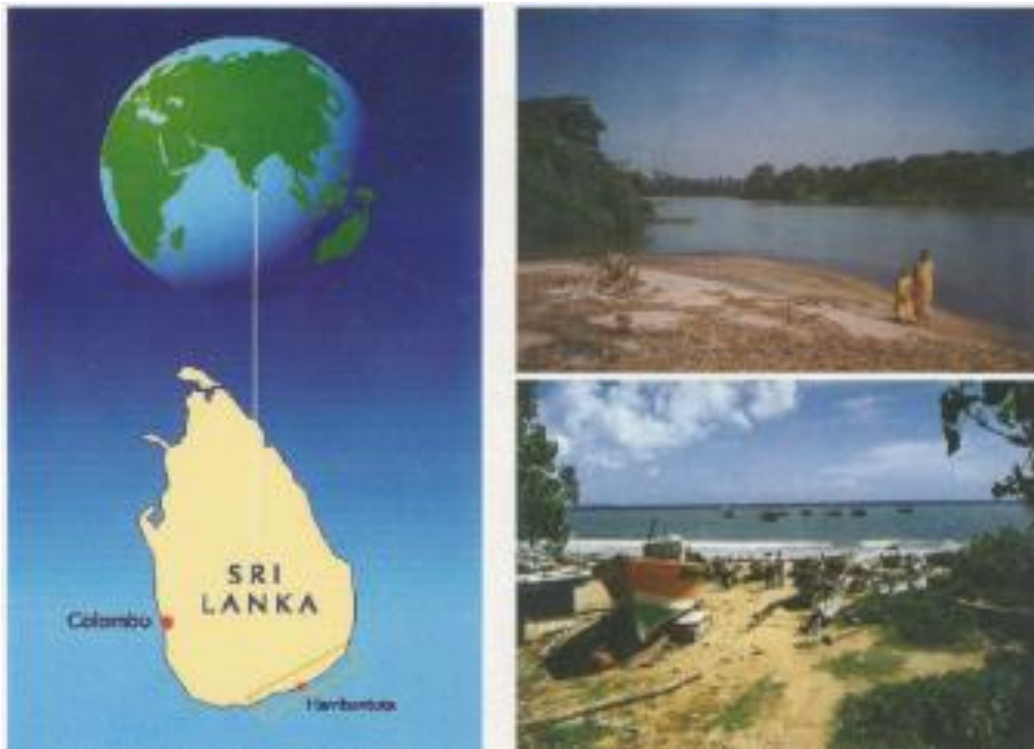




HICZMP Output no. 6

Status Report on Special Area Management Programme of the Hambantota Sand Dunes



**Southern Development Authority
Coast Conservation Department**

HICZMP - Report

Funded by the Government of Norway

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Abstract

This status report presents an overall assessment of the existing environmental, social and economic issues and the significance of the sand dunes as a natural ecosystem of the Hambantota sand dune area. It also presents the views and opinions of the stakeholders in the area concerned. In the absence of proper data and information to formulate management strategies, this profile fulfils a vital requirement to facilitate the basis for developing SAM Plan strategy thereby facilitating future management initiatives.

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PREFACE

The Hambantota Integrated Coastal Zone Management Project (HICZMP) is an umbrella project comprising 14 sub-projects (including project administration), which have been implemented in the course of the current phase 1997-2000 (titles are abbreviated):

- 1) Integrated zoning plan for the coastal area of Hambantota district
- 2) Special Area Management (SAM) process at two prioritised sites: Mawelle lagoon and Hambantota dunes
- 3) Awareness campaign on coastal resources management
- 4) Mapping of environmentally sensitive areas, including recommendations for conservation
- 5) Identification of adverse impacts on the environment from development activities and implementation of mitigation measures
- 6) Existing legal provisions reviewed for purpose of streamlining
- 7) Institutional strengthening in support of coastal zone management in Hambantota District
- 8) Mechanisms for project co-ordination, implementation and effective law enforcement
- 9) Technical support to the coastal extension centre/foundation at Rekawa lagoon
- 10) Coastal and marine pollution monitoring program, including baseline survey
- 11) Consultative mechanism to obtain participation of stakeholders in the management and development process
- 12) Program for utilising existing and planned environmental facilities
- 13) Environmental guidelines for developers, and the public
- 14) Project administration.

The project has been funded by a grant from the Government of Norway. The Southern Development Authority of Sri Lanka (SDA) and the Coast Conservation Department (CCD) has been responsible for the co-ordination and the implementation of HICZMP respectively. Inter-ministerial commitment has been ensured through representation in the National Steering Committee (NSC), while the Project Co-ordination Committee (PCC) has been the main forum for the local authorities, non-governmental organizations, and other stakeholders. The project office located in the town of Hambantota has functioned as the focal point for the project activities.

Sri Lankan consultants have carried out all the sub-projects with technical support provided by the Norwegian Institute for Water Research (NIVA), and with assistance from the Norwegian Institute for Urban and Regional Research (NIBR).

This report provides a resume of the activities carried out under HICZMP sub-project no. 7: Institutional strengthening in support of coastal zone management in Hambantota District. The other documentation referred to in the report (e.g. working papers/technical papers, reports of meetings, training programmers etc.) is also published and will be made available for those interested.

It is hoped that this report and the other supporting documents will be useful to the stakeholders in Hambantota district as well as for all those parties, such as state agencies, non-governmental organizations, planners, researchers and donor-agencies, who are involved in coastal zone management in Sri Lanka.

We wish to place on record our appreciation of the devoted work of all those who have participated actively in the implementation of the project, the authors/consultants for preparing the documents and the project management for publishing them.

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ABBREVIATIONS

BII	Bureau of Infrastructure Investment
BOI	Board of Investment
CCD	Coast Conservation Department
CCC	Community Coordinating Committee
CC Act.	Coast Conservation Act
CBOs	Community Based Organizations
DCS	Dune Care Societies
DCP	Dune Conservation Plan
DPL	Dune Protect Line
ED	Education Department
HWM	High Water Mark
HSDMCC	Hambantota Sand Dune Management Coordinating Committee
SDA	Southern Area Development Authority
SAMP	Special Area Management Plan
SAM	Special Area Management
NCZM	National Coastal Zone Management
GN	Grama Niladhari
M.V.	Maha Vidyalaya
GNDs	Grama Niladhari Divisions
HICZMP	Hambantota Integrated Coastal Zone Management Project
DS	Divisional Secretary (Tangalla)
PS	Pradeshiya Sabha
UDA	Urban Development Authority
DFO	District Fisheries Officer
ID	Irrigation Department
RU	Ruhuna University
CTB	Ceylon Tourist Board
GSMB	Geological Survey & Mines bureau
HDCC	Hambantota District Coordinating Committee
CZMP	Coastal Zone Management Plan
NGOs	Non Governmental Organizations
DFEO	District Fisheries Extension Officer
DEA	District Environmental Authority
SPC	Southern Provincial Council
WDF	Women Development Foundation
SMF	Social Mobilises Foundation

1 - INTRODUCTION ON SPECIAL AREA MANAGEMENT PLANNING AND ITS PROCESSES

1.1 Background

The Special Area Management (SAM) process already tested in Rekawa and Hikkaduwa by the Coast Conservation Department (CCD) has confirmed the need for the application of integrated resource management strategies as an auxiliary for the implementation of the National Coastal Zone Management Plan (CZMP). Implementation experience of the first National CZMP reveals that there has not been a proper mechanism to deal comprehensively with management issues at specific sites especially when the coastal ecosystems extend beyond the coastal zone. The SAM Programme recognises participatory collaborative strategy as an instrument for dealing with the coastal resource management. The CCD through its Revised Coastal Zone Management Plan (RCZMP 1997) has identified twenty-three (23) sites for SAMP designation.

The sites selected under the RCZMP were rated in terms of severity of resource management issues, bio-diversity, viability and economic significance. According to this classification, Hambantota sand dunes have been identified as one of the high priority sites, which require specific management focus. Considering this, the Planning Workshop conducted in August 1997 for providing guidelines in order to formulate the Hambantota Integrated Coastal Zone Management Project (HICZMP) identified Hambantota Sand Dunes as an area requiring urgent management interventions and recommended that a SAM Plan prepared for this site as a sub-project of HICZMP. Accordingly, SAM process was initiated in September 1998.

1.2 Objectives

The main objectives of this report are to present an overall assessment of the existing environmental, social and economic issues and the significance of the sand dunes. It also presents the views and opinions of the stakeholders in the area concerned. In the absence of proper data and information to formulate management strategies, this report fulfils a vital requirement to facilitate the basis for developing SAM Strategy thereby facilitating future management initiatives. Hence it is expected to discuss the important areas highlighted in this report with all stakeholders in future planning. This will enable the prioritization of management issues and overcome the difficulties in formulating management strategies.

1.3 Planning Process

As part of the overall planning process, preparation of a status report for the purpose of documenting and analysing the present social, economic and environmental condition of the target geographic setting has been carried out. In doing this attention was paid on the collection of primary data on various aspects from the existing sources. Subsequently, necessary investigations and studies were conducted to fill the information gaps. To verify the validity of the findings of the primary investigations and studies the views of the communities were obtained through open discussions, interviews and perception surveys. Since the SAMP process mainly focused on a natural physical resource, much emphasis had been placed on technical/scientific analysis to establish cause-effect relationship.

