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PART I : SECTION (I) — GENERAL

Government Notifications

SRI LANKA COASTAL ZONE AND COASTAL RESOURCE MANAGEMENT PLAN - 2018

Prepared under Section 12(1) of the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981

THE Public are hereby informed that the Sri Lanka Coastal Zone and Coastal Resource Management Plan - 2018 was approved by the cabinet of Ministers on 25th April 2018 and the Plan is implemented with effect from the date of *Gazette* Notification.

MAITHRIPALA SIRISENA,
Minister of Mahaweli Development and Environment.

Ministry of Mahaweli Development and Environment,
No. 500, T. B. Jayah Mawatha,
Colombo 10,
23rd May, 2018.

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CHAPTER 1

1. INTRODUCTION

1.1 THE SCOPE FOR COASTAL ZONE AND COASTAL RESOURCE MANAGEMENT

1.1.1. Context and Setting

With the increase of population and accelerated economic activities in the coastal region, the requirement of integrated management focused on conserving, developing and sustainable utilization of Sri Lanka's dynamic and resources rich coastal region has long been recognized. A formal management framework was first adopted by the Coast Conservation and Coastal Resource Management Department through the first generation "Coastal Zone Management Plan" formulated and implemented in 1990 as mandated by Coast Conservation and Coastal Resource Management Act No.57 of 1981. Subsequently, the CZMP has been revised and updated respectively in 1997 and 2004. The Coastal Zone and Coastal Resource Management Plan of 2018 is designed to ensure sustainable use of the coastal environment and its resources in the long term, consistent with the national development goals.

The reviews and evaluations conducted by the Coast Conservation and Coastal Resources Management Department with respect to the impacts and outcomes of the policy objectives, strategies and actions, framed on the identified issues of the past CZMP's revealed some drawbacks in achieving desired targets. This was mainly due to a number of factors including, inadequacy of the legally defined "Coastal Zone", and the absence of legal provisions for proper planning, implementation and institutionalization of the Special Management Areas, inability to address issues beyond the legally defined coastal zone and lack of legal authority to protect conservation areas and public access.

In addition, the impacts and outcomes of the management strategies introduced on integrating coastal fisheries and aquaculture and the management of sites of special significance has not produced desired results due to lack of agency cooperation, questions of authority and responsibility. Apart from these inadequacies, the conflict situation that prevailed in the northern and the eastern region constrained the management of the entirety of the coastal resources in the country.

1.1.2 Major Deviation from 2004 CZMP

In conformity with the legal provisions of the Coast Conservation and Coastal Resource Management Amendment Act No.49 of 2011, the Coastal Zone and Coastal Resource Management Plan - 2018 has been prepared by the Coast Conservation and Coastal Resources Management Department. In considering the practicality, and the capacity of the CCCRMD, the 2018 Plan focused only on five major areas viz. Shoreline Management, Coastal Pollution Control, Management of Coastal Habitats, Special Management Areas and Regulatory Mechanism. The Department has excluded two issues that are addressed through the 2004 CZMP. These issues include management of sites of special significance and public access and the issue of management of coastal fisheries and aquaculture. This deviation was mainly due to outcomes experienced by the Department during the implementation phase and the question of authority and responsibility. However, the regulatory mechanisms for the management of these issues have been emphasized in Chapter 6 – Regulatory Mechanisms.

1.1.3 Post Conflict Opportunities and Development Trends in the Coastal Region

The conflict situation that prevailed for more than 30 years in the northern and the eastern coastal region has disrupted proper management of the coastal resources in those regions. It is also found that the socio-economic status of the coastal communities in the country has been degraded rapidly due to the conflict situation. However with the eradication of terrorism in the country in 2009, ample opportunities have been opened for economic development based on the resources of the coastal region. Accordingly, the government is accorded high priority to developing some of the major economic hubs viz. the Maritime hub, the Tourism hub and the Energy hub within the coastal region. The rapid development of tourism industry in the coastal region has clearly shown the need for balancing conservation requirements with the development need. Similarly development of commercial ports such as Hambantota provides an example of planned development in the coastal region. The policy objectives, management strategies, development guidelines and standards introduced through this plan will further improve the status and quality of the coastal environment whilst accommodating development needs.

1.2 THE CHARACTERISTICS OF THE COASTAL ZONE

1.2.1 The Bio- physical Characteristic

The coastal environment of Sri Lanka is influenced by its location in the northern part of the Indian Ocean, between 5° 54’ and 9° 52’ North Latitude and 79° 39’ and 81° 53’ East Longitude.The coastal area is positioned in the lowest of the three peneplains forming the island, and generally consists of flat coastal plains averaging an elevation of less than 100 ft (30 m) (CZMP 2004). The lowest peneplain containing the coastal plains extends outward from the island and under the sea as the continental shelf for a width of 5-25 miles (about 8-40 km) in most parts, and at an average depth of 216 ft (about 65 m) below sea level. The continental shelf is narrow around the southern part of the island,but widens considerably towards the north where it merges with the shelf around India.Sri Lanka has a coastline of approximately 1,620 km including the shoreline of bays and inlets, but excluding lagoons.

The transverse type coastline in the southwest and northeast is characterized by a series of pictures que sandy bays protected on either side by rocky headlands; the southwesternn coastline also has many complex systems of lakes and lagoons with sinuous shapes (CZMP2004). The bay of Trincomalee on the northeastern coast described as “the most perfect natural harbour of the Indian ocean is of particular significance. The northwestern and southeastern coastlines exhibit lagoons, sandbars, banks and spits that sometimes extend over many kilometres. The presence around the island of the continental shelf with shallow waters has permitted the formation of coral reefs along the coastline amidst well-developed reefs of sandstone and rock. Large deposits of coral are also found inland in the coastal region, particularly between Ambalangoda and Matara, chief among which are the Akurala deposits. Some segments along the southwest coastline are retreating due to natural erosive action of the sea compounded by anthropogenic activities such as river sand mining and destruction of the protective coral reefs. In contrast, some areas of the northwestern and southeastern coastlines are advancing due to accretion.

The coastal landscape contains a very dynamic transition zone between the sea, land and atmosphere, and is formed as a result of sea and atmospheric forces on the landmass and the supply of sediments to the coast. Sri Lanka has 103 rivers, most of which radiate from the hill country and flow down to the seaforming estuaries that are important features of the coastal landscape and provide vital habitats for species of commercial and subsistence use. These rivers transport large amounts of sand, silt and clay essential for beach nourishment; but they are also carriers of pollutants that degrade the quality of coastal waters and habitats. Throughout

its length, the Coastal Zone contains a variety of terrestrial habitats that include sandy beaches, barrier beaches, sand spits and dunes, rocky shores, mangroves and salt marshes. Equally important are the coral reefs, lagoons, estuaries, and sea grass beds in the coastal waters. These systems help maintain vital physical processes, fulfill eco system services and functions and provide land, goods and services (CZMP 2004).

1.2.2 The Impact of the 2004 Tsunami

The Asian tsunami that struck on 26th December 2004 was probably the worst natural disaster in the Sri Lankan history, because of the numbers of people affected, its extent and complexity. As a result of massive destruction, major part of the coastal zone and its bio-physical resource have been lost or damaged. The Tsunami left more than 38,000 people dead and another 7,100 missing. According to the Government figures around one million people are affected (5 percent of the total population), i.e. they lost family members, were injured, lost their belongings, and/or have assets, land and/or houses that are partially or completely damaged. Besides other impacts, drinking water sources have been severely damaged due to the tsunami in the coastal region. A rough estimate revealed that at least 12,000 wells were damaged mainly by salt water intrusion and approximately 50,000 were abandoned. There has been a major loss of water resources surrounding the affected coastal areas. In many cases the domestic water supply (wells) have been contaminated by salt water, dead bodies and pollutants from the disruption of chemical containers or other infrastructure.(MIND 2004). In terms of impacts on coastal resources, much has been reported on damage to the coral reefs, but spatially varied. Corals were damaged at all sites of Tangalle, Kudawella, Kapparatota/Weligama, Polhena, Unwatuna and Hikkaduwa. Besides coral reefs, mangroves have been notably damaged due to the tsunami in areas such as Tangalle, Panama, Vaharai, Sallaitivu and Akkaraipattu.

1.3 THE ROLE OF THE CC&CRMD IN COASTAL ZONE AND COASTAL RESOURCES MANAGEMENT

From the inception of the coastal zone management programme, the Coast Conservation and Coastal Resources Management Department, an attempt has been made to balance the conservation objectives with development needs of the country. The role of the CC&CRMD was somewhat different from traditional notion of conservation performed by other government agencies responsible for conservation of the environment. In considering the dynamic nature of the coastal zone, multiplicity of coastal ecosystem services and functions, and benefits derived from the coastal environment, specific attention was placed on planned management not confined to written policy objectives but with wider stakeholder consultation. In the process of coastal resources management, particular concern is focussed on ensuring provision of basic needs for coastal communities without impediments from competing uses and improving the quality of life.

The planning decisions of the CC&CRMD always pay careful attention on the social cost of the command and control instrument used in coastal resource management and the un-recognized value of the services of the coastal ecosystems. Further more, a bottom up collaborative approach is being promoted and adopted in resources management, where possible.

CC&CRMD aims to accomplish Mission

"The sustainable development of coastal resources and the management of coastal processes to optimize social, economic and environmental status of Sri Lanka

Desired Objectives
To fulfill the Mission, the four objectives that drive the CC & CRMD are:

- To improve status of the coastal environment.
- To develop and manage the coastline.
- To improve the living standards of coastal communities and resource users.
- To promote and facilitate economic development based upon coastal resources.

Results to be Envisaged

- Quality of coastal lands and waters improved.
- Conservation and sustainable use of biodiversity ensured.
- Optimal economic potential of coastal lands realized.
- Development of the Coastal Zone regulated.
- New economic opportunities created.
- Quality of life of coastal communities improved.
- Facilities for recreational use provided.
- Scientific/scenic/historical/archaeological and cultural sites conserved.

