Mottled emigrant	piyasariya	ID	LC	1	0	1	0	1	1	1	0	0	1	0	0	0	0	0	1	1	0	1	0
7	Catopsilia pomona	Lemon emigrant	Kaha piyasariya	ID	LC	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8	Colotis amata	Small salmon arab	Punchi rosa sudana	ID	LC	1	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	1	1
			Podu tembiliwan																						
9	Colotis aurora	Plain orange tip	sudana	ID	VU	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1
Fam	ily - Nymphalidae																								
10	Danaus chrysippus	Plain tiger	Podu koti-thambiliya	ID	LC	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			Podu kaka-																						
11	Euploea core	Common crow	kotithiyaya	ID	LC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
12	Hypolimnas misippus	Danaid Eggfly	Kela Alankarikya	ID	LC	1	0	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0
			Thambily panduru-																						
13	Acraea violae	Tawny costEr	boraluwa	ID	LC	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Fam	ily - Lycaenidae																								
14	Tarucus nara	Striped Pierrot	Thith-iri Mal-nilaya	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
			Punchi Thruna-																						
15	Zizula hylax	Tiny Grass Blue	nilaya	ID	LC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
# Amphibians

		Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Fan	nily - Dicroglossidae																								
Γ		Sphaerotheca																								
	1	breviceps <sup>4</sup>	Banded sand frog	Tunhiri vali madiya	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

# Reptiles

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fam	ily - Agamidae																								
		Common garden																							
1	Calotes versicolor	lizard	Gara katussa	ID	LC	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	1	1
Fam	ily - Gekkonidae																								
2	Hemidactylus leschenaultii	Bark gecko	Kimbul huna	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Hemidactylus																								
3	parvimaculatus	Spotted housegecko	Pulli gehuna	ID	LC	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
		Common house-																							
4	Hemidactylus frenatus <sup>4</sup>	gecko	Sulaba gehuna	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fam	ily - Scincidae																								
5	Eutropis carinata	Common skink	Sulaba hikanala	ID	LC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Lygosoma punctatus <sup>3</sup>	Dotted skink	Tit hiraluhikanala	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fam	ily - Colubridae																								
7	Ptyas mucosa <sup>2</sup>	Rat snake	Gerandiya.	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fam	ily - Viperidae																								
8	Echis carinatus	Saw scale viper	Vali polonga	ID	VU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