2 - HAMBANTOTA SAND DUNES

2.1 Background

A number of coastal habitats such as sand dunes, salt marshes, estuaries, lagoons and mangroves are located within the Divisional Secretariat division of Hambantota. The sand dune stretch from Ambalantota (Godawaya) in Hambantota district towards Sangamankanda point in Ampara district, is one of the most prominent and unique features of the coastal zone of this area. These dunes have been identified as the longest dune stretch in the world closes to the equator.

In Sri Lanka, sand dunes occur over an area of around 20 % of the coastline in both the dry zone and the wet zone in both seasonally high and perennially low wave energy sectors (Swan, 1979). A total of 7606 ha of dunes occur in Sri Lanka and in which 6 percent are found in Hambantota district (Revised CRMP, 1997). The sand dunes described here is situated in the southern part of Sri Lanka within longitude $81^{\circ} 03'$ - $81^{\circ} 09'$ and latitude $6^{\circ} 04' 30''$ - $6^{\circ} 09' 30''$. This area extends from Godawaya (Chitrakala outlet) to the Sea-Water Intake of the Lanka salt Company (east of Talgasmandiya – Mahalewaya, Figure 1).

Hambantota District is the largest district in the southern province of Sri Lanka and encompasses a total area of 260,825 ha (2608 sq. km¹). Administratively, the Hambantota district is divided into eleven Divisional Secretariat Divisions ((DSD) viz. Weeraketiya, Katuwana, Beliatta, Tangalle, Angunakolapelessa, Ambalantota, Hambantota, Suriyawewa, Lunugamwehera, Okewela and Tissamaharama. Of these only four viz. Tangalle, Ambalantota Hambantota and Tissamaharama have a maritime boundary. The population in the district in 1998 was 554,343 persons (Hambantota District Secretariat, 1998).

The Coastal Zone of the Hambantota district contains a variety of rich coastal habitats including headland-bay-beaches with mangroves (539 ha), salt Marshes (318 ha), sand dunes (444 ha), estuaries and lagoons (4488 ha), sea-grass beds and coral reefs. The total length of the coastline of the Hambantota district is approximately 135 km (RCZMP, 1997).

The Hambantota DSD is situated in the western part of the Hamabantota district with a land area of 505.6 sq. km (19 % of the land area in the district). It has a coastline 48 km long and seven

¹ There are ranged of figures given in various sources between 2593 sq. km and 2624 sq. km hence a mean figure of 2608 sq. km considered in this study.

lagoons and salterns (Chitrakala, Karagam Lewaya, Mahalewaya, Koholankala Lewaya, Malala Lewaya, Embilikala Lewaya and Bundala Lewaya) covering 4,068 ha.

Hambatota town is located about 238 km to the south of Colombo. There are 167 small villages within the 48 Grama Niladari Divisions (GNDs). The total population, which was 31,103 in 1971, had increased to 52,213 in 1981 with an annual population growth rate of 6.8% during that decade. However, according to the most recent information, the total population within the Hambantota DS Division in 1997 was 45,693. This reduction of population is not due to migration or slow population growth but due to demarcation of new administrative boundaries for DSDs.

2.2 Objectives

The specific objectives of the status report on sand dunes and related environs under the SAMP are to:

- Document the existing socio-economic and environmental setting of the areas concerned;
- Assess and examine the anthropogenic and natural impacts on the dune system
- Illustrate key environmental, social and economic issues relating to the dunes
- Survey and map the physical setting of the sand dunes
- Examine and assess the biological diversity of dunes as an ecosystem
- Identify vulnerable segments of the dunes
- Identify strategies to manage dunes effectively
- Design proper guidelines to maintain the environmental quality of the dunes
- Show cause and effect relationship pertaining to key issues based on secondary data, initial field investigations and as perceived by stakeholders
- Identify types of non governmental organisations and their role in the management areas
- Identify appropriate approaches to conduct further research/studies required for preparation of environmental profile, and
- Elucidate anticipated constraints pertaining to future process in SAMP

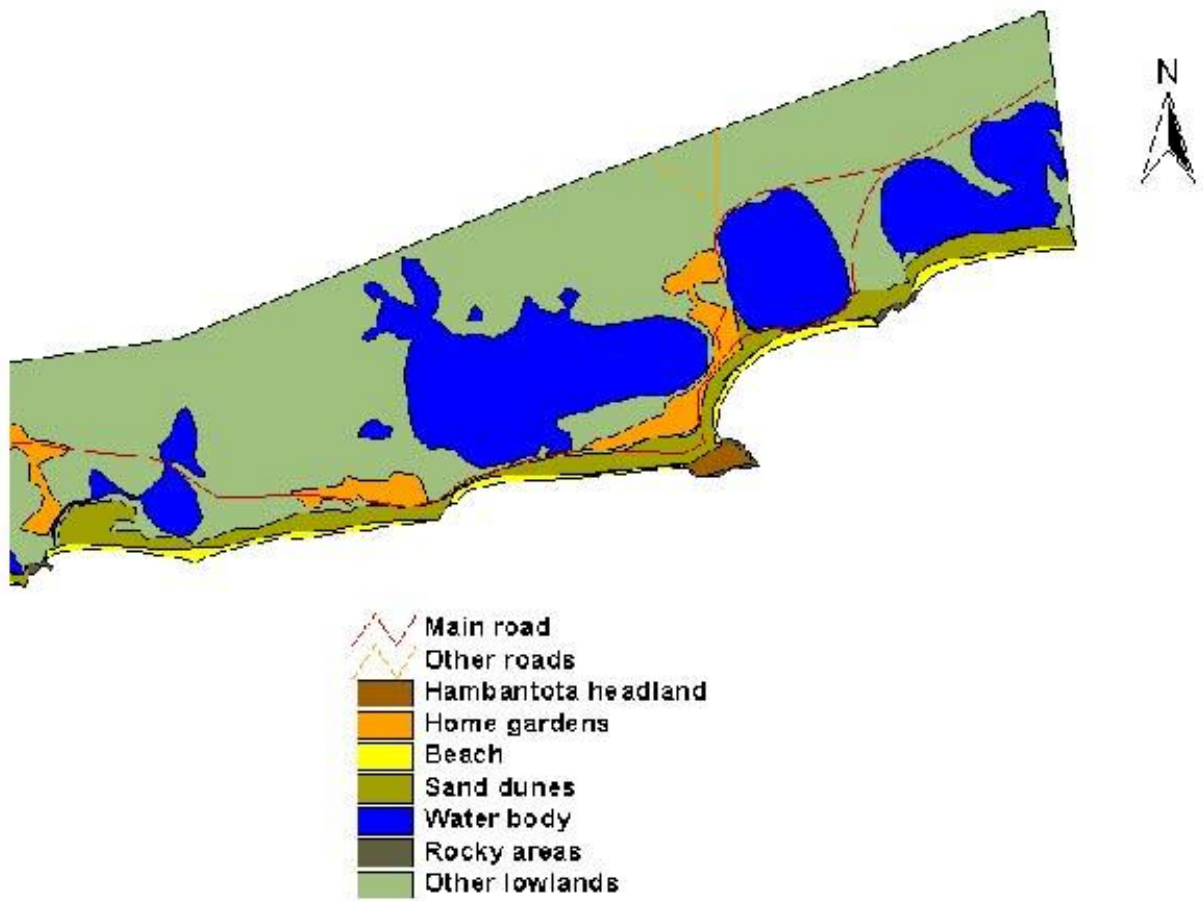


FIGURE 1. DISTRIBUTION OF SAND DUNES IN HAMBANTOTA DISTRICT

2.3 Methodology

The following methodologies were employed to gather information for preparing the status report.

- Secondary data and information collected from existing sources
- Literature survey
- Focused group discussions with key stakeholders (Annex 1.2A & 1.2B)
- Community Perception Survey
- Field investigations and observations
- Land survey

A complete land survey was carried out between October and December 1998 in order to collect necessary information to develop the SAM Plan. For this purpose, 13 randomly selected cross sections were demarcated and measured (Annex 2. Dune cross-sections). Concomitantly, a list of flora using transects and visual-sampling technique in each cross section was compiled.

A transect survey was under taken to assess and compile surface characteristics of the dunes (Annex 1.2C, 12D & Annex 3). Three quadrants (10'x10') were established at uniform intervals (leeward side of the fore-dune, middle ridge and back-dunes) along each transect to examine the species variation of the dune. Thirty-six (10'x10') quadrants were examined within the study area and all plant species were recorded. At the same time, a rating (High, Moderate, Low) based on the plant density was assigned for each transect. The results of the analysis of vegetation pertaining to each sample are described in Annex 4.

Collection of information on fauna through field investigations was a difficult task. Visual technique could not be completely adopted due to time and access constraints. Hence, most of the information on animals and birds contained in the report were collected and compiled through informal discussions and interviews with residents/dwellers in the vicinity and dune users, combined with field observations.

2.4 General description of the SAMP area

2.4.1 *Formation, characteristics and functions of dunes*

An onshore wind blowing over a dry beach, with a speed in excess of approximately 5m per second, will transport sand-size particles in a landward direction. Most of the sand moves in a

series of hops, a process known as saltation. Any obstruction on the upper beach, for example flotsam, will slow down the wind and cause it to deposit some of the sand. Small mounds develop which are known as embryo (incipient) dunes (Microsoft Corporation, 1998). According to Boaden, coastal sand dunes result from the stabilization of transported sediments by vegetation. They are formed from wind-blown rather than from water-moved silt. Although the development of is wind-dependent, the earlier stage depends on tidal or climatically induced water level changes, which enable establishment of high level drift or strandline.