1.3.1 Key Achievements

The outstanding achievements of the CC&CRMD during the past three decades are given below:

- Mitigating impacts of coastal erosion up to a substantial level.
- Considerably reducing beach sand mining.
- Complete halt of coral mining
- Ensuring application of environmental impact assessment (EIA/IEA) process for coastal development.
- Ensuring permit compliance.
- Establishing coastal access.
- Enhancing awareness of coastal issues, including curriculum development for schools.
- Enhance community awareness and education on coastal resource management
- Promoting community participation in coastal resource management.
- Introducing Special Management Areas as an effective supplementary ICM tool
- Introducing legal framework for collaborative coastal resource management.

1.3.2 External Technical Assistance

The CC&CRMD has been successful in receiving external technical assistance in the past to counter or mitigate the consequences of coastal issues that threaten the long-term stability of the Coastal Zone. Chief among these are the Coastal Erosion Management Programme consisting of two DANIDA funded projects (1987-1989 and 1990 -1992), NORAD funded HICZMP (1999-2001), GEF funded Rekawa Ussangoda Kalametiya Bio diversity Conservation Programme (1994-1998) the USAID funded Coastal Resources Management Programme - Phases I and II (1985 – 1991, 1991-1997), the CCD/GTZ funded Coast Conservation Project (1988-1996), ADB-GoN funded Coastal Resourcse Management Project (2001-2007) and GEF/IFAD funded Participatory Coastal Zone Restoration and Sustainable Management Project of the Eastern Province (2009-2016).

1.4 THE COASTAL ZONE AND COASTAL RESOURCES MANAGEMENT PLAN - 2018

1.4.1 New Legal Provisions through 2011 CC Act Amendments

Since 1983 Oct.1st the Coast Conservation and Coastal Resource Management Act, No.57 of 1981came into operation and the coastal zone, its resources and the development activities taking place within the coastal zone were primarily managed, based on the provisions of the above Act. During the course of planning and implementation of management, it was realized that, the vacuum of the provisions of the principle Act has created negative impacts on the planning and management outputs and outcomes. Accordingly, amendment to the principle act was made in 1988 through Coast Conservation Amendment Act, No.64. The 1988 amendments were mainly directed on enhancing regulatory powers on coral and sand mining activities, right of public access to the beaches and demolition of limekilns located within the coastal zone.

With the expansion of scope of the coastal resource management over time and the increase of coastal issues due to both anthropogenic and natural phenomena, the requirement of new legal provisions have been long felt. The need for introducing new legal provisions surfaced in the areas of institutionalizing Special Management Area Process, legitimacy for community participation in collaborative management, expansion of legally defined coastal zone, managing human activities outside the coastal zone that have a direct impact on the coastal zone, managing public access and managing open spaces and access.
In view of the above, the government introduced second amendment to the principle act through Coast Conservation Amendment Act, No. 49 of 2011. The concerned areas of the amendments are;

- Redefining the “coastal zone” incorporating riparian land of the water bodies that connected to the sea within the coastal zone.
- Preparation of a “Coastal Zone and Coastal Resources Management Plan”.
- Provisions for declaration of affected areas within or beyond the coastal zone.
- Provision for declaration of beach parks and conservation areas.
- Provision for designation and institutionalization of Special Management Areas
- Provision for formulating a coastal access plan.

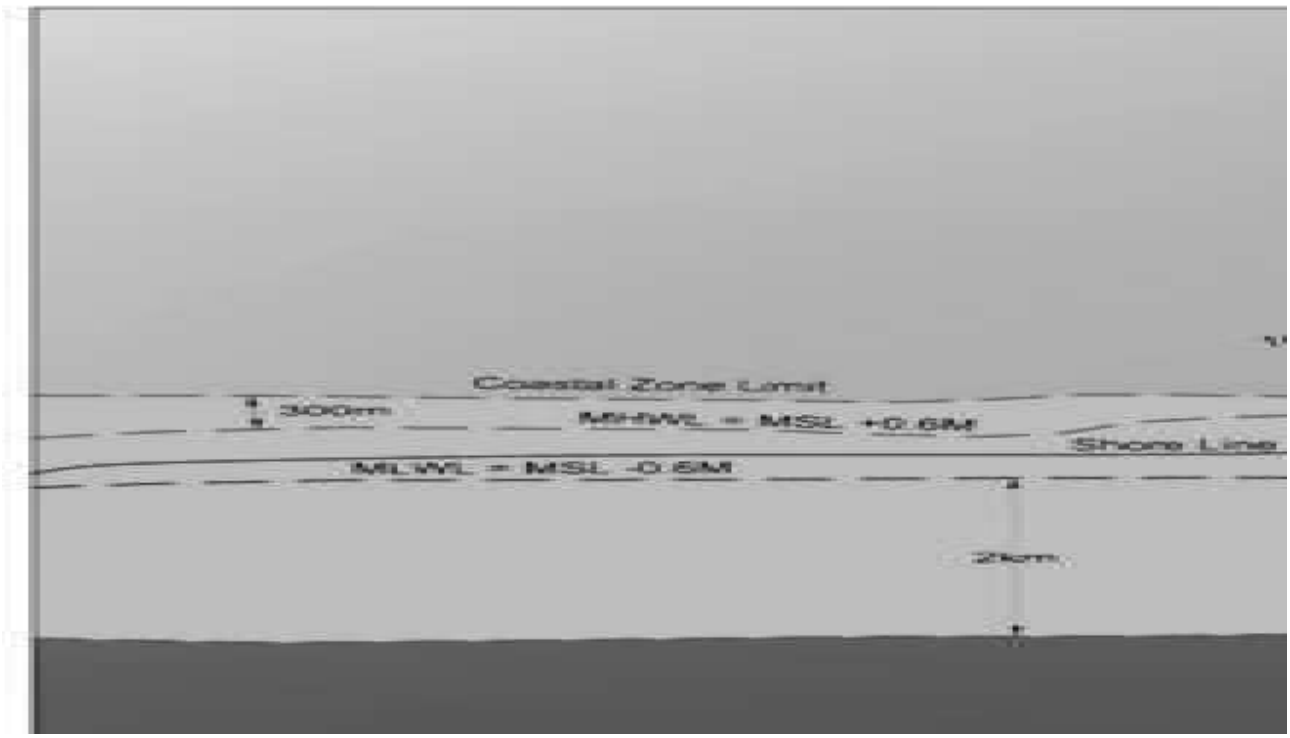

Figure 1.1 :"COASTAL ZONE" THE NEW DEFINITION (ILLUSTRATED)
(As per the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981 as amended by the Act, No. 49 of 2011)

1.4.2 The Preparatory Process

The "Coastal Zone and Coastal Resources Management Plan -2018" has been formulated in conformity with the legal provisions of the Coast Conservation and Coastal Resources Management Act, No. 57 of 1981, amended by Coast Conservation (Amendment)Act, No.64 of 1988 and Act, No. 49 of 2011. The CZCRMP - 2018 was prepared through a participatory process and extensive field investigations and studies to ensure the reliability of information and adequate level of issue identification and analysis. Each chapter was compiled by a Technical Working Group comprised of professionals, CC&CRMD officials and other relevant government officials. To fulfill the information requirement, primary and secondary information on each issue was compiled through five studies. The chapters were reviewed through participatory workshops and public and other agency agreement was obtained through consultative process prior to finalization covering all coastal districts.

1.4.3 Structure and the Content of the Plan

The Coastal Zone and Coastal Resource Management Plan (CZCRMP) is separated into six Chapters. Chapters 2-6 are issue related and deal with keyproblems being addressed through integrated coastal zone and coastal resources management. The chapters on Shoreline Management (Chapter 2), Conserving Coastal Habitats (Chapter 3), Controlling Coastal Water Pollution(Chapter 4), Special Management Area (Chapter 5), and Regulatory Mechanism (Chapter 6) are formulated with primary and secondary information gathered through studies, previous CZM Plan(1990, 1997, 2004), and other secondary sources.Each issue

related chapter provides an insight into the status of the coastal resource or problem needing management interventions (as relevant); the issues to be addressed; and the existing plans, policies,programmes, laws, institutional mechanisms and enforcement regimes that influence management interventions. Each of the issue related chapters contains management objectives, related policies and proposed actions for management. Each objective has been drafted in this Plan as a desired state, and corresponds to a key coastal problem requiring management interventions. The policies indicate the broadcourses of action that will be supported and adopted to realize each objective. The strategies target keyissues and suggest the different interventions or plans of action that can help achieve a particular objective. The proposed actions identify the specific steps required to pursue a particular strategy.

CHAPTER 2

2. SHORELINE MANAGEMENT

2.1 INTRODUCTION

The problem of coastal erosion could be identified as the major triggering factor leading to the initiation of the Coastal Zone Management Programme of Sri Lanka. The development of the programme can be mainly categorized into three distinct periods in terms of its magnitude, related causes, public perceptions, management measures adopted and policy responses. In the early stage, the problem of coastal erosion was experienced mainly from the southern part of the island and was viewed as a natural phenomenon and handled on an ad-hoc basis. There was no single responsible agency vested with the responsibility for coast protection, and a number of government agencies such as Public Works Department (PWD), Colombo Port Commission and Ceylon Government Railway (CGR) carried out coast protection work mainly focused on a "Hold the Line Approach" that was confined to construction of hard structures such as revetments, seawalls and groynes. However, the problem of erosion aggravated and began to be perceived as a major environmental and socio-economic issue overtime. By the 1970's, the perception changed as significant cumulative impact in the form of loss of coastal land and properties, infrastructure such as roads and railway lines and damage to coastal habitats became obvious. At this stage, coastal erosion problem came to be viewed as a significant socio-economic and environmental issue, and developed into a public demand for proper management. The required institutional mechanism was setup with the formation of Coast Conservation Division in 1978 under the Ministry of Fisheries and Aquatic Resources. Thereafter a management programme was initiated at a moderate level. During this period, institutional capacities were also enhanced by formulating a legal framework parallel to the engineering work being implemented. The third distinct period of the programme development could be identified with the formulation of Master Plan for Coastal Erosion Management in 1986 and its subsequent implementation, under the DANIDA Stage 1 and DANIDA Stage 2 projects from 1987, and the ADB funded CRMP from 2001-2007. At this phase, planned coast protection was carried out based on the best available engineering information, simultaneously with the implementation of other management options such as controlling sand and coral mining, conserving coastal habitats, curtailing haphazard development and enhancing public awareness and education.