## Birds

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Family	/ - Phasianidae																								
	Francolinus																								
1	pondicerianus	Grey Francolin	Alu Ussawatuva	BrR	NT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Family	/ - Anatidae					_																			
2	Dendrocygna javanica⁵	Lesser Whistling-duck	Heen Thamba-seruwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Anas penelope $^5$	Eurasian Wigeon	Rankiralu tharava	VRWV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Anas querquedula	Garganey	Bemmasudu tharava	VCWV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Ramphastidae																								
5	Megalaima haemacephala¹	Coppersmith Barbet	Rathlaye Kottoruwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Coraciidae																								
6	Coracias benghalensis	Indian Roller	Dumbonna	BrR	LC	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0
Family	/ - Alcedinidae																								
7	Alcedo atthis	Common Kingfisher	Mal Pilihuduwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Halcyon smyrnensis <sup>1</sup>	White-throated Kingfisher	Layasudu Madi- pilihuduwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Meropidae																								
9	Merops orientalis	Green Bee-eater	Punchi Binguharaya	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
10	Merops philippinus	Blue-tailed Bee-eater	Nilpenda Binguharaya	WV		0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	1	1	0	1	0
Family	/ - Cuculidae																								
11	Clamator jacobinus <sup>4</sup>	Pied Cuckoo	Gomara Kondakoha	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Eudynamys scolopaceus	Asian Koel	Kowula	BrR	LC	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
13	Centropus sinensis <sup>5</sup>	Greater Coucal	Ati-kukula	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Psittacidae																								
14	Psittacula krameri	Rose-ringed Parakeet	Rana Girawa	BrR	LC	1	0	1	1	0	1	1	0	0	0	1	0	0	0	0	1	1	0	0	0
Family	/ - Apodidae																								
15	Collocalia unicolor <sup>4</sup>	Indian Swiftlet	Indu Upa-thurithaya	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Cypsiurus balasiensis	Asian Palm Swift	Asiaa Thal-thurithaya	BrR	LC	0	0	1	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	1	1
Family	/ - Hemiprocnidae																								
17	Hemiprocne coronata	Crested Treeswift	Silu Ruk-thurithaya	BrR	LC	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Family	/ - Columbidae																								
18	Columba livia	Rock Pigeon	Podu Paraviya	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
19	Streptopelia chinensis	Spotted Dove	Alu Kobeiyya	BrR	LC	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	1	0	1
20	Streptopelia decaocto 5	Eurasian Collard Dove	Mala Kobeiyya	BrR	NT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Family	- Rallidae																								
21	Amaurornis phoenicurus⁵	White-breasted Waterhen	Laya-sudu Korawakka	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	<ul> <li>Scolopacidae</li> </ul>																								
22	Limosa limosa ⁵	Black-tailed Godwit	Kalu-penda Gohuduwiththa	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Numenius phaeopus	Whimbrel	Wimburali Kalikaya	wv		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
24	Tringa totanus <sup>1</sup>	Common Redshank	Podu Rathpa Silibilla	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Tringa stagnatilis ⁵	Marsh Sandpiper	Waguru Silibilla	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Tringa nebularia ⁵	Common Greenshank	Podu Palapa Silibilla	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Tringa ochropus	Green Sandpiper	Kola Silibilla	wv		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
28	Tringa glareola ⁵	Wood Sandpiper	Wana Silibilla	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Actitis hypoleucos	Common Sandpiper	Podu Siliththa	wv		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0
30	Arenaria interpres	Ruddy Turnstone	Rath Galperaliya	wv		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
31	Calidris alba	Sanderling	Wali Hinna	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
32	Calidris minuta⁵	Little Stint	Punchi Hinna	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Calidris temminckii	Temminck's Stint	Temminck Hinna	wv		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
34	Calidris ferruginea <sup>5</sup>	Curlew Sandpiper	Kalika Hinna	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	- Burhinidae																								
35	Burhinus oedicnemus	Eurasian Thick-knee	Golu-kiraluwa	BrR	LC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Family	- Recurvirostridae																								
36	Himantopus himantopus	Black-winged Stilt	Kalupiya Ipalpawa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Family	- Charadriidae																								
37	Pluvialis fulva <sup>1</sup>	Pacific Golden Plover	Sethkara Ran Maha- oleviya	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	Charadrius hiaticula	Common Ringed Plover	Loku Mala Oleviya	wv		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0
39	Charadrius dubius	Little Ringed Plover	Punchi Mala Oleviya	BrR & WV	VU	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
40	Charadrius alexandrinus	Kentish Plover	Kenti Oleviya	BrR & WV	VU	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
41	Charadrius mongolus <sup>1</sup>	Lesser Sand Plover	Heen Wali Oleviya	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	Vanellus malabaricus	Yellow-wattled Lapwing	Kaha-yatimal Kirella	BrR	LC	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
43	Vanellus indicus	Red-wattled Lapwing	Rath-yatimal Kirella	BrR	LC	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
Family	- Glareolidae																								
44	Cursorius coromandelicus <sup>6</sup>	Indian Courser	Indu Javalihiniya	BrR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Laridae																								

