

COASTAL HABITATS OF THE POTUVIL-ARUGAM BAY-PANAMA SPECIAL AREA MANAGEMENT ZONE IN EASTERN PROVINCE, SRI LANKA

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ABSTRACT

Sri Lanka has a shoreline that extends over 1760 km and encompasses 24% of the land area defined as the coastal zone. The coastal zone of Sri Lanka contains number of critical ecosystems. Unplanned resource utilization, industrialization, tourism, urbanization and natural hazards have a huge influence on these coastal ecosystems. In order to manage this highly dynamic system, the Coast Conservation Department (CCD) has introduced the concept of Special Area Management in 1980. CCD has identified 57 locations that should come under Special Area Management and the coastal region from Pottuvil to Panama is one such site. This study has been carried out to identify natural coastal habitat within this zone in order to facilitate the preparation of Special Area Management plan. This study was conducted from May 2012 to April 2013 during which 10 main locations along the coastline from Pottuvil to Okanda were sampled to document the types of Natural habitats present and the biodiversity elements that are found in these natural habitats. Altogether 10 lagoons were observed in the study area. The main vegetation types observed in association with these lagoons include mangroves, back mangroves, beaches and sand dunes. This study demonstrates that the coastal zone from Pottuvil to Okanda supports number of important coastal habitats that justify this area being designated as a Special Area Management Zone. These habitats support a rich species assemblage including three Critically Endangered species *Sesamum prostratum*, *Ephippiorhynchus asiaticus* (Black-necked Stork) and the breeding population of *Merops philippinus* (Blue-tailed Bee-eater) that are restricted to this region. Therefore maintaining these habitats in good condition is critical for their survival. Further, these habitats provide number of critical ecosystem services such as shoreline stabilization, functioning as breeding sites for near shore fish, affording protection from natural disasters. However, after the culmination of the armed conflict in 2009, unsustainable natural resource extraction and unplanned expansion of tourism has resulted in rapid degradation of these important coastal habitats. Therefore, updating the Special Area Management plan and its effective implementation are timely needs to ensure accruing continued benefits from these important coastal habitats.

KEY WORDS: Coastal habitats, Ecosystems, Sampling, Vegetation

INTRODUCTION

Sri Lanka, being an island, is endowed with a shoreline of 1760 km. Therefore, nearly 24% of the land area of Sri Lanka comes under the coastal zone. It is also a zone where there is high human activity. For instance 32% of the total population and 65% of the urban population of Sri Lanka inhabit the Coastal Zone. Further, it is also an economically important zone where 90% of industrial units and 80% of tourist infrastructure are located leading to depletion of coastal resources (NECCDEP, 2009a).

Coastal zone of Sri Lanka also contains number of critical ecosystems such as lagoons, estuaries, mangroves, salt marshes, mud flats, beaches, sand dunes and coastal scrublands. Unplanned resource utilization, industrialization, tourism and urbanization have a huge influence on these coastal ecosystems. In addition, natural hazards such as cyclones, storm surges and tsunamis have periodically had a devastating impact on the coastal zone. At

present another major concern is the predicted climate change impacts such as sea level rise and warming of oceans that will not only result in inundation of the coastal zone but degradation of off shore habitats such as coral reefs (CCD, 2006).

Therefore, proper management of this highly dynamic and yet very important zone in terms of the natural resource value and human use value is a must to ensure its long term existence. In order to manage this highly dynamic zone, the Coast Conservation Department has introduced the concept of Special Area Management in 1990 (GoSL, 1990). Since then, 57 locations have been identified along the coastal zone of Sri Lanka as sites that should be considered for Special Area Management (GoSI, 2006). The coastal region from Pottuvil to Panama is one such site which has been selected in recognition of the ecological, socio-cultural and economic significance, and the existing threats to the resources (NECCDEP, 2009a). This area has also been identified as a Tourism Development Area in the Strategic Tourism Development Plan for Eastern Coast of Sri Lanka (NECCDEP, 2009b).

The Pottuvil to Panama Special Area management site supports many critical coastal ecosystems such as lagoons, sand dunes and mangroves. Number of studies have been done on the coastal habitats in this region (GreenTech, 2009a; GreenTech, 2009b; GreenTech, 2009c; NECCDP, 2009c; NECCDP, 2009d). However, these are broader studies focussing either on provincial or district scale based mostly on secondary sources and therefore, provide only a general overview of the biodiversity in the area. Therefore, this study was undertaken with the objective of documenting the habitat diversity of the eastern coastal zone specifically from Pothuvil to Okanda.

MATERIALS AND METHODS

This study was conducted from May 2012 to April 2013. During this period 10 main locations along the coastline from Pottuvil to Okanda were selected for sampling. At each sampling location number of sub samples was taken depending on habitat diversity and extent of the habitats present. The number of sub sampling sites at each of the 10 sampling locations is listed in table 1. Each site was sampled twice, once during the dry (non migrant season for birds) and once during the wet (migrant season for birds) season to capture the total diversity of the habitats as well as the seasonal changes in the species assemblages of these habitats.

Table 1. The number of sub sampling sites at each of the 10 major sampling locations

| Sampling Location | Number of sub samples | Sub Samples taken by habitat | | |
|-------------------|-----------------------|------------------------------|-------|-----------|
| | | Lagoon | Beach | Sand Dune |
| Pothuvila | 2 | 1 | | 1 |
| Arugam Bay | 1 | 1 | | |
| Shastrawela | 8 | 8 | | |
| Ragamwela | 2 | 1 | 1 | |
| Panama | 15 | 13 | | 2 |
| Panakala | 2 | 2 | | |
| Solamba | 4 | 2 | | 2 |
| Kunukala | 3 | 2 | | 1 |
| Helawa | 5 | 3 | 2 | |
| Okanda | 3 | 1 | 2 | |

The main taxonomic groups that were investigated include flowering plants, mammals, birds, reptiles, amphibians and fish, depending on their presence. Since taxonomic keys are not available for most invertebrate phyla, field data collection on invertebrates was limited to butterflies and dragonflies. Species belonging to taxa other than these were collected and identified whenever possible.

The Gradsect (gradient-directed transects) sampling technique was used to gather data on plants. This method involved sampling of an area by transects laid along a habitat gradients. Within the transect, plots of 100 x 5m were done to document the plants. Plots were spaced approximately 100m apart along transects. The Gradsects were walked along a fixed bearing, using a compass, and sampled comprehensively within plots. The exact location of each plot was determined with a hand held GPS reading taken at the middle of each plot. Within each plot, the dominant plant species observed was recorded. The sampling was carried out till a threshold (sampling adequacy) was reached for a given habitat. The plant classification, nomenclature, endemism and local names are in accordance with Dassanayake (1980-2000); MOE (2012); Senaratne (2001).