The above management approach that the Coast Conservation and Coastal Resources Management Department adopted in controlling coastal erosion was able to produce positive outcomes. The overall socio-economic and environmental benefits gained from the management measures exceeded the cost incurred. These benefits are reflected in the areas of protection of land and properties, infrastructure, tourist establishments, fisheries infrastructure as well as in the livelihoods and employment generated in the coastal region.

2.1.1 Nature of the Problem

Coastal erosion is a significant and continuing problem in varying degree in Sri Lanka, which results in socio-economic and environmental repercussions. Erosion occurs due to both natural causes and anthropogenic interventions and entails public and private cost. These include the loss of beaches, disruption of recreational and tourism activities, damage to public and private properties and infrastructure. It also includes a substantial annual expenditure on coast protection, emergency and disaster relief work. According to current information, a sum of SL Rs. 1520 million has been spent on coastal erosion management during the period 1985 – 1999, SL Rs. 3 billion spent during 2001- 2007 under the ADB funded Coastal Resources Management Project. In addition a further amount of US$ 1.4 Million was spent on coastal rehabilitation under the Tsunami Affected Area Rehabilitation Programme(TAARP). Beside this, a total of two billion rupees was spent on sand replenishment and other major coast protection in southern, western and north western coastal stretches to date. However, the incidence of coastal erosion reported from the northern and the eastern coastal segments of the country during the last three decades was insignificant. Similarly the investment incurred on coast protection was also at minimum level in respect of the northern and the eastern coastal segments.

Reduction in supply of sand to the beaches is identified as one of the crucial factors underlying the coastal erosion problem. Long shore currents created by the wind and swell waves, mainly transported sand from one location to other location along coast. It is a continuous process and erosion is not significant if the coast comprises of beaches with sufficient continuous supply of sand. If sufficient sand supply is not available in the beaches to accommodate the longshore transport processor if the beach is blocked by coastal structures, then the coastal erosion is inevitable in the adjacent beach.

As per the current information available with CC & CRMD, a high rate of coastal erosion has been reported from the coastal segment lying north of Lansigama during the last five years (2007-2012), similar to the higher erosion rates reported during 2000- 2005 in Mahaoya- Lansigama coastal segment. Similarly, a significant coastal erosion (localized) rate has been reported from the coastal stretch lying north of Oluvil Harbour in 2010. The emergency coastal erosion incidence reported from 2010-2013 is given in Table 2.1.

In terms of coastal accretion, the reported rates are lower than the coastal erosion rate and only occur in a few locations. As indicated in Table 2.1, the emergency coastal erosion incidence reported during the period of 2010 -2013 demonstrates that despite the management strategies adopted through structural and non-structural solutions, coastal erosion is a continuing problem in the country.

Table 2.1 Reported location of Emergency Coastal Erosion 2010 -2013

Coastal District	Location Description/Remarks
Puttalam	Kudawa-Kandakuliya Muthupanthiya –NagulEliya Arachchikattuwa Illanthidiya-Norachchola Beach Thalwila-Ambakandawila Beach, Marawila Beach Modara - Barudalpola Beach Kappaladiya
Gampaha	Maha Oya Uswetakeiyawa Wattala Hendala Paranaambalama Dungalpitiya

Coastal District	Location Description/Remarks
Colombo	Wedikanda –Ratmalana Dehiwala –Mt. Lavinia
Kalutara	Magalkanda Beach Beruwala – Maggona Pothupitiya Beruwala - Maradana Beruwala - Kechchimale
Galle	Ahangama Unawatuna Palutagaha Goyambokka Beach Gintota Ahangama Induruwa Boossa Dodanduwa
Matara	Kotuwegoda
Hambantota	Welipatanwila Pallikudawa Yarawatta Tangalle Unakuruwa
Ampara	Oluvil Kalmunai
Trincomalee	Verugal Murugan kovil- Kuchchaveli Near Salli- MuthuAmman kovil Kinniya Muthur
Mannar	Arippu

(**Source:** Shoreline Status report 2014)

Cross shore transport by waves in rough sea period brings sediment to the shore. Usually most of the sediment is retained nearshore and provided back to the beach by waves during the calm season. As such beach erosion in rough period and accretion during calm season is seasonal and could be considered as natural behaviour of the beach.

Due to the fact that only a limited area is available to accommodate natural behaviour of the coast, hard coastal structures are the instant or cheapest solution to cope with the erosion and to protect coastal lands and properties. In some instances,such coastal structures may also create erosion in the adjacent beach after a period.

2.1.2 Past Management Activities and its effectiveness

Early Initiatives

The early interventions carried out prior to 1970's in controlling coastal erosion could be identified as temporary solutions due to their adhoc nature. The linkages between anthropogenic activities, especially

the resources extraction practices and consequent coastal erosion has not been recognized. At this stage, the engineering solutions mainly focused on a "hold the line" principle. This was due to the loss of flexibility in the coastline associated with urbanization of the particular coastal stretch. In this process, the totality and the dynamic nature of the coastal segment as well as human activities taking place have not been taken into consideration. In the absence of planned infrastructure development in the coastal zone, the erosion incidence occurring during the monsoon period has created negative impacts on those infrastructure facilities disrupting social and economic well being of the coastal communities. Thus, the overall effectiveness of early coast protection interventions could be categorized as being at a lower level, while indirect impacts were kept to a moderate level.

Initiatives carried out in early 1980's

The schemes of planned coast protection were commenced with the inception of Coast Conservation Unit under the Ministry of Fisheries and Aquatic Resources in 1978. Subsequently it was upgraded to the status of a Government Department in January 1984 in recognition of the magnitude of the task it is mandated to perform. The planned coast protection measures adopted in this period were mainly restricted to the construction of revetments, groins, and gabion walls. In addition, other management measures were implemented to control resources extraction practices such as coral and sand mining in the coastal zone. The effectiveness of such planned coast protection measures were higher than the coast protection measures carried out prior to 1970's. However, as a result of hard solution adopted to curb coastal erosion, beach scene operations and some of the recreational activities as well as vertical and lateral public access along the beaches have been disrupted.

Initiatives under MPCEM

The overall approach adopted in coastal erosion management was turned into a proper path with the formulation of Master Plan for Coastal Erosion (MPCEM) which advocated long term optimal measures in August 1986 under the technical assistance provided by DANIDA. As a result of comprehensive technical, environmental, economic and social analysis carried out by a dedicated team of specialist both from Coast Conservation and Coastal Resource Management Department and the Danish Hydraulic Institute. The problem of erosion in Sri Lanka was defined within the constraints of limited information and the Master Plan recommended the best possible technical approach towards mitigation and also defined the capital investment required for such actions. Since 1986, the coastal erosion management measures have been implemented through DANIDA Stage 1(1987-1989), DANIDA Stage 2 (1990-1992) GTZ - German Technical Cooperation ((1988-1996), ADB and GOSL funded CRMP (2000-2007), mainly based on MPCEM. The coast protection measures under the MPCEM was spatially formulated and categorized based on coastal segments with key areas and singular cases comprising structural solutions such as offshore breakwaters with sand nourishment, revetments and groins. In addition, other management solutions such as application of setback standards for coastal development, enforcement of regulatory measures to minimize sand and coral mining and enhancement of public education and awareness were also implemented. The effectiveness and outcome of planned coast protection carried out under the MPCEM has demonstrated a higher level of success with moderate indirect impacts.

It is also evident that substantial amount of social, environmental and economic benefits were derived from these measures although it has not been quantified as yet. The benefits gained from the past coast protection measures are mainly perceptible in the areas of protecting highways and railway lines, public and private dwellings, fisheries infrastructure facilities tourism and recreational facilities. In addition, the need for private investment on coast protection has been drastically reduced after implementation of MPCEM.

2.2 ISSUES, THREATS AND CHALLENGES

2.2.1 Natural processes and events contributing to coastal erosion

Many segments of the Sri Lanka's coastline are subject to continuing retreat and accretion; some changes occurred seasonally while others are more permanent. The natural processes contributing to coastal erosion are as follows;

- Natural variations in the sand supply to the coast from some rivers.
- Loss of sand inland due to breaching and wash-over of a sand berm
- Offshore sand loss during extreme wave and storm surge conditions
- Loss of sand due to presence of canyons
- Deposition of sand at sand spits and dunes
- Loss of coastal vegetation
- Tsunami, cyclones and other episodic events
- Loss of material from "nodal areas"
- Sea level rise

Among the other factors, the most important factor contributing to coastal erosion in Sri Lanka is the imbalance of the littoral sediment budget. The littoral transport results mainly from the action of monsoon generated short crested wind waves and long crested swell waves on the near shore sediment. Thus coastal erosion through the actions of waves, currents and winds results in the loss of sediment in some places. There is a considerable variation in the supply of sediment to the beach and loss of sand from the beaches due to the longshore transport capacity. The erosion taking place in the southwest coast is mainly due to the high capacity of littoral drift than the supply from the rivers to the beaches. The erosion reported from the coastal stretch located north of Negombo is compounded by the straightness of the coastline and is particularly severe because of a high deficit in the littoral budget due to sand mining in the Maha Oya. As per the prevailing information, sand supply along the south coast is also low, but the coastline is relatively stable due to the bay and headland features predominant.