Once these sand dunes have grown above the level of most high tides, salt-tolerant plants colonize the mound, particularly *Agropyron junceiforme* (sand twitch). These plants act as an efficient sediment trap and the incipient dunes grow rapidly, coalescing to form foredunes. The foredunes are low, narrow ridges on the upper beach. With further accretion *Ammophila arenaria* is able to grow, promoting yet further accretion until a large dune ridge develops running parallel to the shoreline. Where a shoreline is growing seaward through accretion several dune ridges can develop. The troughs between the ridges, known as dune slacks, are quite damp environments and often support a wide diversity of plant species. Above mentioned formative processes and characteristics appear in the Hambantota coastal dunes. However, the factors, which have contributed to sand dune development in Sri Lanka, can be included as climatic conditions, biotic and geomorphic factors (Tables 1 and 2).

The sand dunes in the study area are in different shapes and types. The most common sand dunes have formed parallel to, and behind the beach and they act as a buffer against sea erosion, extreme wave and wind conditions. The sediment exchange between beach and dune is an important natural process for maintaining both morphological stability and ecological diversity. In addition to absorbing wave attack, the dunes shelter landward communities, and assist in the retention of freshwater table against saltwater intrusion.

All the mentioned factors together with sand supply are favorable for the development and distribution of dunes in the Hambantota district. When compared these dunes with those in the southwest coast, the factors such as high humidity, higher number of rainy days per year, poor sand supply, dense growth of vegetation cover, high ground water table etc are the main unfavorable conditions found in the southwest coast. Average wind velocity and the number of months per year with wind in the Hambantota area also very much higher than the Trincomalle, Jaffna and Puttalam (Swan, 1983).

TABLE 1. FACTORS AFFECTING COASTAL DUNES DEVELOPMENT AND DISTRIBUTION

FACTOR	FAVOURABLE	UNFAVOURABLE	COMMENTS
Climatic	Strong persistent, onshore winds; long dry season	Weak, variable or offshore winds; lack of dry season	
Biotic	Prostrate plants and others capable of fixing sand particles blown behind the berm	Dense growth of tall trees behind the berm probably lower velocities of onshore winds	Human interference, including the cultivation of coconut groves behind the berm, appears to have acted as a partial deferent to dune development in wetter areas
Geomorphic	Abundance of quartz sand within 62 to 500p; high broad berm, low lying terrain behind; low water table	Sand deficiency through inadequate supply and retention systems, or coast erosion; low or no berm; high water table; salt crusts on berm; steep ground behind berm	Coastal retreat has obliterated many fore dunes; changing coastal configuration, e.g. The growth of spits, has starved tracts in their lee of sand deterring dune growth.

Source: Swan, 1983

TABLE 2 AVERAGE WIND VELOCITY AT HAMBANTOTA STATION

Station	VELOCITIES (M/SEC)		NUMBER OF MONTHS PER YEAR WITH WINDS	
	Annual	Maximum month	> 5 m/sec	> 4 m/sec
<i>Hambantota</i>	5.5	6.6	8	11
Trincomalee	4.5	6.1	5	7
Jaffna	4.4	7.4	5	7
Mannar	3.9	4.5	0	7
Puttalam	3.4	5.1	1	4
Baticaloa	3.0	4.0	0	1
Galle	3.8	5.5	4	6
Colombo	2.4	3.0	0	0

Source: Swan, 1983

2.4.2 Physical setting

For the purpose of this study, the planning area consists of the coastal strip and the linear dune extending from Godawaya outlet to the Sea Water Intake for Sri Lanka Salt Ltd at the eastern end of Hambantota town area. (Figure 1). Although this stretch of dunes continues further east beyond this point towards Bundala, Yala and Panama those stretches were not included under this study since these areas fall within the Bundala and Yala National Parks and are generally well protected and free of human activities. Thus, only the stretch of dunes falling within four Grama Niladari Divisions (GSD) viz. Sisilasagama (124), Mirijjawila (123), Hambantota West (094) and Hambantota East (093) were included in the study area connected with the formulation of the management plan/strategy. The total length of the coastline is about 12.5 km and covers approximately 210 hectares.

2.4.3 Geology

Geologically the Vijayan Complex crystalline rocks (amphibolite facies rocks) underlie the southern coastal zone predominantly in Precambrian age. The left bank of the Wallace River mouth, where sand dunes stretch to the east, lies on the Highland Complex rocks comprising of biotite gneiss, hornblende-biotite gneiss, migmatitic and granitic in parts of the Vijayan Complex (Hapuarachchi, 1967 & 1968; Balendran, 1968; Geological Survey Department, 1982; Cooray 1984).

According to *Canada - Ceylon Colombo Plan Project (Resource of the Walawe Ganga Basin, 1980)*, the study area consist of Hornblende and biotite gneisses with associated pegmatite and migmatite (Vijayan Series rocks).

2.4.4 Geomorphology

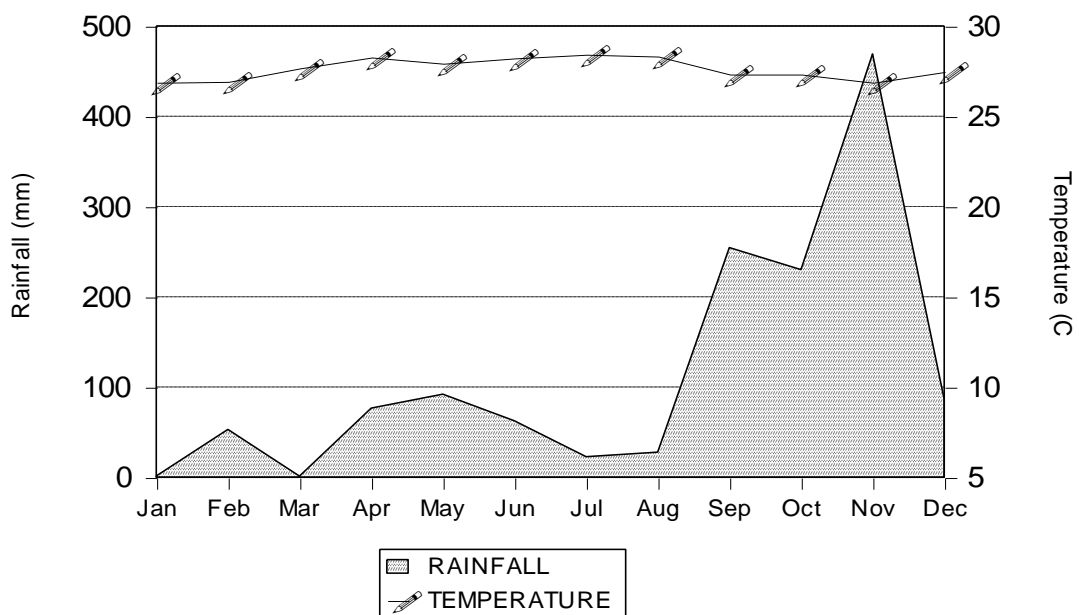
Behind the coastal margins, the terrain is often low-lying and includes large saline lakes, known locally as *lewayas*. Based on the elevation and the morphological characteristics, the southern coastal zone can be broadly divided into three units (Katupotha, 1992): namely; (a) Flat terrain (Lowland I, <30 m); (b) Flat to slightly undulating terrain (Lowland II, <30 m); and (c) Undulating terrain (Lowland III, 30-150 m).

Out of this three units, the Flat Terrain (Lowland I, <30 m), where the study area is located, has been altered by aeolien and marine influences forming of narrow and wide beaches, beach ridges with medium and somewhat high dunes. In some places, the dunes reach heights of 15 to 20m, which are developed on bedrock and Quaternary beds. Salterns, salt marshes and mangrove swamps and mound topography (a hummock relief) have been formed behind them. These

features also reflect the configuration of the underlying bedrock surface. The bedrock outcrops, which are too small and too low, appear as inselberges, toes and other erosional remnants. Sand spits, barriers and sand bars are common features at the estuaries of lagoons. Lowland I is completely 'flat terrain' and the slope is $1/2^0$ or 1^0 (1:100 or 1:60 in gradient). These characteristics determine the formation and distribution of sand dunes in the study area.

2.4.5 Climate

According to Köppen classification, the southern coastal zone extending from Matara to Bundala is classified as Afw''i, Amw''i, Asi and Bsh climatic types (Thambyapillai, 1960)². These types clearly indicate that windy and dry climate exists in the area.



Source: Department of Meteorology, Colombo.

FIGURE 2 MONTHLY VARIATIONS OF TEMPERATURE AND RAINFALL OF THE HAMBANTOTA AREA IN 1997

-
- ² A Rainy climate (Megathermal - high temperature and abundant moisture) - temperature of the coldest month over 18^0 C; no winters
- B Dry climate (Terophytic - arid or semi-arid; the distribution of this climate is in terms of 'precipitation effectiveness' which is determined by the use of formulae
- f Precipitation of the driest month is at least 6 cm
- w'' There are two distinct maxima of precipitation separated by two dry seasons
- m short dry season exists but is compensated by heavy precipitation during the rest of the year
- s Used when dry season comes during the high-sun period
- i Range of mean annual temperature less than 5^0 C.