The faunal sampling was also done along the same Gradsect that was used for plants to allow correlation of faunal data with the vegetation. Both direct observations as well as verifiable indirect observations such as nests, droppings, footprints, and calls were recorded. In addition to the line transect method, point counts were also taken. This was done when the habitat sampled exist as a small patch such mangroves, water holes. *etc.*, In such situations a circular area around a fixed point was sampled. The radius of the circular plot was 25 m. As in the case of transects the circular plots were also overlapped with the vegetation sampling plots to enable correlation between fauna with vegetation. All circular plots were geo-referenced using a hand held GPS. The animal classification, nomenclature, endemism and local names are in accordance with Bedjanic et al., (2007), d' Abrera (1998), Harrison (1999), Phillips (1935), Somaweera (2006), Somaweera and Someweera (2009).

The global and National conservation status of the species observed in the study area was defined according to the IUCN list of Globally Threatened fauna and flora (IUCN, 2014) and Sri Lanka list of Nationally Threatened fauna and flora (MOE, 2012).

RESULTS AND DISCUSSION

Altogether 10 lagoons were observed in the study area. The main vegetation type observed in association with these lagoons includes mangroves and back mangroves. The back mangrove of all these lagoons exists as scrublands. These back mangroves spread as a strip towards inland or in the center of the large islands present in Panama and Shastrawela lagoons. Scrublands that were recorded in such islands can be categorized as open scrublands (open grasslands or forblands mixed with scrubby vegetations). Even though salt marshes are common among the back mangrove vegetations found in the dry and arid zone of Sri Lanka, proper salt marshes were not observed in the back mangroves at any of the sampled locations. However, salt marsh plant species were observed as mangrove associates in the Panama lagoon back mangrove.

Sandy beaches and sand dunes were the other major habitats observed in the coastal area. The beach vegetation in the area is dominated by herbs, creepers and scattered shrubs and sometimes coastal scrublands are present in the more inland face of the beach. Such coastal

scrublands were observed especially in the opening of the Helawa lagoon. Sand dunes were observed at the openings of Solamba, Kunukala, Panama and Pothuvila lagoons. The front areas or the wind face of these dunes comprise of stunted trees and shrubs while the back area comprise of scrublands and/ or coastal forests.

Lagoons observed in the Coastal Zone between Pothuvila and Okanda

Altogether 10 lagoons, namely Pothuvila, Arugam Bay, Shastrawela, Ragamwela, Panama, Panakala, Solamba, Kunukala, Helawa and Okanda were observed in the coastal zone from Pothucila to Okanda. Based on the type of vegetation associated with these lagoons, they can be categorized as mangrove dominated lagoons and mangrove non-dominated lagoons. Pothuvila, Panama, Shastrawela, Ragamwela and Okanada belong to the mangrove dominated category while Helawa, Kunukala, Solamba, Panakala and Arugam Bay lagoon can be categorized as mangrove non-dominated lagoons as they have very little mangrove coverage that is limited to few small isolated patches or few isolated trees. A brief description of these lagoons are given below.

Panama Lagoon

Mangroves and back mangroves (Open Scrublands) are the major vegetation types observed in the Panama lagoon. The mangroves occur on the inner shore of the lagoon and along the shoreline of the islands located within the lagoon. However, some islands, especially the small islands in the Panama Lagoon, are totally covered with mangroves. Panama lagoon is the only lagoon in the area that has extensive mangrove coverage and most of the mangroves in the Panama lagoon are in good and healthy condition. Altogether, 6 true mangrove species were recorded in the Panama lagoon (Table 2). There is a distinct zonation in the distribution of these mangrove species within the mangrove belt. *Rhizophora mucronata* (Kadol) is the dominant species present in the outermost zone of the mangrove strip that occur along the inner shore of the lagoon as well as the shore line of the islands located within the lagoon. *Avicennia marina* (Manda) is the dominant species present in the innermost zone of the mangrove strip. *Bruguiera gymnorhiza* (Mal Kadol) and *Acanthus ilicifolius* (Katu Ikiri) are not present in high densities within the mangrove vegetation of Panama lagoon. However, these two species are neither rare nor uncommon within the mangrove vegetation. In addition to these 6 true mangrove species, a number of mangrove associates was also recorded in the Panama lagoon (Table 2). A single parasitic epiphyte, *Dendrophthoe falcata* (Pilila) is the only epiphyte observed on both true mangrove species and the mangrove associates in the Panama lagoon. Freshwater rheophyte, *Terminalia arjuna* (Kumbuk) was also recorded among the mangrove vegetation present in the Panama lagoon. It was recorded towards the back of the mangrove strip that exists on inner shore of the lagoon or the shoreline of the islands located within the lagoon. *Phoenix pusilla* (Indi) and *Mikania cordata* (Wathu Palu) are the other terrestrial plant species recorded among the mangrove vegetation of the Panama lagoon.

Back mangrove of the Panama lagoon exists as a scrubland and recorded in the back of the mangrove strip towards inland or center of the Issanduwa Island located in the Panama lagoon. These scrublands can be classified as open scrublands that are characterized by open grasslands mixed with scrubby vegetation comprised mainly of *Phoenix pusilla* (Indi), *Calotropis gigantea* (Wara), *Ipomoea sepiaria* (Rasa Tel Kola), *Azadirachta indica* (Kohomba), *Vitex negundo* (Nika), *Asparagus racemosus* (Hathawariya), *Bauhinia racemosa* (Maila), *Cassia auriculata* (Ranawara), *Clitoria ternatea* (Katurodu), *Colubrina asiatica*,

Cordia curassavica, *Crateva adansonii* (Lunu Warana), *Crotalaria verrucosa*, *Dactyloctenium aegyptium* (Putu Tana), *Dendrophthoe falcata* (Pilila), *Desmodium triflorum* (Undupiyaliya), *Dichrostachys cinerea* (Andara), *Euphorbia hirta* (Budadakiriya), *Grewia orientalis*, *Hemidesmus indicus* (Iramusu), *Hyptis suaveolens* (Madurutala), *Indigofera* sp., *Lantana camara* (Gandapana), *Macroptilium lathyroides*, *Manilkara hexandra* (Palu), *Melochia corchorifolia* (Gal Kura), *Mimosa pudica* (Nidikumba), *Ocimum americanum* (Heen Madurutala), *Oldenlandia umbellata*, *Salvadora persica* (Maliththan), *Sesbania bispinosa*, *Tephrosia villosa* (Bu Pila), *Terminalia arjuna* (Kumbuk), *Urena sinuata* (Heen Epala), *Vernonia cinerea* (Monara Kudumbiya), *Waltheria indica*, *Ziziphus oenoplia* (Heen Eraminiya), *Wedelia biflora* (Mudu Gam Palu), *Clerodendrum inerme* (Burenda), *Fimbristylis* spp., *Cyperus* spp., *Suaeda maritima*, *Thespesia populnea* (Suriya) and *Excoecaria agallocha* (Tela Kiriya).