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
45	4		Maha Kalu-hisa					•					~	~											
45	Larus ichthyaetus	Pallas's Gull	Galuviya	WV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	Larus brunnicephalus °	Brown-headed Gull	Bora-hisa Galuviya	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	Sterna nilotica⁵	Gull-billed Tern	Savurulihiniva	SU		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Caspia						Ū		Ū	-	-	Ū		Ű				Ű	Ű	Ŭ			
48	Sterna caspia	Caspian Tern	Muhudulihiniya	WV		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
			Heen Konda			_		_	_				_		_		_	_			_	_		_	
49	Sterna bengalensis	Lesser Crested Tern	Muhudulihiniya	wv		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
50	Sterna bergii	Great Crested Tern	Mana Konda Muhudulihiniva	BrR	NT	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
51	Sterna albifrons <sup>4</sup>	Little Tern	Punchi Muhudulihiniva	BrR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Kadiyalam										-	Ŭ		Ŭ				Ŭ	Ű	Ŭ			
52	Sterna anaethetus	Bridled Tern	Muhudulihiniya	PM/WV/R?		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
	<b>a</b> . <b>(</b> )		Dumbutu						_				_												
53	Sterna fuscata	Sooty Tern	Muhudulihiniya	PIN		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
54	Chlidonias hvbrida <sup>1</sup>	Whiskered Tern	lihiniva	wv		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	- Accipitridae							-	-		-	-	-	-	-	-				-		-			
55	Milvus migrans ⁵	Black Kite	Bora Parakussa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	Haliastur indus	Brahminy Kite	Bamunu Pivakussa	BrR	LC	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1
		White-bellied Sea-	Kusa-ali			-		-	-		-		-		-						-		-		
57	Haliaeetus leucogaster	eagle	Muhudukussa	BrR	LC	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
58	Spilornis cheela ⁵	Crested Serpent Eagle	Silu Sarapakussa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	Circus aeruginosus <sup>4</sup>	Western Marsh Harrier	Waguru Harikussa	WV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Circus macrourus <sup>4</sup>	Pallid Harrier	Sudumali Harikussa	WV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	Accipiter badius	Shikra	Kurulugoya	BrR	LC	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Family	/ - Falconidae																								
62	Falco tinnunculus	Common Kestrel	Podu Ukusugoya	BrR/UWV	EN	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Family	- Podicipedidae																								
63	Tachybaptus ruficollis ⁵	Little Grebe	Punchi Gembithuruwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Anhingidae																								
	Anhinga melanogaster																								
64	5	Oriental Darter	Abikava	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	I - Phalacrocoracidae																								
65	Phalacrocorax niger	Little Cormorant	Punchi Diyakava	BrR	LC	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
66	rnaiacrocorax fuscicolli⁵s	Indian Cormorant	Indu Divakava	BrR	10	0	0	Λ	0	0	0	0	0	0	0	n	Ω	Ω	Λ	n	Λ	0	Ω	Ω	0
Family	- Ardeidae	maidh Comorant		BAR	10	0	Ū	U	U	Ū	0		0	0	0	0	U	U	0	0	0	0	U	U	
67	Egretta garzetta	Little Earet	Punchi Anu-koka	BrR	LC	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
68	Ardea cinerea ⁵	Grey Heron	Alu Koka	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	Casmerodius albus	Great Egret	Sudu maha-koka	BrR	LC	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
70	Mesophoyx intermedia	Intermediate Egret	Sudu Madi-koka	BrR	LC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	Bubulcus ibis	Cattle Egret	Geri-koka	BrR	LC	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
72	Ardeola grayii	Indian Pond Heron	Kana-koka	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
73	Butorides striatus	Straited Heron	Pala-koka	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	Nycticorax nycticorax <sup>1</sup>	Black-crowned Night Heron	Ra kana-koka	BrR	NT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Threskiornithidae																								
75	Threskiornis melanocephalus <sup>1</sup>	Black-headed Ibis	Hisakalu Dakaththa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	Platalea leucorodia ⁵	Eurasian Spoonbill	Handialawa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Pelecanidae																								
77	Pelecanus philippensis	Spot-billed Pelican	Thithhota Pasthuduwa	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Ciconiidae																								
78	Anastomus oscitans	Asian Openbill	Vivarathuduwa	BrR	LC	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Laniidae																								
79	Lanius cristatus	Brown Shrike	Bora Sabariththa	WV		0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1
Family	y - Artamidae																								
80	Artamus fuscus <sup>5</sup>	Ashy Woodswallow	Alu Wanalihiniya	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Dicruidae																								
81	Dicrurus macrocercus	Black Drongo	Kalu Kawuda	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0
82	Dicrurus leucophaeus	Ashy Drongo	Alu Kawuda	WV		0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	y - Corvidae																								
83	Corvus splendens	House Crow	Kolamba Kaputa	BrR	LC	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	1	0
84	Corvus levaillantii	Large-billed Crow	Kalu Kaputa	BrR		1	1	1	1	0	0	1	0	0	1	0	1	1	0	1	1	0	1	1	0
Family	y - Sturnidae																								
85	Sturnus pagodarum	Brahminy Starling	Bamunu Sharikawa	WV		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
86	Acridotheres tristis	Common Myna	Mayna	BrR	LC	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Family	y - Hirundinidae																								
87	Hirundo rustica	Barn Swallow	Atu Wahilihiniya	BrR		0	0	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0	0
Family	y - Pycnonotidae																							]	
88	Pycnonotus cafer	Red-vented Bulbul	Kondaya	BrR	LC	0	0	0	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
Family	v - Cisticolidae																							. 1	