The rainfall station at Hambantota shows two maximum seasons during the Southwest monsoon (May to September) and convectional-cyclonic-depression during the months of October and November (Figure 2). These results in nearly 7-8 dry months in this area. These climatic conditions are conducive to the rapid evaporation of lagoons and lakes as well as the formation and distribution sand dunes (Tables 1 & 2).

2.4.6 Soils

Four main Soil Groups of the southern coastal zone have a close relationship with the geologic characteristics, micro-relief and climatic conditions (Soil Map of Sri Lanka, 1977). Out of these four groups, two soil types occur along the coastal strip (Panabokke, 1996). They are (1) Regosols on recent beach and dune sands in flat terrain form on barrier beaches, beach ridges, sand spits; and (2) Reddish Brown Earth and Low Humic Clay Soils in undulating terrain, which is located behind the coast. Well-drained and imperfectly drained mixed aeolian, residual and alluvial soils occupy these areas. Garnet, ilmenite and other heavy mineral sands occur seasonally as high concentrations in pockets.

gneiss, hornblende gneiss and hornblende - biotite gneissic rocks form rocknobs and erosional remnants as headlands along the coast.

2.4.7 Ecosystem

Coastal dunes are wind blown accumulation of sand, which are different from adjacent landforms such as beaches and tidal flats. Many dunes originated when the sea level was lower and/or when the sediment supply was at its greatest.

Dunes can be seen in a variety of shapes and sizes. The most common formation is that of one or more long dune ridges parallel to and behind the beach. The dune ridge closest to the beach is termed the *fore-dune*³ or the *frontal* or *primary* or “yellow dunes” while those behind it are called *secondary*, *rear* or *back dunes*. The vertical and horizontal growth of dunes depends on the interaction between sand supply, vegetation growth and wind velocities and directions. Of these, the sediment (sand) supply is the most important factor. The dune vegetation appears to respond directly and positively to deposition. In addition, tidal litter lines provide nutrients, moisture and

³ Two basic types of foredune are noted: the “ephemeral” and the “embryonic”, Growth patterns differ markedly one from the other; in the former sediment supply is largely from the unstable faces eroding, transgressive dunes, augmented by minor additions from the beach. The growth pattern is exponential. Embryo dunes are precursors of more permanent land form (Carter, RWG, 1988).

shelter conducive to plant growth. Between fore-dune and back-dune rows, valley like depressions can be seen parallel to the beach.

Most of the dunes in the study area are covered by creeping vegetation such as *Spin fix litterers* and *Ipomoea pescaprae* as well as stunted trees scrublands (*Cassia auriculata* - Ranawara, *Feronia limonia* - Divul, *Dichrostachys cinerea* - Andara, *Carissa spinarum* - Karamba etc.). Among the trees scattered within the scrublands are *Manilkara hexandra* - Palu and *Nerium odorum* – Veera, in Bundala National Park. Mangrove patches along the beach as well as around lakes and lagoons exist in wetlands behind the sand dunes. Results of the investigations of the dune cross-sections in the study area between Seawater Intake and Godawaya have been indicated in Annexe 3.

The observations made during the course of the study correspond to the findings of the studies previously conducted in this region. According to Fernando (1968) and A Canada - Ceylon Colombo Plan Project (Resources of the Walawe Ganga Basin 1960) the southern coastal lowlands are covered by riverine forest, swamp vegetation, mangrove and littoral vegetation

The ecosystem in the Hambantota district as we have already explained earlier comprises marshy lands, barren lands, brackish water bodies, etc., which are unsuitable for utilization as human habitats. With the growth of the population, it is but natural for people to use sand dunes since they can be easily removed or are amenable for landscaping.

2.4.8 Demography

The total population in Hambantota District in 1994 was 515,750. The population in Hambantota Divisional Secretariat (HDS) division was 45,132 in 1994 (Department of Census and Statistics, 1994). According to the records of the HDS division, the population of the four coastal GN Divisions covered by the study area is 16580 persons (Table 2.3). Among the four GN divisions, Hambantota West GN division is contained highest population (about 53 percent).

In terms of population distribution within the coastal dunes and adjacent areas, a remarkable concentration can be seen in places such as Murry Road, U.C Housing Scheme, Sisilasagama and Mirijjawila. Thus in these areas population pressure on the sand dune ecosystem is quite considerable. The field investigations revealed that in 1999, a total of 525 housing units located within the planning area between Godawaya and the Seawater Intake (Talgasmandiya) where dunes are situated seaward of the Main Road. This implies that 3080 people living in the vicinity of sand dunes and the adjacent areas.

In terms of ethnic composition, there are 47% Sinhala, 46% Muslim and 7% Tamil people living respectively within the planning area. The religion wise the study area comprises Buddhist (46%), Muslim (46%) Catholic (3%) and Hindu (2%).

TABLE 3. HOUSING UNITS AND SEMI-COMMERCIAL BUILDING UNITS OF THE PLANNING AREA

GS DIVISION	POPULATION (1998)	HOUSE-HOLD (1998)	HOUSING UNITS (1995)
Sisilasagama	2654	571	286
Mirijjawila	2525	505	270
Hambantota West	8825	1765	1450
Hambantota East	2582	739	279
Total	16586	3580	2285

Source: Divisional Secretariat, Hambantota.

2.4.9 Land use and Economic sector

The major land uses associated with the sand dune system comprises coconut cultivation, home gardening, tourism related establishments such as hotels and restaurants, fish landing centres, casurina plantations and some cottage industries. Apart from the above land uses, there is no major agriculture or industries located in this area. The northern segment of the study area contains homesteads and coconut plantations on sand dunes (Figure 3). The dune segment starting from Godawaya outlet towards Sisislasagama is also largely covered with a private coconut land.

A total of 525 dwellings with home gardens concentrated in pockets are located within the study area. Of these 525 dwellings, a fair amount has been built by encroaching on the dune system by extending their buildings or home gardens into the dune area. The nature of the housing units revealed that, 394 permanent, 49 semi-permanent 52 temporary and 30 unauthorised units located in the area. The majority of the land parcels located within the planning area in which the housing units are located range between 10 perches to 80 perches. We also found that there were 64 housing units located in the same area without proper land ownership. The extent and number of land parcels within the planning area are given in Table 4.

TABLE 4 EXTENT OF LAND PARCEL SIZE

Extent (in perch)	No of Plots
10>	97
11-20	183
21-40	22
41-80	152
>80	7
Squatters	64
TOTAL	525

Source: Field investigations, 1999

Apart from dwelling units, a number of public buildings such as Kachcheri complex, Court complex, market complex, schools and other government and non-government office buildings occupied the land area adjacent to the dunes. The major tourist establishments in the area are located in close proximity to the dune system in Sisilasagama (Oasis Hotel), and in Galwala to the east of Hambantota town (Peacock Beach Hotel). There are few fish landing centres can be seen in Godawaya, Sisilasagama, Rathupasgodella and Hambantota town.

Some cottage industries such as salt packaging and distributing, grinding mills and few garages are located within the sand dune area. Beside these a large number of groceries and restaurants have been developed as pockets along the main road.

3 - ENVIRONMENTAL, ECONOMIC AND SOCIAL SIGNIFICANCE OF SAND DUNE

3.1 Significance of sand dunes

Coastal dunes located landward of the beach act as important natural barriers against coastal erosion and protect life and property within the coastal zone by absorbing the energy of the waves. They provide a reservoir of sand to replace that carried off by the severe storms. They also provide an important habitat for a number of plants and animals.

To examine the community perception on sand dunes in Hambantota, a sample attitude survey was conducted in December 1998. A sample of 80 households was selected on a random from among the households located close to the dunes in the narrow land strip between the highway and the beach. A pre-tested, structured questionnaire was administered to the selected households. The questionnaire included three main sections on:

- An assessment of environmental, economic and social value of the dunes
- The community's knowledge on dunes
- The main causes responsible for the degradation of dunes

The survey results show that the people living in the study area perceive dunes as an important coastal ecosystem in terms of the following:

3.1.1 Environmental significance

- According to the survey results, 27 percent out of 80 respondents perceive the coastal dunes in the study area to play an important role in protecting beaches.
- In the event of southeast monsoon or unusual climatic conditions, the natural process utilises dune materials for natural replenishment. The constant and temporally asymmetric sediment exchange between beach and dune is an important natural process for maintaining beach stability and ecological diversity in the area.
- A fair amount of respondents (19%) believe that coastal dunes exist in the study area act as natural barrier against sea erosion by absorbing wave attacks.
- According to existing information, the annual net erosion rate in the entire Hambantota district is between 0.1 – 0.2 m/yr (Revised CZMP, 1997).

- But, the field investigations revealed that there were no coast protection structures in the study area to prevent sea erosion. This demonstrates the role of existing dunes that act as natural protective barrier against sea erosion.
- Apart from the above noted environmental benefits, a 10% of respondents indicated that the dunes provide recreational and natural scenic beauty to the study area.
- The dune landscape and the vegetation cover inherent to the dunes stimulate the scenic beauty of the area.
- Furthermore, 44% of the respondents indicated that the existing sand dunes act as wind barrier and prevent salt spray into the inland areas.

Besides the above mentioned positive environmental effects, the field investigations revealed that the dunes protect inland areas from floods. This function is especially relevant as far as low-lying water-bodies and salt marshes are concerned.