The global sea level is expected to rise with 30- 40 cm in the 21st century according to the IPCC mid estimates based on the linear melting of the ice sheets of Greenland and Antarctica due to increased emission level of green house gases. Thus it is difficult to disregard the potential increase of coastal erosion due to sea level rise. However, it is more complicated to quantify the level of erosion when it comes to coastlines in the vicinity of inlets, such as river mouths, lagoons and estuaries. These places are affected by other factors, such as inundation with heavy rainfall, basin filling impacts and impacts due to salt water intrusion. Those impacts along the water bodies will be accelerated remarkably with sea level rise.

One of the causes of natural coastal erosion is an increasing gradient in transport rate in the direction of the net transport of the system. This can be due to changes in the wave conditions at certain stretches, a curved coastline, or special bathymetric conditions.The loss of sand inland due to breaching and over-wash

of barrier islands and wind transport lost to offshore during extreme wave and storm surge conditions. The high waves cause the bars to move seawards and the high storm surges also cause an offshore movement of sand due to non-equilibrium in the profile during the high surge.

The loss of sand to an accumulative beach occurs at the tip of a sand spit and into deep water at the leeward side of the tip of sand spit at the termination point of a littoral cell. Sand lost in this way causes accumulative shore and shoal features in the deposition areas, but the upstream coastline has lost the sand. The loss of material from a protruding area to one or two sides is a natural cause of coastal erosion.Erosion can occur of the marine deposit shorelines suspended between sections of protruding semi-hard sections of the coastline, such as sandstone. The hard sections have historically provided material for building up the sedimentary shorelines. The shape of these shorelines is consequently dependent on the presence of the semi-hard sections and the wave climate. However, as the semi-hard sections continue to erode, the sedimentary shorelines will follow suit despite the fact that they were originally accumulative forms.

Another cause of natural coastal erosion is very oblique wave approach to the coastline.Along such coastlines there is a tendency for the natural formation of spits parallel to the coast. They accumulate the sand and shift the sand supply offshore, which means that the downstream coastline is starved and begins to erode.

2.2.2 Impacts of 2004 Tsunami on Coast Protection and Coastal Erosion

The Asian tsunami struck Sri Lanka's coastal region as a leading elevation wave on 26th December 2004 two hours after the Indonesian earthquake. One to three waves were reported depending upon the location with a height of 1m to 15 m. The highest wave height occurred in Koddiyar with 15m in Ampara district and 12 m each at Kurukulamadam and Hambantota town. A 10m height occurred at Mankerni, Pottuvil, Punnaikudah (Batticaloa district) Kirinda and Ratupasgodella, while Kahandamodera and Peraliya recorded 8m respectively. Tsunami waves first arrived on the eastern coast and to the other parts of Sri Lanka covering 12 out of 14 coastal administrative districts. Tsunami waves inundated the southwestern part with varying intensity depending upon topography and coastal defense. The sea water inundation varied considerably from few meters to 3.5km inland. The maximum inundation was recorded at 2km in Batticaloa and Kuchchaveli in Trincomalee. In Peraliya inundation was reported about 2km inland. On the southern coast, the inundation limit went to about 3.5 km in the lagoon system.(Survey of the December 26th Indian Ocean Tsunami in Sri Lanka, James Goff, International Tsunami Survey Team -TST).

The impacts of the tsunami were severe on the coastal zone where there had been some degree of human induced environmental damage such as removal of sand dunes, coral reefs and coastal vegetation. As per the damage assessment carried out by Coastal Resources Management Project (CRMP) just after the tsunami, it was revealed that a number of coast protection structures were damaged in the south west coast while some coastal stretches and sand spits have been severely eroded.

2.2.3 Anthropogenic Activities that Accelerate Erosion

The coastal engineering investigations carried out in Sri Lanka in the past, clearly revealed the correlation between accelerating coastal erosion and the human activities taking place within and outside the coastal zone. This was further confirmed through socio-economic surveys and studies conducted with respect to human activities such as sea coral mining, sand mining from the beaches and the rivers and construction of dams across the water ways and construction of coastal structures. A summary of human activities and their impacts which contribute to coastal erosion are presented in Table 2.2.

Table 2.2: Human Activities with an Impact on Coastal Stability in Sri Lanka

Activity	Current status	Result	Effect on coast	Example of site effected
Beach sand mining	Moderate	Reduction of beach sand volume available for littoral processes	Induces coast erosion	Panadura,Lunawa
River sand mining	High	Reduction of river sand supply to the beaches Salt intrusion to river upstream	Increase coastal and river bank erosion	Kelani, Nilwala,Maha Oya, Kalu Ganga
Collecting coral from beaches and shore face	Low	Reduction of volume of beach materials Reduction of corals to reformation and developments of natural coral reefs	Reduce materials to the beaches, Induces coast erosion	Rekawa Ahangama
Coral mining, reef breaking	Low	Damages to the natural barriers, creation of gaps in reefs	Increase wave energy on beaches and increase coast erosion,	Seenigama Rekawa
Construction of buildings and other structures too close to the beach and on dunes	High	Reduction of coastal stability	Causes damages to the buildings and structures, accelerate coastal and dune erosion	Unawatuna Hikkaduwa
Maintenance dredging in access channels	Moderate	Removal of sand from the littoral budget	Induce coastal erosion	Colombo port
Removal and loss of coastal vegetation	Moderate	Reduction of coastal stability, creation of exposed areas for wind and coastal erosion	Induce dune and coastal erosion	Erosion to be expected along all sedimentary shores.
Construction of unplanned or poorly planned rigid coastal structures	Moderate	Reduction of coastal stability in adjacent coast	Induce of erosion or huge accretion in adjacent coast	Palliyawatta, Negombo Oluvil harbour

The impacts of above listed human activities contributed significantly to coastal erosion but in varying degrees depending on the effectiveness of management measures adopted by the Coast Conservation and Coastal Resources Management Department.

Mostly rigid coastal structures such as groynes, detached breakwaters, sea walls, port and inlet jetties at tidal inlets and river mouths, revetments that are interference with the littoral transport also contribute to coastal erosion. The presence of such structure has a series of effects viz:

- Trapping of sand on the upstream side of the structure takes sand out of the sediment budget, thus causing shore erosion along adjacent shorelines, mainly on the lee side.

- Changes in the wave reflection pattern, hence changes in the wave energy distribution offshore, onshore and longshore.

- May change movement of the existing coastal current pattern and tidal movement.

- Loss of sand to offshore.

- Trapping of sand in entrance channels and outer harbours.

Development Activities that cause Negative Impacts on the Stability of the Coast

Besides the hard maritime structures, other development activities mainly the buildings and other constructions related to tourism, commerce and dwelling purposes located too close to the beach front restricts coastal process and could accelerate erosion in the coastal zone. In addition, irrigation schemes, dams and tanks constructed interior to the coastal zone created negative impacts on the stability of the coast by reducing sand supply to the coast. This situation was evident in the absence of development control mechanisms and environmental impact assessment procedures in the past. Prior to implementation of Coast Conservation and Coastal Resource Management Act and the National Environmental Act, there were no legal and institutional mechanisms to direct such development to avoid negative impacts on the stability of coast.

Sand Mining in the Rivers

Removal of sand from the river system directly reduces the supply of sediments to the beaches and is widely identified as the major cause of coastal erosion in Sri Lanka. The national sand requirement has continuously increased parallel to the growth of the construction industry since late 1970's and reached into a significant level with the economic thrust placed after culmination of the conflict situation in the northern and the eastern part of the country in 2009. The present sand requirement for the entire country has been estimated at approximately 21 Million cubic meters per year in which major portion is fulfilled from river sand.

Despite many controlling measures, sand mining in rivers has taken place at a high level in the North Western, Western, and the Southern provinces where much of the construction activity and major coastal erosion problems are concentrated. However, with the drastic increase of demand and regulatory restrictions imposed on river sand mining, the price of the river sand has been significantly increased while attention on alternative sources such as offshore and land based deposits has also increased. It is also important to note that, Mahaweli Ganga (Manampitiya and Mahiyangana) is also added to the list of places of a significant level of river sand mining in addition to Kelani Ganga, Deduru Oya, Maha Oya, Kalu Ganga, and Nilwala Ganga.

The overall sand mining in rivers at unprecedented rates to meet the current requirement of the construction industry evidently demonstrates the unsustainable status and inevitability in degrading river beds as well as decrease of sand supply to the beaches. It is not worthy to predict severe environmental degradation in the future, if current rate of sand mining continues at Mahiyangana and Manampitiya based on sand sources from Mahaweli Ganga. The authorized volume of sand mined from the rivers through GSMB permits has been depicted in Table 2.4.

It should also be noted that the river sand mining is unsustainable and a long-standing problem that is coupled with socio-economic snags. The impacts of river sand mining are irreversible in the short and medium term. Thus the reactive policy responses will not serve to re-establish the sand supply to the coast from several effected rivers in the short or medium term. In view of the current situation, the policy responses should focus on application of multi management approach that constitute with; (a) regulating river sand mining more effectively to avoid worsening of the current situation and allowing replenishment of the rivers subject to heavy mining in the past (b) curtailing over exploitation in all river system (c) initiating a

further national sand study to explore and promote alternatives and to determine sustainable yields more accurately.

The demand for sand has increased day by day due to growth of the construction industry in the country specially after culmination of the conflict situation. As per the annual usage of cement, the annual sand consumption has been estimated and depicted in Table 2.3.