	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
89	Prinia inornata	Plain Prinia	Sarala Priniya	BrR	LC	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
Family	/ - Sylviidae																								
90	Orthotomus sutorius <sup>3</sup>	Common Tailorbird	Battichcha	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	Phylloscopus trochiloides	Greenish Warbler	Kola Gassraviya	WV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Family	/ - Alaudidae																								
92	Eremopterix grisea <sup>1</sup>	Ashy-crowned Sparrow Lark	Kirulalu Gekurulu- thulikawa	BrR	LC	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
93	Alauda gulgula <sup>1</sup>	Oriental Skylark	Peradigu Ahas Thulikawa	BrR	LC	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Dicaeidae																								
94	Dicaeum erythrorhynchos	Pale-billed Flowerpecker	Lathudu Pililichcha	BrR	LC	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Family	/ - Nectariniidae																								
95	Nectarina asiatica	Purple Sunbird	Dam Sutikka	BrR	LC	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1
Family	/ - Passeridae																								
96	Passer domesticus ⁵	House Sparrow	Gekurulla	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Motacillidae																								
97	Anthus richardi <sup>4</sup>	Richard's Pipit	Richard Varatichcha	WV		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	Anthus rufulus	Paddyfield Pipit	Keth Varatichcha	BrR	LC	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	0	0
99	Anthus godlewskii	Blyth's Pipit	Blyth Varatichcha	WV		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Ploceidae					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	Ploceus philippinus <sup>4</sup>	Baya Weaver	Ruk Wadukurulla	BrR	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Estrididae																								
101	Lonchura malabarica ⁴	Silverbill	Sarala Weekurulla	BrR	VU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## Mammals

															1	1	1	1	1	1	1	1	1	1	2
	Scientific Name	English Name	Sinhala Name	SpS	CoS	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Family	/ - Soricidae																								
		Common musk																							
1	Suncus murinus	shrew	Podhu Hik-miya	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Pteropodidae																								
2	Pteropus giganteus	Flying fox	Ma-vavula	ID	LC	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Family	/ - Vespertillionidae																								
			Indu Koseta-																						
3	Pipistrellus coromandra	Indian pipistrel	vavula	ID	VU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Family	/ - Herpestidae																								
4	Herpestes brachyurus 4	Brown mongoose	Bora Mugatiya	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Herpestes edwardsii	Grey mongoose	Alu Mugatiya	ID	LC	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Family	/ - Bovidae																								
6	Bos indicus	Domestic cattle	Batu Haraka	FE/DO		0	1	0	0	0	1	0	0	1	1	0	1	1	0	0	0	0	0	0	0
7	Capra hircus	Domestic goat	Eluva	DO		0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Equidae																								
8	Equus caballus	Delft ponies / Horse	Diweldiwa Poniya	FE		0	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
Family	/ - Muridae																								
9	Rattus rattus	Common rat	Podu Ge Miya	ID	LC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family	/ - Sciuridae																								
10	Funambulus palmarum	Palm squirrel	Leena	ID	LC	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1
Family	/ - Leporidae																								
11	Lepus nigricollis	Black-naped hare	Wal Hawa	ID	LC	0	1	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	1