3.1.2 Economic and social significance

- According to the perception survey, the community derives a number of economic benefits from existing dunes. In the first place, residents in the study area (29%) use dune-vegetation as a source of fuel wood.
- Most of their day to day requirements of fuel wood is obtained from dune-vegetation and casurina plantation that exists on dunes.
- Approximately 34% of the respondents indicated that dunes are important for fishing and related activities.
- Notably, they use dune areas for boat landing, dry fish processing and net mending. The respondents indicated that dunes perform significant function by supporting tourism and recreational activities in the area. The field observations revealed that almost all the tourism facilities in the area are located in and around dune areas.
- 20% of respondents indicated that the existing dune system is being used as a source of sand for filling and other construction purposes.
- In view of social significance, dunes perform an active role in providing space for sports activities especially for the children of the area. 66% of the respondents believe that this function is an important one in the absence of proper sports and recreational facilities in the area.
- 16% of respondents indicated that they spend their leisure time in and around dunes and they make evening walks frequently.
- Eventually, residents use dune areas for their festival as well as household functions.

Besides the above factors, field investigations revealed that the residents use dunes for a number of activities and to fulfil some social needs. They range from dunes as burial grounds, dumping sites, places for defecating and grazing grounds for domestic animals.

3.2 Ecological diversity

The ecological diversity of dunes has been termed by scientists as 'secret weapon' because it allows rapid adjustment to changing conditions (Carter, 1988). During the field investigations, emphasis was placed on the examination of the issues pertaining to different aspect of dune ecology. Prior to investigating the ecological aspects, a land survey was carried out on a sample basis for the entire dune system. To examine the shape of the dune and the distribution of vegetation, 13 cross sections (dune profiles) were measured and demarcated along the sand dune from Talgasmandiya to Godawaya outlet (Figure 1)⁴. Shape, length and width of the cross-sections have been discussed in details in Annexure 2.

To examine the dune ecology, 32 quadrants (10'x10') were marked on 12 cross-sections out of 13. The floral diversity was not encountered in No. 13 cross-section, because it almost starchy, about 85%, of the Coconut State from back-dune to fore-dune area. The quadrant demarcation was carried out covering both fore-dunes and back-dunes. Fore-dunes are associated with seaward-most dunes that still receive significant wind-blown sand input and support pioneer dunes. The back-dunes receive little or no fresh sand input.

The investigations revealed that the dunes in the study area are vegetated in a distinct but consistent sequence (Table 6). The fore-dunes, which are directly exposed to the full force of the wind and the shifts in formation that results from the wind blowing, have the least vegetation. Most of the fore dunes are mainly covered with *Spenifix littorus* (Maharawan) and *Ipomea asarifolia*. These plants appearing in the sand are fragile and susceptible to human disturbances or rapid changes in dune configuration. They spread by forming runners (creepers) or underground root systems. The centre ridges (intermediate) are mostly covered with creeping vegetation and stunted bushes. The back-dunes, which are more stable covered with bushes and trees. It was observed that the type of vegetation and their quantities increase in the intermediate to back-dunes, which are less exposed to the wind. In the back-dunes, *spenifix littorals* and creeping vegetation is replaced by less fragile woody vegetation, shrubs and trees such as Andara (*Dichrostachys cinerea*), Ranawara (*Cassia auriculata*), Kohomba (*Azadirachta indica*), Divul (*Feronia limonia*), Tal (*Borassus flabellifer*). When the dune become vegetated, it gets more or

⁴ Location of 13 cross sections are marked on Figure 1

less stabilised. The ability of the dune to hold sand depends largely upon the amount of vegetation available to entrap it.

Although the low nutrient status of dune plant communities is appeared, the dunes provide permanent or temporary habitats for a wide variety of animals for resting, nesting or feeding by birds and small mammals. However, it was difficult to observe and record much on fauna during the short duration of the survey. According to the information given by dwellers during the focused group discussions it was revealed that the sea turtles are important nesters of the dune front and the upper beach of the study area. Apart from turtles, such as ghost crabs, cobras, wipers, rabbits, rats, and variety of birds use the dune areas as their habitat. The discussions with the residents and other knowledgeable persons in the area consulted indicated that the animal population in the dune areas has been decreasing rapidly due to various factors of which the more important of are listed below:

- Construction of hotels and tourist facilities
- Construction of houses
- Burning of dune vegetation
- Grazing of dune plants by goats and cows
- Trampling
- Plantation of *casurina* spp.

In general, plants and animals in the dune areas face a constant struggle to survive. The soil contained in the dunes is nutritionally poor. At the same time, exposure, sand engulfment and drought are all hazards to be added to the usual stresses of competition, perdition and disease on animals living in the dune area.

TABLE 5 COMMON VEGETATION TYPES ON HAMBANTOTA SAND DUNES

CREEPING VEGETATION	
LOCAL NAME	SCIENTIFIC NAME
Maha ravana	<i>Spinifix littorerus</i>
Mudu binthamburu	<i>Ipomoea pescaprae</i>
Mudugetakola	<i>Hydrophylax maritime</i>

SHRUBS VEGETATION	
Ranawara	<i>Cassia auriculata</i>
Malitta	<i>Salvadora persica</i>
Andara	<i>Dichrostachys cinerea</i>
Karamba	<i>Carissa spinarum</i>
Kukul Katu	<i>Acacia eburnean</i>
Demata	<i>Gmelina asiatica</i>
Katupila	<i>Tephrosia purpurea</i>
Pathok	<i>Opuntia dillenii</i>
Takkada	<i>Scaevola frutescens</i>
TREES	
Kohomba	<i>Azadirachta indica</i>
Divul	<i>Feronia limonia</i>
Dhaluk	<i>Luphorbia antiqorum</i>
Palu	<i>Manilkara hexandra</i>
Veera	<i>Nerium odorum</i>
Tal	<i>Borassus flabellifer</i>
OTHER PLANTS	
Olinda	<i>Abrus precatorius</i>
Elabatu	<i>Solanum xanthocarpum</i>
Anguna	<i>Dregea volbilis</i>
Niyangala	<i>Gloriosa superb</i>
Wal Bevila	<i>Desmodium triquetrum</i>

Source: Field investigations

4 - KEY ISSUES FOR THE HAMBANTOTA DUNES

4.1 Vulnerability and degradation of dunes.

Since it was not possible to undertake a comprehensive land survey a sample land survey was carried out. In considering the uniform nature of some parts of the dune system, 13 locations were randomly selected for surveying cross section of the dune. The survey results are given in annex maps 1-13. The vegetation density pertaining to each sample locations were collected and rated during the field investigations using the criteria given below.

SCALE: H = High Scale
 M = Moderate
 L = Low

The analysis and micro-morphological characteristic along the transects and for each sample location are described in Annexure 2, and floral description have been given in Annexure 3.

An attempt was made to illustrate the present vulnerability level of the dune system located within the study area. Hence, sand dune vulnerability assessment has been carried out based on the results of the land survey and the field investigations. This exercise mainly focused on the following aspects:

- Morphology of the dunes
- Condition of the beach
- Character of seawards side
- Pressure of use
- Protection measures

Micro geomorphology in each cross-section has been discussed in Annexure 3. Cross-sections 1, 2 and 3 are located at Talgasmandiya. Cross-section 1 extends approximately 175 m while the other two extend about 120m from Matara – Kataragama road to the beach. Damages are not so high in the area under cross-sections 1 and 2, but the vegetation covers are secondary as compared with the vegetation cover of the Bundala National Park. The floral diversity of the area is considerably high in the back-dune area, but the seaward side is mostly covered by *Spenifix littorus*. People damaged the starting point of the cross-section No. 3. Close to the main road, westward of this cross-section (No. 3), dune sands have been removed for construction of a house

(Annex 1.4.A & 1.4B). But the shape and the floral diversity at the top and the seaward side of the cross-section No. 3 are almost similar to the cross sections 1 and 2.

The cross-section No. 4 stretches along the Kachcheri Complex area. About 75 percent of the surveyed area is covered by a gravel bed, and the rest (seaside) is covered by low dunes with *Tephrosia purpurea* and *Desmodium triquetrum* species. The area is subjected to grassing and the vegetation cover has been cleared to pave the way for recreational activities (to provide a play ground) by the nearby residents.

Cross-sections No. 5 and 6 show that the sand dunes at Murray Road area have been completely and irreparably damaged by residents. Particularly the back-dunes have been used to construct houses, commercial structures, goat-yards and to cultivate coconut. The seaward side however is thinly covered by *Spinifex littorus*.

The cross-section No. 7 is located in Hambantota west, and the transect stretches about 300m from the main road to the sea. Along this transect, two crests can be clearly identified. The old dune located close to the road have been damaged in the course of construction of houses, foot-paths and other access roads as well as coconut cultivation. The second sand ridge on seaside is nearly 15m high. Small landowners as well as illegal squatters have used the valley of both dune ridges for various purposes such as to build cadjan huts and home-gardens. Besides all this, casuarina sp. has recently been introduced to the area. The species such as *Spinifex littorus* and *Dichrostachys cineria* are dominant vegetational types on the seaward side and these have suffered much less damage.

Human activities have led to degradation of the dunes around cross section No 8 , which is located in front of the (No. 8) Karagan Lewaya. Here too, the main causes have been landscaping, removal of sand, planting of coconut and *Casuarina quaietifolia*. The seaside of this cross-section has a steep slope towards the beach and is covered with creeping vegetation.