Pothuvila Lagoon

Mangroves are the predominant vegetation observed in the Pothuvila lagoon. The mangroves are present on the inner shore of the Pothuvila lagoon and on shores of the islands located in the Pothuvila lagoon. Altogether, 7 true mangrove species were recorded in the Pothuvila lagoon (Table 2). As in the case of Panama lagoon, *Rhizophora mucronata* (Kadol) is the dominant mangrove species present in the outermost zone of the mangrove strip that occur along the inner shore of the lagoon as well as the shore line of the islands located within the lagoon. However, unlike in the Panama lagoon, *Excoecaria agallocha* (Tela Kiriya) is the dominant species present in the innermost zone of the mangrove strip. *Bruguiera gymnorhiza* (Mal Kadol), *Lumnitzera racemosa* (Beriya) are also commonly occurring mangrove species in the Pothuvila lagoon. The remaining three true mangrove species, *Heritiera littoralis* (Etuna), *Avicennia marina* (Manda) and *Acanthus ilicifolius* (Katu Ikiri), although not widely distributed within the mangrove vegetation, are neither rare nor uncommon. In addition, several mangrove associates were also recorded in the Pothuvila lagoon (Table 2). As in the case of Panama lagoon, the parasitic epiphyte, *Dendrophthoe falcata* (Pilila) is the only recorded epiphyte on both true mangrove and mangrove associates in the Pothuvila lagoon. Freshwater rheophyte, *Terminalia arjuna* (Kumbuk) was also recorded among mangroves in the Pothuvila lagoon.

Shastrawela Lagoon

Mangroves and back mangroves (Open Scrublands) are the major vegetation types observed in the Shastrawela lagoon. Mangroves exist on the inner shore of the lagoon and on the outer shore of the islands located in the lagoon as a thin belt. However, unlike in the Panama and Pothuvila lagoons, the mangroves vegetation present in the Shastrawela lagoon is not in a healthy condition as they are disturbed due to human activities. Altogether, 4 true mangrove species were recorded in the Shastrawela lagoon (Table 2). As in the case of two previously described lagoons, *Rhizophora mucronata* (Kadol) is present in the outermost zone of the mangrove strip that occur along the inner shore of the lagoon as well as the shore line of the islands located within the lagoon. As in the case of Panama lagoon, *Excoecaria agallocha* (Tela Kiriya) is the dominant mangrove species present in the innermost zone of the mangrove strip. The other two recorded species, *Bruguiera gymnorhiza* (Mal Kadol) and *Heritiera littoralis* (Etuna) were also commonly observed in the mangroves present in the Shastrawela lagoon. The true mangrove species, *Heritiera littoralis* (Etuna) recorded only in the Shastrawela lagoon and the Pothuvila lagoon in the study area was the commonly

occurring species in the Shastrawela lagoon. In addition, several mangrove associates were also recorded in the Shastrawela lagoon (Table 2). Freshwater rheophytes, *Terminalia arjuna* (Kumbuk) and *Nauclea orientalis* (Bakmi) were also recorded in the back of the mangrove strip that exists on inner shore of the lagoon and on the shore of the islands in the lagoon. *Mikania cordata* (Wathu Palu), *Ludwigia peruviana*, *Sphaeranthus africanus* (Velmudda) are the other plant species recorded among the mangrove vegetation.

Only scrublands exist as the back mangrove vegetation in the Shastrawela lagoon as well as the center of the large Island located in the Shastrawela lagoon. Scrublands that were recorded in the lagoon and large island can be classified as open scrublands characterized by open grasslands mixed with scrubby vegetations such as *Phoenix pusilla* (Indi), *Cassia auriculata* (Ranawara), *Thespesia populnea* (Suriya), *Fimbristylis* spp., *Cyperus* spp., *Justicia procumbens* (Mayani), *Achyranthes aspera* (Gas Karal Heba), *Carissa spinarum* (Heen Karamba), *Asparagus racemosus* (Hathawariya), *Ageratum conyzoides* (Hulan Tala), *Blumea obliqua* (Mudamahana), *Eupatorium odoratum* (Podisinnamaran), *Vernonia cinerea* (Monara Kudumbiya), *Xanthium indicum* (Urukossa), *Cordia curassavica*, *Murdannia spirata*, *Diospyros nummulariifolia*, *Maba buxifolia*, *Croton aromaticus* (Wel Keppetiya), *Phyllanthus pinnatus*, *Bauhinia racemosa* (Maila), *Cassia fistula* (Eheḷa), *Cassia tora* (Pani Tora), *Crotalaria pallida*, *Desmodium triflorum* (Undupiyaliya), *Indigofera* sp., *Salacia chinensis* (Heen Himbutu Wel), *Ocimum americanum* (Heen Madurutala), *Memecylon umbellatum* (Korakaha), *Chloris barbata* (Mayuru Tana), *Imperata cylindrica* (Iluk), *Manilkara hexandra* (Palu), *Canthium coromandelicum* (Kara), *Limonia acidissima* (Divul), *Azima tetracantha*, *Lindernia crustacean*, *Phyla nodiflora* (Hiramanadetta) and *Sphaeranthus africanus* (Velmudda).

In open areas of the open scrublands there are small seasonal waterlogged areas where species such as *Crinum defixum* (Heen Tolabo), *Monochoria vaginalis* (Jabara), *Fimbristylis* spp., *Cyperus* spp., *Murdannia spirata*, *Lindernia crustacean* and *Phyla nodiflora* (Hiramanadetta) were present.

Okanda Lagoon

Okanda lagoon is a comparatively small lagoon and mangroves are the predominant vegetation associated with the lagoon. Mangroves occur on the inner shore of the lagoon and shores of the creeks that are flowing through the lagoon. Altogether, 5 true mangrove species, were recorded in the Okanda lagoon (Table 2). *Lumnitzera racemosa* (Beriya) and *Rhizophora mucronata* (Kadol) are the dominant species present in the outermost zone of the mangrove strip that occur along the inner shore of the lagoon. *Avicennia marina* (Manda), *Excoecaria agallocha* (Tela Kiriya) and *Bruguiera gymnorhiza* (Mal Kadol) are the dominant plant species present in the innermost zone of the mangrove strip. In addition to these true mangrove species, a number of mangrove associates was recorded in the Okanda lagoon (Table 2).

Ragamwela Lagoon

Ragamwela lagoon is a small lagoon where the inner shore is covered with mangroves. Floristically, mangroves found in Ragamwela lagoon are less diverse. Only 2 true mangrove species were recorded in the Ragamwela lagoon (table 2). Out of the two species, *Lumnitzera racemosa* (Beriya) is the dominant mangrove species present in the Ragamwela lagoon. In addition to these 2 true mangrove species, a number of mangrove associates were recorded among the mangrove vegetation found in the Ragamwela lagoon (Table 2).