## Annex 5. Marine flora and fauna recorded around Delft Island

	Animal group/Family	Genus/Species
	Fish	
1	Ariidae	Arius caelatus
2	Carangidae	Carangoides chrysophrys
3		Scomberoides commersonianus
4	Clupeidae	Sardinella albella
5	Hemiramphidae	Rhynchorhamphus malabaricus
6	Loliginidae	Loligo duvauceli
7		Sepioteuthis lessoniana
8	Sepiidae	Sepia aculeate
9		Sepia pharaonis
	Crustaceans	
10	Crustacea	Mantis shrimps
11		Squilla
12		Gonodactylus cr. smithil
14		Snrinps Popoque latigulature
14		Crahs
16		Portunus pelagiicus
17		Scylla serrata
18		The lemite create
10	Echinoderms	
40	Echinodermata	
19	Lennodermala	
20		Holothuria scabra
21		Holothuria atra
22		Holothuria spinifera
23		Holothuria leucospilota
24		Holothuria edulis
25		Thelenota ananas
	Coral	
26	Acroporidae	Acropora hyacynthus
27		Acropora cythrea
28		Acropora humilis
29		Acropora monticulosa
30		Acropora gemmifera
31		Montipora peltiformis
32	Pocilloporidae	Pocillopora damicornis
33	Faviidae	Favites complanata
34		Favites pallida
35		Favites speciosa
36		Favites favus

	Animal group/Family	Genus/Species
37		Favites mattaii
38		F. abdita
39		Favites halicora
40		Favites pentagona
41		Cyphastrea microphthalma
42		Goniastrea retiformis
43		Goniastrea sp.
44		Leptoria phrygia
45		Cyphastrea serailia
46		Platygyra daedalea
47		Platygyra sinensis
48		Montastrea sp.
49	Poritidae	Porites lutea
50		P. lobata
51		Goneopora stokensis
52	Mussidae	Symphyllia recta
53		Symphyllia radiance
54	Merulinidae	Merulina ampliata
55	Acanthuridae	Acanthurus xanthopterus
56		Acanthurus nigricauda
57	Apogonidae	Apogon sp.
58	Caesionidae	Caesio xanthonota
59		Caesio cuning
60	Chaetodontidae	Chaetodon collare
61		Caesio auriga
62		Caesio octofasciatus
63	Gobiidae	Amblyeleotris steinitzi
64	Hamulidae	Plectorhinchus gibbosus
65	Holocentridae	Sargocentron diadema
66	Lethrinidae	<i>Lethrinus</i> sp.
67		Lethrinus fulvus
68	Nemipteridae	Scolopsis vosmeri
69	Pomacanthidae	Pomacanthus annularis
70		Abudefduf vaigiensis
71		Abudefduf bengalensis
72		Abudefduf sexfasciatus
73		Amblyglyphidodon leucogaster
74		Neopomacentrus azyaron
75	Scaridae	Scarus niger
76		Scarus ghobban

	Animal group/Family	Genus/Species
77	Scorpaenidae	Pterois volitans
78	Serranidae	Cephalopholis sp.
79		Epinephelus malabaricus
80	Siganidae	Siganus sp.
81	Tetradontidae	Arothron hispidus
82	Phylum:Porifera	Acanthella klethra
83	Sponges	Lanthella flabelliformis
84		Phyllospongia lamellosa
85		Spirastrella vagabunda
86		Clathria sp.
87		Haliclona sp.
88		<i>Jaspi</i> s sp.
89		Xestospongia sp.
	Phylum:Cnidaria	
90	Class:Hydrozoa	Halocordyle disticha
91	Order:Zoantharia	Palythoa sp.
	Order Alcyionacea Soft corals	Sinularia sp.
92		
93	Phylum Annelida	Sabellastrate sp.
	Phylum:Mollusca	
94	Gastropoda	Strombus sp.
95		Turbinella pyrum
96		Cymatium lotorium
97		Lambis lambis
98		Lambis scorpius
99		Conus sp.
100		Cypraea sp.
101		Phasianella sp.
102		Littorina sp.
103		<i>Mitra</i> sp.
104	Bivalvia	Atrina vexillum
105		<i>Pteria</i> sp.
106		Trachicardium flavum
107		Spondylus sp.
108		Anadara transversia
	Phylum: Echinodermata	
109	Sea star	Protoreaster sp.
110	Sea urchins	Salmacis belli
111		Clypaster sp.
112		Lovenia sp.
-		