The dunes at Ratupasgodella (literally this means red sand dune) are of much older origin. The cross-section concerned ie. No. 9 indicates that the whole area has been landscaped. The accumulations on the seaward side also appear to be very slow. Sand dunes at Mirijjawila (Nos. 10 and 11) are approximately 16m high on the landward side. The cross-section No. 10 indicates that the landward side has been damaged on account of *Casuarina quaietifolia* cultivation. Micro-morphology of the area is not usual. The fore-dune area has a steep slope with a wide beach.

Cross-sections No. 12 and 13 are located at Sisilasagama and Godawaya. Dunes in the Sisilasagama area has a turtle back shape but at Godawaya it is almost flat. In both areas, the dune morphology is changed as a result of housing development, construction of hotel and other recreational facilities, commercial purposes and coconut cultivation.

4.2 Encroachment

The dune environment is frequently tagged as ‘fragile’, ‘sensitive’ or ‘vulnerable’ due to its propensity for change under slight environmental stress. By and large the several segments of the existing dune systems have been irreversibly altered or damaged due to human activities both by design and improper uses. In Sri Lanka, however, no effort has been made so far to study the dune systems objectively enabling the development of a management plan.

During the study, an attempt was made to find cause and effect relationship related to degradation of dunes within the study area. As pointed out in the earlier section, particularly 4.1 a large part of the dune system, especially the back dunes in Mirijjawila, Ratupasgodella, Karagan Lewaya, Murray Road and Talgasmandiya, have got severely damaged or disturbed due to human activities (Annex 1.4A & 1.4B). Some of the major reasons identified for the degradation of sand dunes are the following:

- (a) long-term or temporary leasing of sand dune areas by government for economic or construction activities;
- (b) unauthorised constructions; and
- (c) removal of sand for social needs.

It was observed that there is a landward extension of back-dunes towards the main-road. Since there is a bigger demand for land adjacent/closer to the main-road, land-owners as well as squatters try to use the sand dunes for housing construction purposes. Two reasons can be identified for the high demand for land closer to the main road or the town centre. One is that there is a tendency for people to settle people very close to the urban centres in the coastal areas mainly to use the available infrastructure facilities. The other is that almost all the land over which most of the sand dunes are distributed belongs to the Government from which long-term leases or temporary occupation permits can be obtained by paying a mere nominal fee. This encourages the chances of encroachment of sand dunes in the study area.

Once these issues were identified, further information was collected from the stakeholders through a questionnaire survey conducted in December 1998 designed to examine the community

perceptions on sand dunes in Hambantota. The sample consisted of a group of 80 randomly selected residents living close to the dunes in the land strip between the highway and the beach. The questionnaire included three sections, which focussed on assessment of environmental, social and economic value of the dunes, the community knowledge on dunes and the main causes responsible for the degradation of dunes.

In this survey, the respondents identified the removal of sand and altering the contours of the dunes for housing construction as the key factors responsible for dune degradation. This was highlighted and confirmed by 28 percent of the respondents. The field investigations and the questionnaire survey revealed that this situation could have been avoided if proper design criteria were laid down by the authorities (the Urban Council and the Pradeshiya Sabha) and the conformity certificate system for building construction was properly implemented and enforced.

The field investigations revealed that the continuity of the sand dunes have been disrupted at several places in the study area. For example, the dune in front of Karagam Lewaya had been cut-down a couple of years ago to provide for a canal (aptly called “Moda Ela”) with the objective of controlling a major flood. In addition to the non-achievement of its objective this has caused a major gap in this dune which is an irreparable damage. The growth of dunes has been disturbed by other circumstances as well. A good example can be observed at Talgasmandiya area where the growth of backdunes has been disturbed due to the existence of salterns. In comparison with the back-dunes, the damage to the foredunes have been minimal.

According to the findings of the perception survey, the other main cause of sand dune degradation is as follows:

- unauthorised constructions (27% of the respondents confirmed this);
- trampling and related human activities, especially the ever increasing network of paths and tracks occur along and across the dunes (38%); and
- landing of fishing crafts and drying up of nests (7%).

Apart from the above factors, it was observed that sand dunes have got degraded due to dumping of solid waste and the removal of sand from the dunes for various purposes such as road construction and other non-commercial purposes such as funerals and other social events.

4.3 Solid Waste

Dumping of solid waste within the dune system is another critical issue, which prevails in the study area (Annex 1.4C & 1.4D). The urban waste generated from households, commercial establishments and market places are indiscriminately dumped closer to the dune system. Dumping of solid waste is a critical problem and has a great bearing on the maintenance as well as of the aesthetic quality of the dunes. This phenomenon can be seen at a number of places such as Murray Road, Karagam Lewaya and Ratupasgodella where large heaps of solid waste can be observed rotting and emanating unbearable odors. Beside the solid waste generated by the households, a considerable amount of waste in the form of plastic and other non-biodegradable materials are dumped usually by the travellers who use the beach front and the dune areas for recreational purposes.

Because of waste concentration in dune areas, a number of negative impacts could be envisaged. This includes the risk of health hazards, declining ground water quality and loss of bio-diversity in the dune areas.

4.4 New Developments

There are a number of project proposals put forward both by the government and private developers for Hambantota coastal zone some of which pose serious threats to the long term sustainability of the sand dunes. According to CCD sources, there are six major development projects to be sited within the coastal zone. These projects are as follows;

1. Development of a commercial Harbour at Mirijjawila
2. Wind power generation project along the coastal belt from Walawa river mouth to Yala sanctuary
3. LPG terminal and gas storage complex at Kuda Mirijjawila
4. Fisheries harbour project at Hambantota town
5. Oil refinery at Mirijjawila
6. Garnet extraction project for export purposes

Although the above project proposals are yet in their conceptual stages, it is important to identify the issues that could be envisaged since the government has given priority to the economic and social development of the Southern province. According to the conceptual designs provided by the project proponents, it is clearly indicated that all or some components of the projects involve the use of dune areas considered under this conservation plan. Hence, it is imperative that serious

attention be paid to the possible impacts that would surface in the process of implementation of these projects.

In view of the details provided in the initial project proposals, a number of environmental and social impacts in regard to sand dunes could be envisaged in the following areas:

1. Coastal and dune erosion due to construction of proposed maritime structures
2. Loss of dune stability and the reduction of the aesthetic value of the dune system
3. Disruption to surface drainage water system
4. Degradation of fauna and flora associated with the dune system
5. User conflicts over the utilisation of space
6. Displacement of human settlements that are located close to the dune system.
7. Threat of increased extraction of sand from the dunes to meet the increased demand for sand from the construction sectors

Taking into consideration the potential negative impacts on the dune system, it is important to formulate management strategies that will promote the conservation of the dune ecosystem and are still compatible with the development needs of the area. Thus, it is important that under this conservation plan attention is paid to the formulation of management strategies to ensure the physical and legal protection of the dunes, promote public education and awareness and adoption of new technical intervention in dune management.

4.5 Lack of public awareness and education

In terms of coastal resource management, public awareness and education is one of the prime concerns. Lack of public awareness and education is one of the major causes that has led to degradation coastal dunes in Hambantota. Human interventions such as construction of structures, encroachments, grading and the removal of vegetation and sand have contributed towards the degradation of sand dunes in the area. If a proper understanding on the natural functions of the dunes and their ecological and economic significance were prevalent among the public the damage that has been caused to the dunes perhaps would not be have occurred.

Apart from the general public, the government officials who handle the subject of coastal land, irrigation and housing construction must have an adequate awareness and an understanding of the environmental value of the dune system. In the event of inadequate concern and understanding, most of the government officials tend to treat sand dunes either as marginal land or a resource that has no economic value. This is clearly evident in the areas of land distribution, flood control activities and infrastructure development.

5 - INSTITUTIONAL SET-UP

5.1 Government Institutions

In terms of sand dune conservation and protection, there is no single agency with responsibility at the local level. It lies with the Coast Conservation Department since in accordance with the Coast Conservation Act, the powers and responsibility connected of dune management brought under the purview of Coast Conservation Department. However, the management boundaries are confined to 300 meters from the high watermark towards land area. Due to this limitation, the Coast Conservation Department has no authority to manage dunes that extend beyond the *Coastal Zone*⁵ for e.g. within the Bundala and Yala National Parks. The necessity of managing the coastal sand dunes as an important coastal ecosystem has been identified by the CCD through its CZMP (1990) and the Revised CZMP (1997). By doing this, required policies and guidelines have been introduced. According to the existing legislation of the Crown Land Ordinance, the Government Agent or the Divisional Secretary has some powers to control coastal land. Although there is no proper agency to take the responsibility of managing sand dunes, the existing institutional set-up could be used to formulate a collective effort. In this regard, the following agencies of local and national levels have stake as well as powers to intervene in the dune management process.

- Coast Conservation Department
- Urban Development Authority
- Divisional Secretariat
- Provincial Land Commissioner's Office
- Pradeshiya sabha
- Urban Council
- Forest Department
- District Fisheries Extension Office
- District Environmental Agency

5.2 Non-Governmental Organisations

Non-governmental organisations are not at present directly involved in dune management in the Hambantota district. There are several strong local and national level non-governmental organisations and community based organizations active in the study area, which could get involved in the dune management process. Some of the more important organizations are:

⁵ Coastal Zone defines as the area lying within a limit of three hundred meters landward of the Mean High Water Line and a limit of two kilometers seaward of the Mean Low Water Line.