Helawa Lagoon

Few small isolated patches of mangroves, consisting of true mangrove species *Lumnitzera racemosa* (Beriya) and *Excoecaria agallocha* (Tela Kiriya) were observed on the inner shore of the lagoon's false opening area as well as the lagoon opening. In addition to these 2 true mangrove species, a number of mangrove associates was recorded among the mangrove vegetation (Table 2).

In the upper part of the Helawa Lagoon, beyond the water level, there are seasonally flooded grasslands (Pitiya) inhabited by species such as *Cynodon dactylon* (Ruha), *Cyperus stoloniferus*, *Xanthium indicum* (Urukossa), *Desmodium triflorum* (Undupiyaliya), *Cyperus* spp., *Fimbristylis* spp., *Platostoma menthoides*, *Striga angustifolia* and *Lindernia crustacean*. Some parts of the seasonally flooded grasslands have small waterlogged areas where aquatic semi aquatic plant species, such as *Nymphaea pubescens* (Olu), *Nymphaea nouchali* (Manel), *Marsilia quadrifolia*, *Monochoria vaginalis* (Jabara), *Neptunia oleracea* (Diya Nidikumba), *Limnophyton obtusifolium*, *Cyperus* spp., *Fimbristylis* spp., *Eleocharis* spp., *Aponogeton natans* (Kekatiya), *Eclipta prostrata* (Kikirindiya), *Hygrophila schulli* (Niramulliya), *Murdannia spirata*, *Nymphoides hydrophylla* (Kumudu) are present.

Kunukala Lagoon

Few small isolated patches of mangroves, consisting of the true mangrove species *Lumnitzera racemosa* (Beriya) and *Excoecaria agallocha* (Tela Kiriya) were observed on the inner shore of the lagoon opening of Kunukala lagoon. In addition to these two species, several mangrove associates were recorded among the mangrove vegetation (Table 2).

The upper part of the Kunukala Lagoon, beyond the water level, contains seasonally flooded grasslands (Pitiya) inhabited by species such as *Cynodon dactylon* (Ruha), *Cyperus* spp., *Fimbristylis* spp., *Desmodium triflorum* (Undupiyaliya), *Platostoma menthoides*, *Striga angustifolia*, *Lindernia crustacean*, *Murdannia spirata*, *Blumea obliqua* (Mudamahana), *Centranthera indica* (Dutu Satutu), *Drosera burmannii* (Wataessa), *Eriocaulon quinquangulare* (Heen Kokmota) and *Xyris pauciflora*.

Solamba Lagoon

Few small isolated patches of mangroves, consisting of the true mangrove species *Lumnitzera racemosa* (Beriya) was observed on the inner shore of lagoon opening of the Solamba lagoon. In addition to the true mangrove species, a number of mangrove associates was also recorded among the vegetation present around the lagoon mouth (Table 2).

Seasonally flooded grasslands (Pitiya) were observed in the upper part of the Solamba Lagoon, beyond the water level. These grasslands are inhabited by plant species such as *Cynodon dactylon* (Ruha), *Cyperus* spp., *Fimbristylis* spp. and *Cyperus stoloniferus*.

Panakala Lagoon

A small strip of mangroves, consisting of the true mangrove species *Lumnitzera racemosa* (Beriya), *Excoecaria agallocha* (Tela Kiriya) and *Avicennia marina* (Manda), was observed on the inner shore of lagoon opening of Panakala lagoon. In addition to these true mangrove species, a number of mangrove associates was observed around the lagoon mouth (Table 2). The parasitic epiphyte, *Dendrophthoe falcata* (Pilila) was also recorded on both true mangrove and mangrove associates present in the Panakala lagoon.

Seasonally flooded grasslands (Pitiya) were observed in the upper part of the Panakala Lagoon, beyond the water level. These grasslands are inhabited by species such as *Cynodon dactylon* (Ruha), *Cyperus* spp., *Fimbristylis* spp. and *Cyperus stoloniferus*.

Arugam Bay Lagoon

Only a few scattered *Excoecaria agallocha* (Tela Kiriya) trees were observed on the edges of the Arugam Bay lagoon. Further, few *Thespesia populnea* (Suriya) trees were observed on the left side shore of the lagoon. The mangrove associate, *Sporobolus virginicus* (Mudu Etora) was observed on the seasonally flooded grasslands that are present around the lagoon. The other plant species observed in such seasonal grasslands include *Fimbristylis* spp. and *Cyperus stoloniferus*.

Distribution of Mangroves and Mangrove Associates in the Ten Lagoons

Altogether seven species of true mangroves and 21 mangrove associates were recorded in the 10 lagoons that are present in the study area (table 2). The highest species diversity was observed in the Panama lagoon followed by Pothuvila, Shastrawela and Okanda lagoons. Out of the seven true mangrove species, *Excoecaria agallocha* (Tela Kiriya) and *Lumnitzera racemosa* (Beriya) show a wide distribution while *Heritiera littoralis* (Etuna) was restricted to only two lagoons.

Among the mangrove associates, species showing a wide distribution includes *Sporobolus virginicus* (Mudu Etora), *Clerodendrum inerme* (Burenda), *Derris trifoliata* (Kala Wel), *Thespesia populnea* (Suriya) and *Hibiscus tiliaceus* (Beli Patta). The mangrove associates that showed a restricted distribution include *Dolichandrone spathacea* (Diya Danga), *Premna obtusifolia* (Maha Midi), *Sporobolus virginicus* (Mudu Etora), *Dendrolobium umbellatum*, *Pemphis acidula*, *Wedelia biflora* (Mudu Gam Palu), *Typha angustifolia* (Hambupan), *Calophyllum inophyllum* (Domba), *Barringtonia acutangula* (Ela Midella), *Sesuvium portulacastrum* (Maha Sarana), *Suaeda maritima*, *Eclipta prostrata* (Kikirindiya) and *Phragmites karka*.