Sand Mining on the Beaches and Dunes

Corresponding to the increased demand and the higher prices, sand mining from the beaches and dunes also increased in the recent past, irrespective of suitability or quality standards required for the construction industry. In contrast to the volume of river sand mining in the country, beach sand mining is not significant. Although the quantity of sand extracted annually from the beaches and dunes is less, beach sand mining is much more damaging to the stability of the coast than the river sand mining since it has instantaneous impacts on the deficit of the littoral sand budget.

However, sand mining from the beaches has been drastically reduced due to the management measures adopted by the Coast Conservation and Coastal Resources Management Department through enforcement of regulations, enhancement of public education and awareness and coordination with other agencies. In considering the small quantities of beach sand requirement for the coastal communities for religious and other purpose, issue of permits for sand removal (not exceeding 2 cubes) from pre-identified locations has been delegated among Divisional Secretaries under the provisions of the Coast Conservation and Coastal Resources Management Act. Subsequently, issuance of such permits through DSD's for sand removal from the beaches also discontinued.

In spite of the management measures effectively implemented by the CC&CRMD, sand removal from the dune systems has increased considerably in the Northwestern, Eastern and the Northern provinces in the recent past. The unauthorized removal of sand from the dune system in the Eastern and the Northern coastal segments could not be regulated due to conflict situation that prevailed in those areas in the past. Thus some of the valuable dune systems have been significantly damaged.

Table 2.3 Annual Sand Consumption 2003 – 2012*

Sand(m^3) (000')	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Sand Consumption	8082	6339.6	8986.2	12214.8	13514.4	12873.6	11358	13507.2	17247.6	21110.4

***Based on Annual Cement Consumption - Formula: 3.6 m^3 of Sand = 1 ton of Cement (Sources: Byrne G. et al. 2002, Alternative for river sand, Unpublished report CRMP, 2002)**

Table 2.4 Annual Volume of River Sand Mining through permits issued by GSMB

Year	Extraction (Million m^3)
2005	2.6
2006	5.35
2007	0.367
2008	0.266
2009	4.7
2010	4.83
2011	8.97
2012	8.97

Table 2.5 Quantity of offshore sand pumping for the requirement of construction industry of Sri Lanka from 2004 – 2013

Period	Volume/Quantity
2004-2012	2.8 million m^3
2011-2013	3.7 million m^3

Source: Sri Lanka Land Reclamation and Development Corporation (SLRDC) records

Coral Mining

Coral is the principle source of lime for the construction industry in Sri Lanka until recent time and supplied approximately 90% of the lime requirement. Sea coral mining from the nearshore areas were reported in the west and the south coast and some parts of the eastern coastal areas causing a significant level of coastal erosion. Although coral has been mined for almost four hundred years in certain parts of the coastline, it was confined to a low level and only from the relic reefs behind beaches. The growth of the construction industry since late 1970's has led to accelerated sea coral mining which involves the destruction of living reefs that act as barriers against wave action. As per the available records, it was revealed that inland and sea coral extraction from the west and south coast has increased from 18,000 tons in 1984 to 30,500 tons in 1998. With the enforcement of stringent regulatory action under the Coast Conservation Amendment Act No. 84 of 1988 banning operating lime kilns, possession, processing and transporting corals within the coastal zone, the amount of sea coral mining has declined from 7,660 tons in 1984 to 2,200 tons in 1994. In this context, coral mining and related socio economic and environmental impacts were frequent focal themes of discussion in the subject of Integrated Coastal Resources Management (ICRM) in Sri Lanka. Thus, to control coral mining, comprehensive management strategy was adopted by the CC&CRMD since 1978, comprising regulations, introducing and promoting substitutes for coral based lime, enhancing public education and awareness and providing alternative employment to people engaged in coral mining. As result of these management measures, the level of sea coral mining was maintained at a lower level up to 2004. However, with the tsunami disaster that struck Sri Lanka's coastal region in 2004, sea coral mining has been drastically reduced or almost halted with the self-realization of its ecological and environmental importance of reefs among the coastal communities especially in the southern province.

Table 2.6: Coral mined from Coastal Zone of Sri Lanka's Western and Southern Coastal Sector

Type of coral	Amount 1984 (tons)	% of total	Amount 1992 (tons)	% of total	Amount 1998 (tons)	% of total	AMOUNT 2013(tons)
Inland coral	10,400	58	15,800	80	28,300	93	Not reported
Sea coral	7,660	42	4,020	20	2,200	7	Not reported
Total	18,060	100	19,820	100	30,500	100	Not reported

Source: Coastal Zone Management Plan - 2004

2.2.4 Future Impacts of Climate Change

The potential climate change effects, especially the global warming resulting in sea temperatures and sea level rise, increased frequency and magnitude of tropical storms and other extreme events will have negative impacts on coastal processes, ecosystems and human wellbeing. Although the global mean sea level rise is an important aspect, the relative sea level rise is the main factor determining impacts on the coast. According to the central estimate predicted by the International Panel of Climate Change (IPCC), the global sea level may rise 0.2 cm and 0.5 cm by years 2010 and 2050 respectively. In consistancy with the possible rise of temperature and relative sea level, it is expected to cause shoreline retreat, inundation of low-lying areas and vulnerable areas, salt water intrusion into the inland water bodies, geomorphological changes in sediment transport and damage to the coastal habitats such as coral reefs. In addition, sea level rise will create negative impacts on fisheries, tourism and other beach uses and coast protection and other structures that have not been designed to withstand such effects.

According to the Climate Change Vulnerability Assessment conducted by Ministry of Environment and Renewable Energy in 2011, sea level rise exposure on important sectors such as urban development, human settlement and economic infrastructure, water, agriculture and forestry, biodiversity and eco system services, livestock have been investigated and highly vulnerable areas have been identified. The Figure 2.1 depicts the sea level rise exposure map. Based on the IPCC predictions, inundated areas due to predicted sea level rise at the end of 25, 50, 75 and 100 years including the areas covered presently as water bodies are given in Table 2.8.

Estimated coastal erosion due to sea level rise as per the Bruun Rule (1:100 ratios) is as follows:

After 25 years coastal erosion extent = 50 m

After 50 years coastal erosion extent = 65 m

After 75 years coastal erosion extent = 80 m

After 100 years coastal erosion extent = 95 m

Table 2.7: Projected Inundated Area in each district including/excluding Water Bodies

District	Total Inundated Area (ha) Including water bodies				Additional Inundated Area (ha) Excluding water bodies			
	25 year	50 year	75 year	100 year	25 year	50 year	75 years	100 year
Colombo	959	1133	1327	1534	201	375	569	776
Gampaha	3638	4154	4631	5073	459	976	1452	1894
Puttalam	11334	12583	13716	14809	1113	2362	3494	4587
Mannar	8024	8262	8518	8758	248	486	741	981
Jaffna	10321	11164	12014	12891	864	1706	2557	3434
Mulaitivu	912	1004	1092	1180	88	180	268	355
Trincomalee	2315	2529	2791	3033	252	467	729	971
Batticaloa	2325	2443	2568	2702	130	247	372	507
Ampara	1880	2175	2479	2762	293	588	892	1175
Hambantota	4265	5553	6516	7322	885	2173	3136	3942
Matara	1277	1634	1994	2401	384	741	1101	1508
Galle	5622	6462	7249	8014	776	1617	2403	3169
Kalutara	1956	2370	2790	3203	417	830	1251	1664

Source: Shoreline Status Report - 2014

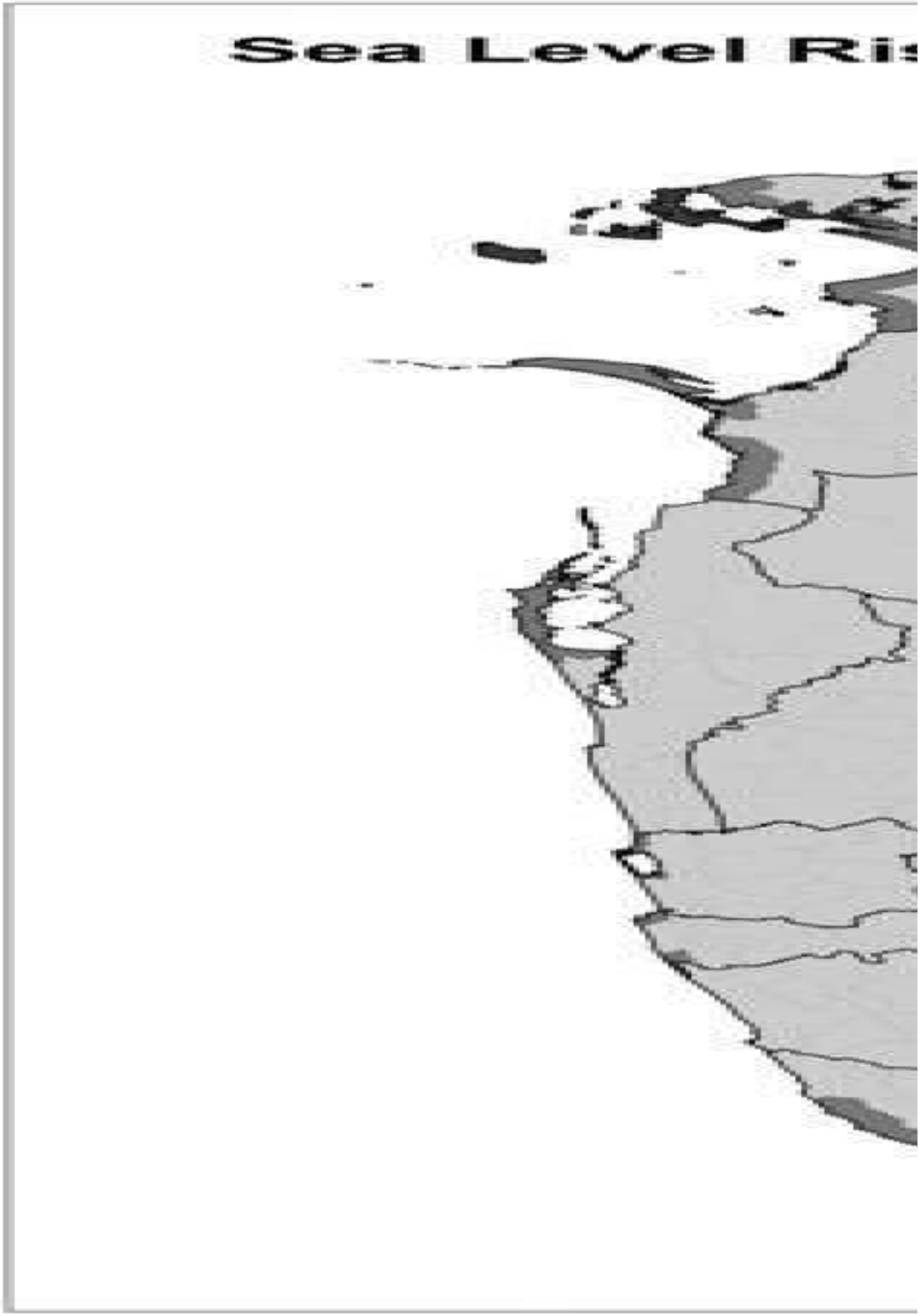

Figure 2.1: Sea Level Rise Exposure Map of Sri Lanka
(**Sources**; Climate Change vulnerability Data Book 2011)