- Women Development Foundation (WDF)
- Sarvodaya
- Social Mobilisers Foundation (SMF)
- Mihikatha Institute
- Sealeage (Semi-government)
- Agromot (Semi-government)
- District Chamber of Commerce
- Fisheries Co-operative Societies

The situational analysis demonstrated that the following activities should be undertaken to strengthen the planning process on a priority basis for the development of the management plan for Hambantota sand dunes:

- Setting up of community co-ordinating committee
- Initiate awareness and education program emphasising future management requirements
- Conduct of workshops to refine and prioritise the issues
- Discuss and reach an agreement on land use zoning strategy for dune areas and identification of further research needs.
- Development of guidelines together with stakeholders for housing construction in dune areas
- Development of a surveillance system and reporting mechanism to be established to prevent further removal of sand from the dune system with the assistance of non-governmental agencies and residents of the dune area
- Develop and adopt a strategic plan for dune restoration and management usually tailored to meet the specific site constraints. In adopting such an approach, it is important to view dune system, especially where future development can increase internal demand and pressures.

Under the SAM planning process initiated by the HICZMP the groundwork has been laid for a sustainable dune management process by the appointment of a Hambantota Sand Dune Management Co-ordinating Committee (HSDMCC) under the Chairmanship of the Divisional Secretary. The other members of this CC include the representatives from governmental and non-governmental organisations.

6 - OUTLINE OF MANAGEMENT PLAN

The basic information on environmental, social, economic and institutional aspects of the status report of Hambantota sand dunes provides the foundation for formulation of Conservation Plan for these dunes. The outline of the Conservation Plan and the planning / implementation framework for the process are given below.

Out Line of the Conservation Plan for Hambantota Sand Dunes

6.1 Contents

CHAPTER 1 INTRODUCTION

- 1.1 Introduction
- 1.2 Management Principles
- 1.3 Planing process, Goals and Objectives

CHAPTER 2 HAMBANTOTA SAND DUNES

- 2.1 General description of the conservation area
- 2.2 Physical setting
- 2.3 Demography
- 2.4 Land Use

CHAPTER 3 ENVIRONMENTAL, SOCIAL AND ECONOMIC SIGNIFICANCE OF SAND DUNES

- 3.1 Significance of sand dunes
 - 3.1.1 Environmental significance
 - 3.1.2 Economic significance
 - 3.1.3 Social significance
- 3.2 Ecological diversity

CHAPTER 4 KEY ISSUES FOR THE HAMBANTOTA DUNES

- 4.1 Dunes vulnerability and degradation
- 4.2 Dune Encroachment
- 4.3 Trampling and Unauthorised constructions
- 4.4 Dumping of Solid Waste

- 4.5 New developments
- 4.6 Lack of public awareness and education

CHAPTER 5 OBJECTIVES, POLICIES AND ACTION FOR CONSERVATION

CHAPTER 6 LEGAL AND INSTITUTIONAL SETUP FOR CONSERVATION

- 6.1 Legal framework
- 6.2 Institutional constraints
- 6.3 Management structure
- 6.4 Implementation schedule

ANNEXES

6.2 Executive Summary –Hambantota Dunes

Introduction

Hambantota sand dunes which, considered in this plan is a part of the longest dune system in the world located close to equator. The dune segment, starting at Godawaya ending at the sea water intake at Talgasmadiya is approximately 12.5 kilometers in length and covers an area of 210 hectares. The geographic area of the dune system comes under the purview of four GN Divisions vis. Sisilasagama, Mirijjawila, Hambantota West and Hambantota East. The composition of the dune segments varies with the existence of primary dunes, secondary dunes and tertiary dunes.

The Coast Zone Management Plan that came into operation in 1997, has recognized the importance of Hambantota dunes as one of the prime ecosystem for management. The plan recommended to adopt SAM process that is based on participatory approach. With the SAM process and planning in place, it is possible for the community and the other stakeholders to manage sand dunes effectively.

Environmental, Social and Economic significance of sand dunes

The sand dunes situated in the planning area play an important role in protecting people, property and other low lying coastal areas from storm damage and freak conditions occurring during the monsoon periods. It also provides excellent opportunities for recreational activities based on the aesthetic beauty in the area. In addition, the sand dunes serve as a wind barrier and prevent or minimize damages to agriculture and dwellings by strong winds.

Vesitation dunes on the in Hambantota served as a useful source of fuel wood for the resident of the area. It is also being used for fisheries related activities such as boat landing, dry fish processing and net mending. Dunes perform a significant economic function by supporting tourism and recreational activities in the area. Beside these functions, the dunes provide large quantities of sand for filling and other construction activities. The mineral resources such as garnet in these dunes, have the great potential for industrial development in the area.

In terms of social significance, dunes perform a number of functions, which are useful for day-to-day life of the residents in the area. Among these functions, providing space for social activities and dumping solid waste are important.

Ecological diversity

In terms of ecological diversity, a large variety of floral and faunal resources are found within the Hambantota dune areas. The primary dunes or fore dunes are covered with creeping vegetation such as *Spenifix littorus* (Maharawana) and *Ipomea asarifolia*. The center dune ridges are mostly covered with creeping vegetation and stunted bushes. The back dunes, which are more stable contains larger trees, and shrubs. The number of species as well as the intensity of occurrence increases progressively as they extend from the fore dunes towards the back dunes.

Besides variety of floral resources, a number of faunal resources are found within the dune areas. Although the low nutrient status of dune plant communities is not very but provides temporary and permanent habitats for animals birds and mammals.

Key management Issues

Among the number of issues prevailed in connection with the dunes in Hambantota, the following priority issues have been considered for management.

- Dune vulnerability and degradation
- Dune encroachment
- Unauthorized constructions and trampling

- Dumping of solid waste
- Impacts of new development

Based on the findings of the investigations and issue analysis, comprehensive objectives, policies, and actions have been formulated for management.

Management Objectives Policies and Actions

In considering the magnitude of the issues, availability of resources, stakeholder agreement and future potential for obtaining financial assistance more practical and viable management policies/actions are presented as far as possible in the plan. The institutional arrangements for implementation of management policies and actions are also identified in the plan.

However in view of the development priorities given for the Southern Province in the present political agenda, careful co-ordination among government agencies, non-governmental agencies and policy makers is an essential function. Thus, flexibility of modifying and introducing new management policies and actions to the plan in the future will enable to achieve the overall objectives of this plan.

6.3 Objective, policies and action for conservation

Issue 1: Dunes vulnerability and degradation

Objective 1: Ensure safety of the people and the property by protecting and maintaining the dune system as a natural barrier against erosion and coastal floods

Policy: Co-ordinate with, and assist local authorities, non-governmental organisations and coastal communities in protecting and maintaining sand dunes as a natural barrier against erosion and coastal floods

Action:

1. Restore the damaged portions of the sand dune by mobilising communities and adopting environmentally sound and financially viable methods
2. Declare the portions of the dune system located in front of low-lying areas as critical zone
3. Establish a dune protection fund with external and internal assistance
4. Prohibit removal and extraction of sand from the beaches and dunes
5. Enforce legal action against violators

Objective 2 Conserve biological diversity of the dunes to enhance the environmental quality of the coastal zone

Policy: Prevent human activities which lead to reduced biological diversity of the dune system

Action:

- 1 Prohibit removal and destruction of plants, trees and any other type of vegetation and animal species from the dune system
- 2 Promote and launch a programme directed towards replacing casurina plantation with native dune vegetation for selected areas
- 3 Stop further expansion of casurina plantation within the dune system
- 4 Initiate research on planting indigenous species as undergrowth vegetation in casurina planted areas

Objective 3 Ensure sustainable dune management by establishing participatory management network among land owners who occupy land adjacent to dune system

Policy: Encourage and recognise sharing of management responsibility between land owners who occupy dune lands and government institution

Action:

1. Formulate dune management group among dune dwellers
2. Develop guidelines to maintain dune areas to prevent further degradation
3. Provide suitable plants to replant dune areas

Issue 2: Dumping of Solid Waste

Objective: Minimise coastal pollution within the limits of dune system and related environment

Policy: Prevent dumping of solid waste and any types of dredge material within the dune system

Action:

1. Relocate existing dumping sites located at Murray road and in front of Karagam Levaya

2. Assist local authority to establish new dumping site in a suitable location
3. Relocate the slaughterhouse located on the beach front near Murry road
4. Launch dune-cleaning campaign with the participation of all stakeholders
5. Display sign-boards indicating importance of keeping dune system as a clean environment

Issue 3: Encroachment

Objective: Curtail all types of encroachments in dune conservation areas

Policy: Prohibit encroachments towards sand dune areas beyond Dune Protection Line (DPL) established by the Coast Conservation Department.