Table 2. A comparison of the true mangrove and mangrove associated species observed in the 10 lagoons present in the study area.

| Name of the Species | PN | PV | SW | OK | RW | HL | KK | SL | PK | AB |
|---|----|----|----|----|----|----|----|----|----|----|
| True Mangroves | | | | | | | | | | |
| <i>Avicennia marina</i> | + | + | | + | | | | | + | |
| <i>Excoecaria agallocha</i> | + | + | + | + | + | + | + | | + | + |
| <i>Rhizophora mucronata</i> | + | + | + | + | | | | | | |
| <i>Lumnitzera racemosa</i> ^{NT} | + | + | | + | + | + | + | + | + | |
| <i>Bruguiera gymnorhiza</i> ^{VU} | + | + | + | + | | | | | | |

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|--|-----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <i>Acanthus ilicifolius</i> | + | + | | | | | | | | | |
| <i>Heritiera littoralis</i> ^{NT} | | + | + | | | | | | | | |
| Species Richness | 6 | 7 | 4 | 5 | 2 | 2 | 2 | 1 | 3 | 1 | |
| Mangrove Associates | | | | | | | | | | | |
| <i>Hibiscus tiliaceus</i> | + | + | + | + | + | | + | + | | | |
| <i>Thespesia populnea</i> | + | + | + | + | | | + | | + | + | + |
| <i>Clerodendrum inerme</i> | + | + | + | + | + | + | + | + | + | + | |
| <i>Dolichandrone spathacea</i> ^{NT} | + | + | | | | | | | | | |
| <i>Derris trifoliata</i> | + | + | + | | | | + | + | + | + | |
| <i>Premna obtusifolia</i> | + | | | + | | | | | | | |
| <i>Sporobolus virginicus</i> | + | + | + | + | + | + | + | + | + | + | + |
| <i>Dendrolobium umbellatum</i> ^{VU} | + | | | | | | | | | | |
| <i>Acrostichum aureum</i> | + | | + | + | | | | | | + | |
| <i>Pemphis acidula</i> ^{NT} | + | | | | | | | | | | |
| <i>Fimbristylis</i> spp. | + | + | + | + | + | | | | | | + |
| <i>Cyperus</i> spp. | + | + | + | | | | | | | | |
| <i>Wedelia biflora</i> | + | | | + | | | | | | | |
| <i>Typha angustifolia</i> | + | | + | | | | | | | | |
| <i>Calophyllum inophyllum</i> | + | | | | | | | | | | |
| <i>Barringtonia acutangula</i> | + | | | | | | | | | | |
| <i>Sesuvium portulacastrum</i> ^{NT} | + | | | | | | | | | | |
| <i>Suaeda maritima</i> ^{NT} | + | | | | | | | | | | |
| <i>Eclipta prostrata</i> | + | | | | | | | | | | |
| <i>Phragmites karka</i> | | | + | | | | + | | | | |
| <i>Cyperus stoloniferus</i> | | | | | | | + | | + | + | + |
| Species Richness | 19 | 8 | 10 | 8 | 4 | 6 | 4 | 6 | 6 | 6 | 4 |

Abbreviations Used: PN - Panama, PV - Pothuvila, SW - Shastrawela, OK - Okanda, RW - Ragamwela, HL - Helawa, KK - Kunukala, SL - Solamba, PK - Panakala and AB - Arugam Bay

Distribution pattern of all the recorded endemic, threatened and near threatened plant species within the lagoon vegetation that were observed in the study area is given in Table 3.

Table 3: Endemic, threatened and near threatened plant species recorded within the lagoon vegetation present in the study area.

| Species | HA | TS | CS | PN | OK | SW | HL | PK | SL | KK | RW | AB | PV |
|--------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| <i>Sesuvium portulacastrum</i> | C | N | NT | + | | | | | | | | | |
| <i>Aponogeton natans</i> | H | N | VU | | | | + | | | | | | |
| <i>Dolichandrone spathacea</i> | T | N | NT | + | | | | | | | | | + |
| <i>Suaeda maritima</i> | H | N | NT | + | | | | | | | | | |
| <i>Lumnitzera racemosa</i> | T | N | NT | + | + | | + | + | + | + | + | | + |
| <i>Drosera burmannii</i> | H | N | VU | | | | | | | + | | | |

| | | | | | | | | | |
|----------------------------------|---|---|----|---|---|---|---|---|---|
| <i>Diospyros nummulariifolia</i> | T | E | LC | | | | | | + |
| <i>Dendrolobium umbellatum</i> | T | N | VU | + | | | | | |
| <i>Salacia chinensis</i> | C | N | NT | | | | | | + |
| <i>Pemphis acidula</i> | T | N | NT | + | | | | | |
| <i>Colubrina asiatica</i> | C | N | VU | + | | | | | |
| <i>Bruguiera gymnorhiza</i> | T | N | VU | + | + | + | | | + |
| <i>Salvadora persica</i> | T | N | NT | + | | | | | |
| <i>Manilkara hexandra</i> | T | N | VU | + | | | | + | |
| <i>Striga angustifolia</i> | H | N | NT | | | | + | | + |
| <i>Heritiera littoralis</i> | T | N | NT | | | | | + | + |

Abbreviations used: HA - Habit, T - Tree, S - Shrub, H - Herbaceous, C - Climber or Creeper, TS - Taxonomic Status, E - Endemic, N - Native, CS - Conservation Status, CR - Critically Endangered, VU - Vulnerable, NT - Near Threatened, PN - Panama, OK - Okanda, SW - Shastrawela, HL - Helawa, PK - Panakala, SL - Solamba, KK - Kunukala, RW - Ragamwela, and AB - Arugam Bay PV - Pothuvila

Sand dunes observed in the Coastal Zone between Pothuvila and Okanda

Sand dunes were observed in the Panama coastal area and the lagoon openings of Solamba, Kunukala and Pothuvila lagoons. The front or the windward face of the dune comprises of stunted trees and shrubs while the back or the landward face of the dune comprises of scrublands and/ or coastal forests. *Ipomoea pes-caprae* (Mudu Bin Thamburu), *Spinifex littoreus* (Maha Ravana Revula), *Hydrophylax maritima* (Mudu Geta Kola), *Bulbostylis barbata*, *Cyperus arenarius*, *Euphorbia thymifolia* (Bindadakiriya), *Emilia baldwinii*, *Gisekia pharnaceoides* (Atthiripala) and *Launaea sarmentosa* are the commonest herbs and creepers observed on the sand dunes in the study area.

The common species of shrubs and trees encountered in the sand dunes include *Calotropis gigantea* (Wara), *Bauhinia racemosa* (Maila), *Salvadora persica* (Maliththan), *Manilkara hexandra* (Palu), *Cassine glauca* (Neralu), *Pleurostyliya opposita* (Panakka), *Syzygium cumini* (Madan), *Azima tetracantha*, *Capparis rotundifolia*, *Azadirachta indica* (Kohomba), *Maba buxifolia*, *Memecylon umbellatum* (Korakaha), *Walsura trifoliolata* (Kiri Koon), *Scaevola plumieri* (Heen Takkada), *Maytenus emarginata*, *Atalantia monophylla*, *Capparis zeylanica* (Sudu Welangiriya), *Crateva adansonii* (Lunu Warana), *Cissus vitiginea*, *Pavetta indica* (Pavatta) and *Asparagus racemosus* (Hathawariya).