In view of the magnitude of the potential issues related to sea level rise, an overall accepted response is the proper adaptation. Thus it is important to pay careful attention on the following adaptation technologies:

1, Imposition of adequate buffer areas (set-backs) for coastal development.

2. Formulation of design criteria for coastal structures with due consideration of relative sea level rise.

3. Sand dune rehabilitation/stabilization as a soft defense mechanism.

4. Restoration of coral reefs as a soft defense mechanism.

5. Beach nourishment.

In addition to the sea level rise, other natural phenomenon related to climate change repercussion which are important for coastal erosion management are cyclones and strong storms which frequently experienced in the Bay of Bengal region during October and November when the inter-tropical convergence zone shifts southwards towards the equator.

2.2.5 The Current Status of Coastal Erosion in the North and the Eastern Coastal Provinces

As per the Shoreline Status Report 2014, the present status of coastal erosion in the North and the Eastern provinces were collected through consultation process and are summarized below. In Jaffna district no continuous erosion is reported. However seasonal erosion is reported especially in Point Pedro coastal area.

In Mannar district, coastal erosion has been reported from Silavatrai and Arippu area in Musali DSD, Vankali in Nantan DSD and south of Talimannar in Mannar town DSD. In considering the coastal erosion that took place in Vankalai, CC&CRMD has constructed series of groynes in the past. According to the prevailing information severe erosion has been reported from South bar, Kaalmadu during North West monsoon period. In addition,erosion is taking place in Doric bungalow and Arippu area.

In the Batticaloa district most of the erosion incidences reported are seasonal in nature but continuous in areas such as Navaladi and Nasivanthive. Further, seasonal erosion incidences are reported from Manmunai DSD, Palamunai GND, Puthukudirippu, Kirankulam, Passikudah and Kalkudah.

In Tricomalee Town and Gravets DSD, significant erosion is reported from Veera Nagar, Murugapuri, Jamalia, Sirimapura and Salli. In addition several erosion incidences are reported from Iqbal Nagar adjacent to Bible College, Veloor near Murugan Kovil and Nilaveli in Kuchchaveli DSD.

In Ampara district, a considerable level of erosion is reported in the Oluvil Harbour to Periyakallar area. In this coastal stretch, especially Ninthavur, Oluvil, Attapalam, Nochiadi and Muttupali are severely eroded. It is estimated that approximately 250 – 300 acres of coastal land had been lost due to erosion in this segment.

By and large, the inadequacy of data and information on coastal process in the Northern and the Eastern coastal provinces will pose a major challenge in providing long term engineering solution, if the requirement is provoked.

2.2.6 Absence of Data and Information on Coastal Process/Characteristics for the Northern and Eastern Coastal Region

The requirement of reliable and updated information on coastal processes as well as socio-economic, ecological and environmental factors related to coastal erosion is a prime necessity for coastal erosion management. Although, the required data and information pertaining to coastal erosion management has

been collected through coastal investigations and other research studies for the west, southwest, south and northwest coastal segments during the past few decades, little or no data and information available for the North and the Eastern provinces due to the conflict situation that prevailed during the last three decades. Since the North and Eastern coastal provinces are also highly vulnerable to climate change repercussions as well as episodic extreme natural events such as cyclones, storms and tsunami incidents, availability of reliable data and information is a vital requirement for coastal erosion management. In addition, the potential impacts of human induced causes such as significant level of sand mining in the major rivers such as Mahaweli that feed the beaches of the eastern province has not yet been assessed. Moreover, the attempt being made on massive economic development in the north and the eastern provinces by the GOSL, availability of data and information on coastal process, and parameters such as wave characteristics, currents, tides and sediment transportation patterns are vital to determine the environmental impacts.

In view of the above, it is important to collect required data and information on a long term basis to enable the design of proper coastal erosion management programme for the north and the eastern coastal provinces.

2.2.7 Accommodating New Development Activities within the Coastal Region

Sri Lanka has been transforming after eliminating terrorism and civil conflict that prevailed for more than three decades in the country in 2009, and overall economic development has grown to shift the status from low income earning country to a middle income country with annual per capita income of U$ 4000. Now the economic development process being attempted to escape the middle income trap to higher income earning status by developing six economic hubs in which three hubs namely tourism, maritime and energy are mainly concentrated in the coastal region. In addition, the planned mega projects such as Colombo Port Expansion Project (CPEP) and Port City Development project will be located in the urban coastal waterfront. Therefore, minimizing vulnerability of the coastal region from episodic and chronic coastal hazards is a prime requirement for attracting and accommodating new development interventions related to the above economic sectors while ensuring sustainability of the coastal resources. To achieve the desired objectives of the economic development thrust placed on the coastal region, scientific and engineering knowledge of the coastal resources, its behavior and functions should be considered with the social aspects of the coastal region, for a proper development decision making process.

2.3 POLICIES, PLANS, LAWS AND INSTITUTIONAL ARRANGEMENTS

2.3.1 Plans and Policies

The policies on coastal erosion management are mainly governed by the Coast Conservation and Coastal Resource Management Act No.57 of 1981 and its amendment Act No.64 of 1988 as they provide legal provisions for regulating activities in the coastal zone. In view of the requirement of controlling some influencing activities even outside the coastal zone, the legal regime was strengthened through amendment Act No.49 of 2011. In addition, the first national Coastal Zone Management Plans of 1990, Revised CZM Plans of 1997, 2004, “Coastal 2000”; A Resources Management Strategy for Sri Lanka’s Coastal Region also addressed the issue of coastal erosion. Based on the policy guidelines provided through CZM Plans and “Coastal 2000”, an overall coastal erosion management strategy was implemented in compliance with the Master Plan for Coastal Erosion Management (MPCEM) prepared in 1986.

In accordance with the legal and institutional provisions, the responsibility and discretion for control of coastal erosion lies with the Director General of the CC&CRMD. Thus, to implement coastal stabilization schemes within the coastal zone, the requirement of an Environmental Impact Assessment has been waived.

As a policy,so far priority has been given for protection of public infrastructure (roads, railway lines, bridges etc.), followed by public utilities and buildings, dwelling units, state land and private/commercial buildings respectively, for CC&CRMD funded coast protection schemes. The CC&CRMD permits private and public agencies to implement coast protection schemes, if they are consistent with the guidelines and criteria spelt out in the MPCEM. Management actions and regulatory mechanisms are implemented at the national level. In accordance with the CC&CRM Act, an EIA may be required for the development activities including coast protection carried out within the coastal zone by both private and state agencies, at the discretion of the Director General of the CC&CRMD. Development activities that go beyond the coastal zone require adherence to the EIA procedure of the National Environmental Act No.47 of 1980 and its amendment Act No. 56 of 1988, but special concerns of the CC&CRMD will also be taken into consideration. There are many regulatory mechanisms and institutions that are important in controlling activities such as mining, reclamation and diversions of waterways directly or indirectly create impacts on the stability of the coast.

2.3.2 Future Approaches and Trend in Coastal Erosion Management Practices

Coastal erosion and accretion are natural processes.However this natural phenomenon may become a significant problem when exacerbated by human activities and natural disasters or changes. In addition the spreading of poverty, coupled with the growing population in the coastal region and the increasing economic growth has created major challenges in managing coastal erosion along the coast, in the future. Thus careful attention has to be paid to the following in managing coastal erosion in the country.

1. Prevailing information revealed that the existing coast protection measures provide significant protection.

2. Scientific findings revealed that presence of vegetation in coastal areas will improve slope stability, consolidate sediment and diminish the amount of wave energy moving onshore and protecting the shoreline from erosion.

3. Increased interest in soft options for coast protection is becoming predominant and is in line with the advanced knowledge on coastal processes.

4. A combination of hard and soft solution is sometimes necessary to improve the efficiency of the option and to provide environmentally and economically acceptable coast protection measures.

5. Requirement of adopting climate compatible technologies and designs for fisheries, tourism and other economic activities located in the coastal zone.

6. As per the legal provisions introduced through Coast Conservation and Coastal Resource Management Amendment Act No. 49 of 2011, the declaration of affected areas and conservation areas should be implemented as appropriate, for controlling coastal erosion.

2.4 Management Objectives, Policies, Strategies and Actions

Objective 1

Coastal erosion is addressed by adopting optimal shoreline management works/ measures consist of combination of hard and soft solutions.

Policy 1.1

Coastal stabilization will be carried out in a planned manner by the identification of coastal erosion trends.