Action:

1. Establish Dune Protection Line (DPL) based on a land survey and considering the setback standards stipulated in the Revised Coastal Zone Management Plan of 1997 to minimise further encroachments
2. Educate the public regarding importance of maintaining dune protection line
3. Exclude the dune/land areas from the DPL towards HWM when allocating crown land for development projects and dwelling purposes
4. Prohibit further expansion of structures which are already located within the DPL

Issue 4: Lack of public awareness and education

Objective: Enhance public awareness and education on social, economic and environmental significance of the Sand dunes in conservation area

Policy: Promote education and awareness among all stakeholders on conservation of sand dunes in the conservation area

Action:

1. Formulate dune protection societies in the following schools with a view to educate and enhance interest on conservation of sand dunes in the conservation area
 - Mirijjawila M.V

- St. Mary's College
 - Sahira College
2. Establish demonstration dune vegetation nursery plots with the assistance of Dune Protection Societies
 3. Establish sand dune information centre at Rajapaksa Foundation
 4. Prepare and distribute printed materials on environmental significance of sand dunes

Issue 5: New developments

Objective: Minimize environmental impacts of new development on sand dune systems located in the conservation area

Policy:

1. Direct new developments compatible with the overall objectives of the management of sand dunes within the conservation area
2. Discourage siting of non water dependent activities within the dune area

Action:

1. Formulate siting criteria for new development closer to the dune system
2. Prohibit exploration/extraction of commercially valuable mineral sand from critical segments of the sand dunes
3. Requires Environmental Impact Assessment mandatory for siting of new development in the dune areas and extraction of mineral sand from the dune systems
4. Enhance co-ordination and make aware the officials of the project approving agencies such as BOI, BII, CTB, CCD,
5. Cease allocation of crown land located between the main road and the sea for non water dependent development projects within the dune areas

Issue 6: Trampling and Unauthorised constructions

Objective: Minimize negative impacts due to unauthorized construction and trampling in dune areas

Policy:

1. Prohibit all types of constructions beyond the DPL towards HWM other than the coast protection structures
2. Promote and provide adequate access to the beach at suitable locations through the dunes by means of elevated dune walkover structures.

Action:

1. CCD and Local Authority should not allow construction of structures beyond DPL towards HWM
2. Develop guide lines for water dependent activities which are envisaged to be sited within the dune areas
3. Enforce legal action against violators
4. Implement community monitoring system to curtail unauthorised construction activities within the dune systems
5. Construct elevated dune walkovers to provide access to the beach on pilot basis
6. Restore the dune areas already damage/degraded due to trampling using indigenous vegetation

7 – CONCLUSIONS

In view of the data and information presented in this report and analysis carried out on environmental social and economic aspects pertaining to sand dunes in Hambantota coastal area, the following can be concluded

Physical setting

The sand dune in Hambantota area is a part of the largest sand dune located close to the equator. The sand dunes in the study area cover an area of 210 hectares and falls within five GN divisions. The height of the dunes varies between 1- 20meters. In terms of types of dune, primary dunes, middle ridges and back dunes can be seen in this area.

Demography

According to current information, the total population in the study area covering five GN divisions is about 15, 537. The population growth rate in Hambantota district is higher than the country's average growth rate. Thus it can be expected that an increased population pressures may have a regarding effect on the sand dune ecosystems and resources in the future

Environmental, Social and Economic significance

Coastal dunes in the Hambantota area play an important role in protecting beaches and adjacent land from coastal erosion. The lower rate of erosion incidence reported in the area, confirms the environmental value of the dunes in protecting life and property. Since most of the interior land adjacent to dunes is located below sea level, the natural function of the dune is important. The dunes in the study area serves as a place for collecting fuel wood for the dune dwellers, provides space for fisheries, tourism and recreational related activities. It is also important as source of commercially valuable mineral sand.

In social point of view, dunes and related ecosystems provides a number of services and opportunities. The residents and the institutions in the vicinity use the dune area as a dumping site for waste, burial grounds and grazing place for animals.

Ecological diversity

The faunal and floral diversity of Hambantota sand dunes is rich in general. Most of the fore dunes, which are exposed to the full force of the wind are mainly covered with creeping vegetation such as *Spenefix littorus* (Maharawana) and *Ipomea asarifolia* (bintamburu). The center ridges of the dunes mainly comprise with creeping vegetation and stunted bushes. The back dunes, which are more stable are covered with larger trees and bushes.

Although the low nutrient status of the dune plant communities the dunes provide permanent or temporary habitat for a wide variety of animals birds and small mammals.

Key management Issues

Dune vulnerability and degradation

The rapid environmental degradation of the sand dunes is one of the key management issues in the study area. The findings of the vulnerability assessment carried out during the study period show that some segments of the dune system have been damage mainly due to human interventions. The dune system have been degraded as a result of human activities such as clearing of vegetation, removal of sand, grading, construction of dwellings, agriculture and flood control measures. Hence the vulnerability level has increased in some segments of the dune, especially in Mirijjawila, Ratupasgodella, Karagam lewaya, Murry road and Talgas mandiya area posing a threat to life and properties of coastal residents.

Dune encroachment

Field investigations reveal that a large part of the dune system, especially back dunes at Mirijjawila, Ratupasgodella, Karagan Lewaya, Murray Road and Talgasmandiya, are severely damaged or disturbed due to encroachments. The major reasons for such encroachments are mainly due to leasing of land in sand dune areas, unauthorized constructions, removal of sand, the nature of land ownership.

Unauthorised constructions and Trampling

Unauthorised constructions, trampling and the network of footpaths located in the dune area have been identified as another factors influencing the degradation of dunes in Hambantota.

In the absence of a proper dune protection line, this has emerged as a critical issue especially in locations such as Mirijjawila, Ratupasgodella, Murray road and Galwala areas.

Dumping of Solid Waste

Dumping of solid waste within the dune system is another critical issue which, prevails in the study area. The urban waste generated from households, commercial establishments and market places are indiscriminately dumped close to the dune system. Dumping of solid waste is a critical problem and has a great bearing on the maintenance or otherwise of the aesthetic quality of the dunes. This phenomenon can be seen at a number of places such as Murray Road, Karagam Lewaya and Ratupasgodella where large heaps of solid waste could be observed rotting and emanating unbearable odors.

New Developments

The new development projects such as construction of a commercial harbour, wind power generation project, LPG terminal and storage, Garnet sand extraction project and fishery harbour development and proposed to be located in the vicinity of the dune areas pose serious threats to the long term sustainability of the sand dunes.

Management Strategy

In view of the magnitude and the severity of the current issues prevailed in sand dunes areas in Hambantota, a participatory approach in association with all stakeholders is a must. Necessary policies guidelines and development intervention should be developed for future management.

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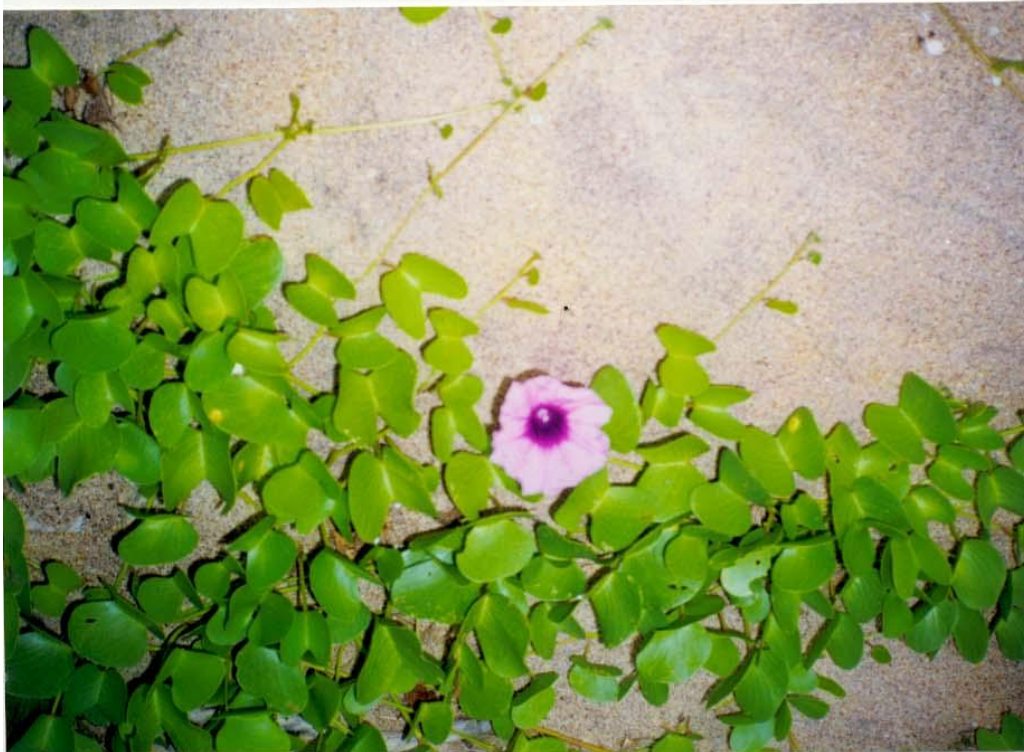
ANNEX 1. PHOTOGRAPHS



1.2A & 1.2B Focused group discussions with key stakeholders



1.2C & 1.2D Transect survey on ecological diversity



1.3A & 1.3B Typical creeping vegetation (*Spenifix littorus* and *Ipomea asarifolia*) on fore dunes



1.3C & 1.3D Scrub vegetation on dune ridges. Takkada (*Scaevola frutescens*) and Pathok (*Opuntia dillenii*)



1.3E & 1.3F Scrub vegetation on dune ridges. Malitta (*Salvadora persica*) and Kohomba (*Azadirachta indica*)

1.5A



1.4

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1.5A & 1.5B Dumping of solid waste on sand dunes