The other common plant species encountered in this habitat are *Sansevieria zeylanica* (Niyanda), *Justicia betonica* (Sudu Puruk), *Crinum zeylanicum*, *Sesamum prostratum*, *Pachygone ovata*, *Dendrophthoe falcata* (Pilila), *Cissus quadrangularis* (Heressa), *Tridax procumbens*, *Asystasia gangetica* (Puruk), *Eupatorium odoratum* (Podisinnamaran), *Lantana camara* (Gandapana) and *Ixora pavetta* (Maha Ratambala).

Four endemic plant species were recorded among the sand dunes that are present in the study area. The plant assemblage observed on sand dunes present in Panama, Solamba and Kunukala area (*i.e.* from Panama to Okanda sand dunes) contained one Critically Endangered (CR) species, *Sesamum prostratum*. Further, four Vulnerable (VU) species, and six Near Threatened (NT) plant species were also recorded among the vegetation associated with sand dunes in the study area. *Psilanthus wightianus* was only recorded on sand dunes present in Kunukala area. Likewise, *Salacia chinensis* (Heen Himbutu Wel) and *Sarcostemma brunonianum* (Muwa Kiriya) were only recorded on sand dunes present in the Panama and

Pothuvila area respectively. Distribution pattern of all the recorded endemic, threatened and near threatened plant species within the sand dunes that were observed in the study area is given in Table 4.

The sand dune vegetation also included three, alien invasive plant species, namely *Opuntia dillenii* (Pathok), *Lantana camara* (Gandapana) and *Eupatorium odoratum* (Podisinnamaran).

Table 4. Endemic, threatened and near threatened plant species recorded within Sand Dunes present in Panama, Solamba, Kunukala and Pothuvila Area.

| Species | Local Name | HA | TS | CS | PN | SO | KK | PV |
|----------------------------------|------------------|----|----|----|----|----|----|----|
| <i>Crinum zeylanicum</i> | | H | N | VU | + | + | | |
| <i>Sarcostemma brunonianum</i> | Muwa Kiriya | C | N | NT | | | | + |
| <i>Emilia baldwinii</i> | | H | E | NT | + | + | + | |
| <i>Cassine glauca</i> | Neralu | T | E | LC | + | + | + | + |
| <i>Sansevieria zeylanica</i> | Niyanda | H | N | NT | + | | + | + |
| <i>Diospyros nummulariifolia</i> | | T | E | LC | | | | + |
| <i>Derris parviflora</i> | Kala Wel | C | E | LC | | + | | |
| <i>Scaevola plumieri</i> | Heen Takkada | S | N | NT | + | + | + | |
| <i>Salacia chinensis</i> | Heen Himbutu Wel | C | N | NT | + | | | |
| <i>Pachygone ovata</i> | | C | N | VU | + | + | | |
| <i>Sesamum prostratum</i> | | H | N | CR | + | + | + | |
| <i>Psilanthus wightianus</i> | | S | N | VU | | | + | |
| <i>Salvadora persica</i> | Maliththan | T | N | NT | + | + | + | |
| <i>Manilkara hexandra</i> | Palu | T | N | VU | + | + | + | + |

Abbreviations used: HA - Habit, T - Tree, S - Shrub, H - Herbaceous, C - Climber or Creeper, TS - Taxonomic Status, E - Endemic, N - Native, CS - Conservation Status, CR - Critically Endangered, VU - Vulnerable, NT - Near Threatened, PN - Panama, SO - Solamba, KK - Kunukala, PV - Pothuvila

Beaches and Beach Scrubs

Ipomoea pes-caprae (Mudu Bin Thamburu) is the commonest plant species observed on the beaches. The other common species observed in the beach vegetation include species such as *Calotropis gigantea* (Wara), *Spinifex littoreus* (Maha Ravana Revula), *Aeluropus lagopoides*, *Scaevola plumieri* (Heen Takkada), *Cyperus arenarius*, *Launaea sarmentosa*, *Spermacoce hispida*, *Crinum zeylanicum*, *Cyperus stoloniferus*, *Hydrophylax maritima* (Mudu Geta Kola), *Canavalia rosea* and *Euphorbia thymifolia* (Bindadakiriya).

Beach scrub vegetation was observed in the back of Helawa and Okanda beach areas. The common plant species observed in this habitat include, *Asystasia gangetica* (Puruk), *Justicia betonica* (Sudu Puruk), *Crinum zeylanicum*, *Calotropis gigantea* (Wara), *Asparagus racemosus* (Hathawariya), *Eupatorium odoratum* (Podisinnamaran), *Tridax procumbens*, *Vernonia zeylanica* (Pupula), *Ehretia laevis*, *Cassine glauca* (Neralu), *Pleurostyliia opposita* (Panakka), *Maytenus emarginata*, *Capparis rotundifolia*, *Capparis zeylanica* (Sudu Welangiriya), *Crateva adansonii* (Lunu Warana), *Bulbostylis barbata*, *Maba buxifolia*, *Coccinia grandis* (Kowakka), *Acacia caesia* (Hinguru Wel), *Bauhinia racemosa* (Maila), *Cassia auriculata* (Ranawara), *Cassia roxburghii* (Ratu Wa), *Indigofera* sp., *Reissantia indica*, *Leucas zeylanica* (Thumba), *Strychnos potatorum* (Ingini), *Dendrophthoe falcata* (Pilila), *Hibiscus micranthus* (Bebila), *Hibiscus vitifolius* (Maha Epala), *Thespesia populnea* (Suriya),

Memecylon sp., *Memecylon umbellatum* (Korakaha), *Azadirachta indica* (Kohomba), *Tinospora cordifolia* (Rasakinda), *Gisekia pharnaceoides* (Atthiripala), *Syzygium cumini* (Madan), *Boerhavia diffusa*, *Ochna obtusata* (Mal Kera), *Pedaliium murex*, *Hemidesmus indicus* (Iramusu), *Plumbago zeylanica* (Ela Netul), *Canthium coromandelicum* (Kara), *Morinda coreia* (Ahu), *Pavetta indica* (Pavatta), *Spermacoce hispida*, *Atalantia monophylla*, *Salvadora persica* (Maliththan), *Allophylus cobbe* (Kobbe), *Manilkara hexandra* (Palu), *Gmelina asiatica* (Demata), *Lantana camara* (Gandapana), *Cissus quadrangularis* (Heressa), *Cissus vitiginea*, *Ipomoea pes-caprae* (Mudu Bin Thamburu), *Sesamum prostratum*, *Colubrina asiatica*, *Euphorbia thymifolia* (Bindadakiriya), *Flueggea leucopyrus* (Katu Pila), *Caesalpinia bonduc* (Kalu Vavulatiya), *Walsura trifoliolata* (Kiri Koon), *Spinifex littoreus* (Maha Ravana Revula), *Ziziphus oenoplia* (Heen Eraminiya), *Lepisanthes tetraphylla* (Dambu), *Waltheria indica*, *Premna obtusifolia* (Maha Midi) and *Vitex negundo* (Nika). Also, two alien invasive plant species *Lantana camara* (Gandapana) and *Eupatorium odoratum* (Podisinnamaran) was also observed among the beach scrub vegetation.