Strategy 1.1.1

Identify coastal erosion trends; prioritize areas for protection based on high levels of erosion and threats to public and private properties, economic activities and utilities as well as critical habitats; adopting proper monitoring procedures and formulating site specific management interventions.

Proposed Actions

1. Study and identify coastal erosion trends and areas with specific attention on North and Eastern coastal segment subject to, or liable to, high levels of erosion.

2. Conduct monitoring programmes based on priority areas to enable the preparation of a Status Report on coastal conditions,and to update it periodically.

3. Develop a programme to introduce Shoreline Management Planning where appropriate.

4. Initiate the process of Shoreline Management Planning for priority locations on a pilot basis.

5. Permit public or private entities to prepare and implement coast protection works which comply with the shoreline management plans.

6. Monitor performance of existing coastal protection works and stability of coastline in areas where some form of control measures have been introduced based on a scheduled plan, and take action to maintain such works.

7. Consider applying the general/specific guidelines introduced through shoreline management plans at appropriate locations during project approval procedures in the Coastal Zone.

Policy 1.2

Coastal erosion control/ shoreline management will be based on sound scientific/engineering assessment.

Strategy 1.2.1

Facilitate the collection, storage and use of all scientific and socio-economic information relevant for erosion control and management through collaboration with National and International research agencies and universities, and develop a database for easy access of such information for shoreline management initiatives.

Proposed Actions

1. Establish a national programme (in collaboration with universities and other research agencies as relevant) for regular monitoring of coastal erosion and collate and collect related data/information on: scientific investigations of sediment balances and assessments of sediment sources; coastal erosion trends and status; threats to dwellings,land use and critical habitats from erosion; hydrographic conditions; and socio-economic characteristics in the Coastal Zone.

2. Establish and maintain a comprehensive database -through institutional monitoring on hydrographic conditions, land use,critical coastal habitats and socio-economic characteristics in the Coastal Zone.

3. Establish (a) an inter-institutional database relevant for coastal erosion management and (b) a survey of coastal erosion and protection status.

4. Formulate appropriate mechanisms to provide access to the metadatabase (above) as well as an institutional data base for public and private agencies and research workers.

Policy 1.3

Severe coastal erosion in highly developed and degraded areas with existing coastal protection measures will be addressed by reclamation to enable new development possibilities and enhance economic potential of coastal frontages.

Strategy 1.3.1

Promote measures to expand existing coastal frontages by implementing environmentally acceptable reclamation schemes, selectively and only where feasible, to provide development possibilities, coastal protection and opportunities to enhance economic potential.

Proposed Actions

1. Develop guidelines for reclaiming coastal frontages for development possibilities and providing additional buffers.

2. Provide guidance on the preparation of reclamation plans to ensure that reclamation is confined to sites where protection costs can be recovered through development consistent with this objective.

Policy 1.4

Dune stability will be enhanced by promoting the growth of environmentally suitable/ endemic vegetation on sand dunes to minimize coastal erosion.

Strategy 1.4.1

Control adverse activities that damage dune vegetation and replant environmentally suitable/ endemic vegetation on sand dunes where the native vegetation is damaged.

Proposed Actions

1. Control activities that cause damage to dune vegetation.

2. Replant sand dunes with environmentally suitable/ endemic vegetation.

Policy 1.5

Stability of natural coastal features will be enhanced in the process of shoreline management.

Strategy 1.5.1

Formulate and implement shoreline management plans/coast protection schemes to minimize impacts of coastal erosion while enhancing stability of the coastal natural features.

Proposed Actions

1. Identify priority areas suitable for adopting shoreline management plans with special emphasis on coastal natural features.

Objective 2

The location and type of development activities in and outside the Coastal Zone are made consonant with conserving the natural shoreline and coastal features.

Policy 2.1

Development activities within and outside the Coastal Zone will be coordinated and regulated to ensure that natural coastal processes are unhindered.

Strategy 2.1.1

Permit only new development activities which are regulated within the Coastal Zone in accordance with setback standards and in areas not subject to erosion or flooding.

Proposed Actions

1. Develop a "Compliance Monitoring Plan", and enforce adherence to coastal setback standards by conducting permit compliance monitoring surveys as required.

2. Identify areas that are prone to coastal erosion and flooding and formulate appropriate guidelines.

3. Initiate legal action against non-compliance of stipulated setback standards as required, by working with relevant state agencies.

4. Build awareness of setback regulations at local, divisional and provincial level.

5. Prepare a developers guide book comprising new set-back standards, regulations and guidelines.

Policy 2.2

Adverse impacts on the Coastal Zone from construction of coastal and marine structures will be minimized.

Strategy 2.2.1

Implement mitigation measures according to EIA /IEE studies to minimise adverse impacts due to construction of coastal and marine structures (Except shoreline management structures in accordance with shoreline management plans).

Proposed Actions

1. Implement mitigatory measures recommended through EIA/IEE to minimising adverse impacts in the Coastal Zone from coastal structures and other schemes.

Policy 2.3

The impacts of development activities carried out beyond the coastal zone will be investigated and areas suitable for designation as "affected areas" determined.

Strategy 2.3.1

Formulate appropriate criteria to identify affected areas and prepare list of potential areas to be declared as affected areas within or adjacent to the coastal zone, through indepth field investigations and public consultation. Declare affected areas as required through *Gazette* notification.

Proposed Actions

1. Prepare appropriate criteria and list of candidate sites to be declared as affected areas.

2. Formulate regulations for administration and management of the affected areas.

Policy 2.4

Creation of additional buffers, reclamation and creation of artificial islands will be recognized as mechanisms to cope with coastal erosion and to minimize development pressures within the coastal zone.

Strategy 2.4.1

Formulate criteria based on technical, ecological, social, economic and political factors to determine suitable areas to create additional buffers, islands and reclamation.

Proposed Actions

1. Based on the finalized criteria, prepare a list of candidate locations suitable for creation of additional buffers, reclamation and islands.

2. Carry out EIA to identify potential environmental, social and economic impacts and mitigatory measures.

3. Formulate technical guidelines for creating island and additional buffers.

Objective 3

Beach stability is enhanced by controlling sand mining within the Coastal Zone and from the rivers and eradicating sea coral mining.

Policy 3.1

Beach stability will be enhanced by regulating sand extraction from beaches and rivers, streams and canals**.**

Strategy 3.1.1

Regulate sand mining in rivers and estuaries by means of guidelines specifying quotas, time and area limitsand imposition of monitoring schemes.

Proposed Actions

1. Prepare a strategy for enforcement of the Guidelines for Sand Mining in the Coastal Zone; as well as landwardand seaward of the Coastal Zone (including rivers upstream), in collaboration with relevant state organisations /agencies.

2. Undertake or facilitate periodic checking of sand mining in the Coastal Zone and in the rivers inland to curtail illegal sandmining in collaboration with the GSMB and the Divisional Secretariate's officers according to the above strategy.

3. Ensure adherence to guidelines by licensed mining operations.

4. Conduct a survey and collate data on sand mining in and outside the Coastal Zone to identify the present magnitude ofthe problem, in collaboration with relevant institutions such as the GSMB.

5. Define sustainable limits and site specific sand budgets (using established sediment budgets) in collaboration with relevant state institutes, universities and research organisations.

Policy 3.2

River sand mining will be alleviated by the promoting alternative sources of sand for construction.

Strategy 3.2.1

Promote research to find feasible alternatives for the use of river sand in the construction industry.

Proposed Actions

1. CC&CRMD to promote research in collaboration with institutions and relevant administrative bodies to:

   - Identify new technologies that minimise the use of sand for construction.
   - Enhance the use of alternatives to river sand to meet the requirements of the construction industry.

Strategy 3.2.2

Promote the use of sand from offshore sources as an alternative to river sand.

Proposed Actions

1. Explore appropriate sources of offshore sand deposits through investigations.

2. Collate all available information and data in Sri Lanka and elsewhere on the use of sea sand in the construction industry in collaboration with research organisations, Universities and National organizations funding research, and form a Central database.

3. Carry out a cost benefit study of the use of offshore sand in the construction industry.

4. Create awareness on the benefits of the use of offshore sand for the construction industry and beach nourishment in collaboration with national and regional level state organisations, media and NGOs, based on available data and results of impact assessments.

5. Coordinate inter-agency efforts to provide alternative employment for displaced river sand miners.

6. Encourage government entities for the usage of offshore sand for public sector constructions.

Policy 3.3

Beach stability will be enhanced by eradicating sea coral mining.

Strategy 3.3.1

While recognizing the low level of sea coral mining, enforce the ban on sea coral mining more stringently to ensure a total halt.

Proposed Actions

1. Enforce the ban on coral mining in collaboration with the Police and Local Authorities.

2. Identify alternative sources for coral lime, and plan and promote mining of these resources.

3. Formulate collaborative mechanisms with relevant authorities to promote the introduction of alternatives for coral based lime.

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Policy 3.4

Promote conduct of national sand study to determine availability of sources and quantity of sand including off shore sources for construction and other purposes in compliance with the future demand.

Strategy 3.4.1

Launch a programme on the importance of conducting a national sand study in the face of massive economic development taking place in the country and the envisaged economic development targets for next ten years.

Proposed Actions

1. Prepare concept paper highlighting the requirement of conducting a national sand study.

2. Submit a cabinet paper to obtain government concurrence and funding.

3. Launch a national sand study and disseminate findings for policy considerations.

Objective 4

Ensure the availability of contingency measures to mitigate impacts of climate change on coastal features, infrastructure and coastal communities and that systems for timely implementation of such contingency measures and plans are developed.

Policy 4.1

Availability and timely implementation of contingency measures to mitigate impacts of climate change on coastal features, infrastructure, livelihoods, and coastal communities.