	Animal group/Family	Genus/Species
113		Echinodiscus sp.
114		Tripneustes gratilla
	Red Algae	
115	Corallinaceae	Amphiroa sp.
116		
117	Gelidiellaceae	Gelidiella acerosa
118	Cystocloniaceae	Hypnea sp.
	Green Algae	
119		Caularpa taxifolia
120		Caulerpa recemosa
121	Caulerpaceae	Caulerpa tarifolia
122	Dasycladaceae	Neomeris sp.
123		Ulva reticulata
124	Ulvaceae	<i>Ulva</i> sp.
	Brown Algae	
125		Dictyota sp.
126	Dictyotaceae	Padina sp.
127		Sargassum polycystum
128	Sargassaceae	Sargassum sp.
129		Cymodocea rotundata
130	Cymodoceaceae	Syringodium sp.
131		Halophila ovalis
132	Hydrocharitaceae	Thalassia sp.

### Appendix 6: Photo-catalogue of Delft Island

Note: Image sources are as follows:

**Figure 37:** Hennel, L. (2010) A *little Irish luck leads to elusive past: Kindness of strangers guides photographer to family homestead.* Calgary Herald. <u>http://www.calgaryherald.com/travel/little+lrish+luck+leads+elusive+past/2690765/story.html?tab=PH</u> <u>OT</u> (Last accessed: 20 February, 2013).

**Figure 39:** Reproduced from Baldaeus, P. (1672) *A description of the great and most famous isle of Ceylon*. Amsterdam. 829p.

**Figure 40:** Reproduced from Perera, K.S. (2005) *Commentaries of the photographs of the exhibition Frontiers Lost.* Godage and Brothers. 184pp.

**All other images**: Sampath de A Goonatilake @ IUCN Sri Lanka (terrestrial images) and Dr. P. B. Terney Pradeep Kumara @ University of Ruhuna (marine under-water images).







Figure 17. Tarucus nara (Striped pierrot).

Figure 18. Colotis amata (Small salmon arab).



Figure 19. *Colotis aurora* (Plain orange tip) – a Vulnerable (VU) species.



Figure 20. *Calotes versicolor* (Common garden lizard).



Figure 21. *Lathrecista asiatica* (Pruinosed bloodtail).

Figure 22. *Pseudagrion microcephalum* (Blue sprite).



Figure 23. Buddhist stupa at Vetiyaracankottai.

Figure 24. Buddhist stupa at Vetiyaracankottai.





Figure 25. Destroyed Buddha statue at Vetiyaracankottai.



Figure 27. Destroyed Buddhist ruins at Vetiyaracankottai.

Figure 26. Foundation stones used to build fences at Vetiyaracankottai.



Figure 28. Hindu Kovil.









Figure 39. Drawing of the capture of horses in Jaffna observed by P. Baldaeus (in 1672). This appears to be a scene in Delft, with Veddukkulam and the Portuguese or Dutch Fort being clearly identifiable - reproduced from Baldaeus (1672).





Figure 40. Lt. Nolan's official vehicle during the 1970s (© Kirthi Sri Perera - reproduced from Perera, 2005).

Figure 41. An abandoned old traditional house showing the Dutch influences on the island.



Figure 42. Ferry used for transport between the island and the mainland.



Figure 43. A more sophisticated boat used to carry passengers to the island.



Figure 44. Palmyrah seed cultivation for the production of "Kotta Kilangu".



Figure 45. Palmyrah seed collection.









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Delft Pony (*Equus caballus*) – one of the characteristic features of Delft Island Sampath Goonatilake @ IUCN Sri Lanka