Distribution pattern of all the recorded endemic, threatened and near threatened plant species within the beach scrub vegetation that were observed in the study area is given in Table 5.

Table 5. Endemic, threatened and near threatened plant species recorded within beaches and beach scrubs present in the Helawa, Ragamwela and Okanda area

| Species | Local Name | HA | TS | CS | Okanda | | Helawa | | Ragamwela |
|-----------------------------|--------------|----|----|----|--------|----|--------|----|-----------|
| | | | | | BE | BS | BE | BS | BE |
| <i>Crinum zeylanicum</i> | | H | N | VU | | | + | + | |
| <i>Vernonia zeylanica</i> | Pupula | C | E | LC | | + | | + | |
| <i>Cassine glauca</i> | Neralu | T | E | LC | | + | | + | |
| <i>Scaevola plumieri</i> | Heen Takkada | S | N | NT | + | | + | | |
| <i>Strychnos potatorum</i> | Ingin | T | N | VU | | | | + | |
| <i>Tinospora cordifolia</i> | Rasakinda | C | N | VU | | | | | + |
| <i>Sesamum prostratum</i> | | H | N | CR | | + | | | |
| <i>Colubrina asiatica</i> | | C | N | VU | | + | | | |
| <i>Salvadora persica</i> | Maliththan | T | N | NT | | | + | + | |
| <i>Manilkara hexandra</i> | Palu | T | N | VU | | + | | + | |

Abbreviations used: HA - Habit, T - Tree, S - Shrub, H - Herbaceous, C - Climber or Creeper, TS - Taxonomic Status, E - Endemic, N - Native, CS - Conservation Status, CR - Critically Endangered, VU - Vulnerable, NT - Near Threatened, BE - Beach, BS - Beach Scrub

Overview of the Flora and Fauna observed in the coastal habitats from Potuvil to Okanda

Flora: A total number of 200 plant species including five endemic, one Critically Endangered (CR), 11 Vulnerable (VU) and 12 Near Threatened (NT) plant species were recorded. Majority of the plant species recorded are herbaceous species followed by tree species, creepers and shrubs (Table 6). Only a single epiphyte was observed. More than 90% of the plant species observed was found to be native to Sri Lanka. Only a few exotic shrubs and herbaceous species were observed. This indicates that most of the habitats are not disturbed by human activity. The exotic plants recorded in the study area included three species *Eichhornia crassipes* (Japan jabara), *Lantana camara* (Gandapana) and *Opuntia dillenii* (Pathok) of alien invasive plant species.

Table 6. A summary of the flora observed within the costal habitats from Potuvil to Okanda

| Plant Type | Total | CR | EN | VU | NT | Endemic | Native | Exotic |
|--------------|------------|----------|----------|-----------|-----------|----------|------------|-----------|
| Tree | 51 | 0 | 0 | 4 | 5 | 2 | 48 | 1 |
| Shrub | 26 | 0 | 0 | 1 | 1 | 0 | 20 | 6 |
| Herb | 85 | 1 | 0 | 3 | 3 | 1 | 76 | 8 |
| Creeper | 37 | 0 | 0 | 3 | 3 | 2 | 32 | 0 |
| Epiphyte | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Total | 200 | 1 | 0 | 11 | 12 | 5 | 174 | 14 |

Abbreviations used: CR - Critically Endangered, EN - Endangered, VU - Vulnerable, NT - Near Threatened

The highest plant diversity was observed in the lagoons followed by sand dunes, beach and beach scrubs (Table 7). Only a few endemic or threatened species were observed in each of the natural habitat types present in the study area. This is the general pattern that is to be expected in such dry zone coastal habitats.

Table 7. A summary of the plant species recorded in the major coastal habitats from Potuvil to Okanda

| Category | Study Area | Lagoon | Sand Dune | Beach |
|-------------------------|------------|--------|-----------|-------|
| Species Richness | 200 | 111 | 90 | 73 |
| Endemic species | 5 | 1 | 4 | 2 |
| Native species | 174 | 101 | 79 | 68 |
| Exotic species | 14 | 9 | 7 | 3 |
| Threatened species | 11 | 6 | 5 | 6 |
| Near Threatened species | 12 | 9 | 6 | 2 |

Fauna: A total number of 193 faunal species including nine endemic species were recorded in the study area (Table 8). This also included 17 threatened species and 11 near threatened species (Table 9).

Table 8. A summary of the faunal species recorded in the coastal habitats from Potuvil to Okanda

| Taxonomic Group | Total | Endemic | CR | EN | VU | NT | Lagoon | Sand Dune | Beach |
|-----------------|------------|----------|----------------|----------|----------------|-----------|------------|-----------|-----------|
| Butterflies | 32 | 2 | 0 | 0 | 1 | 2 | 29 | 6 | 12 |
| Dragonflies | 19 | 0 | 0 | 0 | 1 | 3 | 19 | 0 | 3 |
| Reptiles | 12 | 0 | 0 | 3 | 0 | 2 | 9 | 5 | 7 |
| Birds | 115 | 6 | 5 ¹ | 0 | 4 ² | 2 | 104 | 25 | 36 |
| Mammals | 15 | 1 | 0 | 2 | 1 | 2 | 14 | 8 | 6 |
| Total | 193 | 9 | 5 | 5 | 7 | 11 | 174 | 44 | 64 |

Abbreviations used: CR - Critically Endangered, EN - Endangered, VU - Vulnerable, NT - Near Threatened;

¹ Out of the 5 species listed as Critically Endangered 4 have both breeding and migrant populations. Only the breeding population is listed as Critically Endangered as the breeding population has a highly restricted distribution. Out of the 4 species listed in this category, only one species, *Merops philippinus*, has a breeding population restricted to the study area. The other three species even though listed as Critically Endangered, the population found in the study area comprise of migrants and therefore should be considered as Least Concern

² Out of the 4 species listed as Vulnerable, 1 species, *Sterna albifrons*, is represented by a breeding population and a migrant population. Only the breeding population is listed as Vulnerable as the breeding population has a

highly restricted distribution. Therefore, this species, even though listed as Vulnerable, the population found in the study area comprises of migrants and therefore should be considered as Least Concern.

Dragonflies: Total number of 19 species of dragonflies and damselflies were recorded. All of these species are common species encountered in man modified habitats and none are listed as endemic to Sri Lanka. The dragonflies observed in the study area included a single threatened species and three near threatened species (Table 8 & 9). These dragonflies were recorded mostly from the lagoons.

Butterflies: Total numbers of 32 butterfly species were recorded including two endemic species (table 8 & 9). Majority of the species recorded are common species that show a wide distribution in Sri Lanka. The butterfly fauna observed also includes a single threatened species and two near threatened species (Table 8 & 9). Butterflies were recorded mostly in the lagoons and beach associated scrub habitats.

Reptiles: Altogether 12 species of reptiles were recorded from the study area. All these species are commonly occurring species in such coastal habitats. None of the species observed are endemic to Sri Lanka. The reptiles observed included three threatened species of turtles and two near threatened species. The beach area south of Panama is frequently used by these three turtles as breeding sites. An *in situ* conservation programme for breeding turtles operated by an NGO with the support of villagers has been observed in the Kunukala area. They have reported that all three species of turtles nest in this area.

Birds: Birds were the most abundant group of animals observed in the study area, represented by 115 species. This was expected as the study area is well known for bird diversity, especially the Kumana (Yala east) National park where the main conservation target is birds. This included six endemic species (Table 8 & 9). Nearly 20% (21 species) of the bird species recorded in the area are migrant species. Six of these migrant species also have resident breeding populations. Of these six species *Merops philippinus* (Blue-tailed Bee-eater) is the only known species to have a breeding population in the Panama region and during the survey one such breeding colony was observed in the sand dunes present at the mouth of the Kunukala lagoon. This breeding colony comprised of about 200 nests dug into the seaward facing side of the sand dune. This is the second record of such a breeding colony and the previous record was from inside the Yala East National Park. Since this breeding colony is found outside the protected area it should be protected as this is probably one of the few sites in Sri Lanka where this species of bird is known to breed. Out of the the main coastal habitats present, the lagoons provide the best habitat conditions for the water birds including the Critically Endangered *Ephippiorhynchus asiaticus* (Black-necked Stork).

Mammals: A total number of 15 mammal species including one endemic species, were recorded in the coastal habitats (Table 8 & 9). Further, three species of threatened and two species of near threatened mammals were also observed in these habitats.

Endemic and Threatened fauna: The species assemblage observed in the study area included 17 threatened species and 11 near threatened species. It should be noted that the threatened species indicated with an asterisk (*e.g.* CR*) were previously considered as migrant species with no resident population and hence were not listed in the 2007 list of threatened species (IUCN & MENR, 2007). However, these species are now known to breed in Sri Lanka only in few places and hence the breeding population is listed as Critically Endangered. Five out of the 17 threatened species observed in the study area fall into this category. Only *Merops philippinus* (Blue-tailed Bee-eater) has a breeding population in the

study area which was confirmed by this study as a breeding colony and was recorded in the sand dunes present at Kunukala area.

Table 9. Endemic, threatened and near threatened animal species recorded within the study area

| Scientific Name | TS | CS | Lagoon | Sand Dune | Beach |
|-----------------------------------|----|-----|--------|-----------|-------|
| Butterflies | | | | | |
| <i>Pelopidas agna</i> | N | NT | + | | |
| <i>Tirumala septentrionis</i> | N | NT | + | | |
| <i>Papilio crino</i> | N | VU | | + | |
| <i>Troides darsius</i> | E | LC | | | + |
| <i>Appias galena</i> | E | LC | + | | |
| Dragon Flies | | | | | |
| <i>Ischnura aurora</i> | N | NT | + | | |
| <i>Orthetrum luzonicum</i> | N | NT | + | | |
| <i>Orthetrum pruinosum</i> | N | NT | + | | |
| <i>Trithemis festiva</i> | N | VU | + | | |
| Reptiles | | | | | |
| <i>Eretmochelys imbricata</i> | N | EN | | + | + |
| <i>Lepidochelys olivacea</i> | N | EN | | + | + |
| <i>Crocodylus palustris</i> | N | NT | + | | |
| <i>Dermochelys coriacea</i> | N | EN | | + | + |
| <i>Geochelone elegans</i> | N | NT | | + | |
| Birds | | | | | |
| <i>Ocyrceros gingalensis</i> | E | LC | + | | |
| <i>Charadrius alexandrinus</i> | N | VU | + | | |
| <i>Ciconia episcopus</i> | N | NT | + | | |
| <i>Ephippiorhynchus asiaticus</i> | N | CR | + | | |
| <i>Leptoptilos javanicus</i> | N | VU | + | | |
| <i>Treron pompadora</i> | E | LC | + | | |
| <i>Glareola lacteal</i> | N | VU | + | + | + |
| <i>Hirundo daurica</i> | E | LC | + | + | |
| <i>Sterna albifrons</i> | N* | VU* | + | | |
| <i>Sterna caspia</i> | N* | CR* | + | | |
| <i>Sterna nilotica</i> | N* | CR* | + | | |
| <i>Sterna saundersi</i> | N* | CR* | + | | |
| <i>Merops philippinus</i> | N* | CR* | + | + | |
| <i>Phalacrocorax carbo</i> | N | NT | + | | |
| <i>Gallus lafayetii</i> | E | LC | | + | |
| <i>Megalaima rubricapilla</i> | E | LC | + | | |
| <i>Pellorneum fuscocapillum</i> | E | LC | + | | |
| Mammals | | | | | |
| <i>Rusa unicolor</i> | N | NT | + | | |
| <i>Elephas maximus</i> | N | EN | + | + | + |
| <i>Felis chaus</i> | N | NT | + | | |
| <i>Panthera pardus</i> | N | EN | + | | |
| <i>Lutra lutra</i> | N | VU | + | | |

| Scientific Name | TS | CS | Lagoon | Sand Dune | Beach |
|--------------------------|----|----|--------|-----------|-------|
| <i>Moschiola meminna</i> | E | LC | | + | |

Abbreviations used: TS - Taxonomic Status, E - Endemic, N - Native, CS - Conservation Status, CR - Critically Endangered, EN - Endangered; VU - Vulnerable, NT - Near Threatened

This study demonstrates that the coastal zone from Potuvil to Okanda supports number of important coastal habitats that justify this area being designated as an Special Management area by the Coast Conservation Department (NECCDEPa). Even though these habitats are not rich in endemic and threatened species, there are at least three Critically Endangered species *Sesamum prostratum*, *Ephippiorhynchus asiaticus* (Black-necked Stork) and the breeding population of *Merops philippinus* (Blue-tailed Bee-eater) that are restricted to this region and therefore maintaining these habitats in good condition is critical for their survival. Further, these habitats provide number of critical ecosystem services such as shoreline stabilization, functioning as breeding sites for near shore fish and affording protection from natural disasters (as was demonstrated during the 2004 tsunami where Potuvil to Okanda section received comparatively less damage than the coastal areas north of Potuvil (UNEP, 2005) due to presence of stable sand dunes). However, after the culmination of the armed conflict in 2009, unsustainable natural resource extraction and unplanned expansion of tourism have resulted in rapid degradation of these important coastal habitats. Therefore, updating the Special Area Management plan and its effective implementation are timely needs to ensure accruing continued benefits from these important coastal habitats.

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