Strategy 4.1.1

Formulate contingency measures through quantifying and monitoring impacts of climate change on sea level rise, coastal erosion, flooding, coastal structures and other coastal development.

Proposed Actions

1. Collate data from all relevant authorities on climate change parameters such as wind patterns, rainfall, temperature, sea level rise, etc. to predict coastal impacts of sea level rise.

2. Establish a database on climate change features relevant to coastal zone management in collaboration with relevant state organisations.

3. Establish links with international agencies/global programmes to obtain data and information on climate change, related features and mitigatory actions.

4. Analyse impacts of climate change and establish systems for timely adaptive and mitigatory action.

5. Develop an effective mechanism to collaborate with institutions dealing with the scientific and social aspects of natural hazards to minimise impacts and for efficient remedial action.

6. Coordinate inter-agency action required to mitigate impacts of natural hazards in the Coastal Zone and for remedial measures.

7. Establish a mechanism through which realistic estimates of sea level rise and other climate change impacts are taken into account routinely in erosion management and development in the Coastal Zone.

Policy 4.2

Promote climate adaptation measures to minimize issues related to possible sea level rise.

Strategy 4.2.1

Formulate climate adaptation strategy considering the potential sea level rise.

Proposed Actions

1. Attempt to establish a most realistic level of sea level rise.

2. Formulate climate compatible guidelines for coastal development including coastal fisheries and aquaculture in collaboration with relevant agencies.

Objective 5

Coastal community resilience will be adopted as a long term measure to minimize impacts and vulnerability of coastal erosion that may increase due extreme coastal hazards.

Policy 5.1

Identify and promote designation of coastal hazard prone areas to minimize vulnerabilities and to bounce back from the social and economic shocks.

Strategy 5.1.1

Formulate criteria for identifying hazard prone areas in the coastal region based on past experience and predictions made through coastal vulnerability index.

Proposed Actions

1. Identify areas to be designated as coastal hazard prone areas based on the criteria formulated.
2. Initiate coastal community resilience programme in such areas in a collaborative manner to minimize and to bounce back from shocks.

REFERENCES

1. Byrne G. et al. 2002, Alternative for river sand, Unpublished report CRMP, 2002
2. Byrne, G and Nanayakkara, A. 2002, Alternatives for River Sands, Final Report, unpublished, Coastal Resources Management Project
3. Coast Conservation and Coastal Resources Management Department, 1986 , Master Plan for Coastal Erosion Management
4. Coast Conservation and Coastal Resources Management Department, 2004, Revised Coastal Zone Management Plan 2004
5. Coast Conservation and Coastal Resources Management Department, 2014, Preparation of a Shoreline Status Report Covering Effectiveness of Structural and Non-structural Solutions Adopted by Coast Conservation Department since 2004
6. Ministry of Environment Sri Lanka, 2011, Climate Change Vulnerability Data Book
7. Sri Lanka Land Reclamation & Development Corporation, 2013, Quantity of offshore sand pumping for the requirement of construction industry of Sri Lanka from 2004 – 2013(Internal Records)
8. Olsen et.al, 1992 “Coastal 2000”; A Resources Management Strategy for Sri Lanka’s Coastal Region.

CHAPTER 3

3. CONSERVING COASTAL HABITATS

3.1 INTRODUCTION

3.1.1 Environmental, Social and Economic significance of Coastal Habitats

Sri Lanka has a diverse range of coastal habitats that include estuaries and lagoons (214,522 ha), mangroves (11656ha), sea grassbeds (37137ha) salt marshes (27520 ha), coral reefs (not determined) and large extents of beaches including barrier beaches, spits (5731ha) and sand dunes (10363 ha) (Table 3.1 gives the extents of these habitats by districts based on GIS data analysis). Each of these coastal habitats possess a significant amount of species and provides an array of ecosystem services vital to human. In addition to the environmental services, these habitats support livelihoods of the coastal communities in significant manner to enhance their economic status and maintain social integrity. Many coastal and nearshore resources associated with the coastal habitats support a developing export industry based on export of Prawns, Lobsters, crabs, Beach de mer (sea cucumber), Chanks and Shells and other fishery products which earned over rupees 24,716 million in 2015 (MFARD 2016).

Coastal habitats comprise a rich component of the country’s coastal and marine biodiversity.As per the prevailing information, the identified species in marine and coastal waters are over 1,800 pelagic species of fish; five species of turtles that come ashore to nest on the beaches; 38 species of endangered and rare marine mammals including the dugong and 37 species of cetaceans. Several species of sea snakes and a

diverse array of coral and reef associated organisms are also found in these areas. Genetic diversity within coastal habitats is also believed to be high, and of possible economic value. In addition estuaries and lagoons, coralreefs, mangroves, seagrass beds and salt marshes are also function as vital breeding and/or nursery grounds for numerous species of fish, crustaceans and molluscs, many of which are of commercial value.

The non-extractive value of coastal habitats such as coral reefs, mangroves, estuaries/lagoons and beaches are very high and has considerable economic and aesthetic value. The water bodies of lagoon and estuaries function like buffer zones, protecting coastal communities from full force of weather related events, such as storm surges, floods and cyclones by damping wave action, dissipating river discharge and temporarily storing water. The habitats such as mangroves, sea grass beds and salt marshes function as large filters to extract pollutants, excess nutrients and sediment carried out from municipal and industrial wastewater inland and storm water runoff.(Miththapala, Sriyanie 2013) Mangroves are also used for mooring of small fishing crafts and for many other fishery related activities. Beaches around the island accommodate sites of religious,archaeological and historic value as well as homesteads for a considerable section of the coastal population, particularly for fishing communities.

Coastal vegetation such as mangroves are traditionally used by coastal communities for various purposes, such as providing food and beverages, timber for house building and boat construction, firewood, material for preparation of fishing accessories, etc. Many coastal habitats, particularly coral reefs and sand dunes help to stabilize the shoreline. Coral reefs especially act as natural barriers against coastal erosion by dissipating high-energy wave action, which is particularly heavy during the monsoons.

Table 3.1 Extent of coastal habitats by District (ha)*

District	Mangroves	Saltmarshes	Dunes	Beaches, barrier beaches and spits	Lagoons and Esturaies	Other water bodies	Sea grasses
Colombo	-	-	-	-	-	400	-
Kalutara	130	-	-	45	172	105	-
Galle	495	224	-	112	1259	486	-
Matara	45	-	-	338	-	101	-
Hambantota	156	1270	1623	325	1346	2213	-
Ampara	301	294	607	816	-	-	-
Batticaloa	1921	2646	-	1093	44132	2273	-
Trincomalee	1707	1365	-	337	18100	1192	-
Mullaitivu	208	722	-	717	5377	352	2054
Jaffna	2427	4970	4590	800	43872	2100	21225
Kilinochchi	507	5943	-	872	8123	76	509
Mannar	1502	5602	899	215.5	5144	1661	13349
Puttalam	2114	1557	2644	328.6	83581	3003	-
Gampaha	143	1274	-	36.7	3416	-	-
Total Extent	11,656	27520	10363	5731.6	214522	13062	37137

Source: Synthesis report on coastal habitats (2014)

*** Extent of habitats were calculated through application of GIS in 2014**

3.1.2. The Current Status of Coastal Habitats

Coral reefs

Coral reefs are tropical shallow water rigid platform like structures that stand above the surrounding sea floor and located parallel to the coastline. They are formed from a biological secretion of Calcium Carbonate by living organisms, mainly reef building coral colonies and coralline algae.

Coral reefs in Sri Lanka are categorized into three habitat types. They are: (a) true coral reefs consisting of live corals as well as calcareous substances, (b) sandstone reefs, and (c) rocky reefs. The latter two reef types may also be covered by corals in varying degree. All three habitats are distinctly different, but may be found mixed together (Rajasooriya and White 1995).

As per the condition of the reef, mainly combined with substrate cover, diversity and abundance of reef organism; indicate that best reefs are associated with the barrier type reefs located offshore. These reefs are found mainly in Northwestern; Southeastern and Eastern waters. Most extensive coral reefs in Sri Lanka are the patchycoral reefs in the northwestern coastal and offshore waters, occurring within the Gulf of Mannar and west of the Kalpitiya peninsula. Patchy coral reefs have also been recorded in the western and eastern coastal areas of the island at a distance of about 15-20 km from the shore, at an average depth of 20 m. The southwestern, eastern and northern coasts also contain fringing coral reefs adjacent to the shore, growing from the sea floor usually on a nucleus of rock. It has been estimated that about 2% of the coastline contains fringing coral reefs. Hikkaduwa, Unawatuna and Rumassala are some of the main fringing reefs along the southwestern coast and Passikudah is one of the known fringing reefs in the eastern coast. Coral reefs also occur around the Jaffna Peninsula - mainly around the small coastal islets, but they are not extensively developed. Barrier coral reefs, consisting of ridges of coral lying some distance from the shore, parallel with it, and forming a broad 'reef lagoon', are rare in Sri Lanka but some are found at Vankalai and Silavathurai. Sandstone reefs are wide spread along the coast. Many of these are located along the bathymetric contours of the continental shelf. Rocky reefs occur from south of Colombo in the west coast to the southern areas of the Trincomalee District in the northeast.

The coral cover in the reefs located in the southern part of the island is extremely low when compared to the reefs located in the eastern and the northern part mainly due to the external impacts. Bottom set netting, stepping, dynamiting, coir industry, glass bottom boat maneuvering, destructive fisheries activities and excess sediment and fresh water influx are the major causes responsible for the degraded situation in the southern coast (*Synthesis Report on Coastal Habitat 2014*). However, current information revealed that the live coral cover at Hikkaduwa National Park had increased from 12% in 2005 to 26% in 2007 mainly due to rapid settlement and growth of *Pocillopora damicornis* which had risen from 6% of the total live coral cover in 2004 to 35% in 2007. It is also reported that the present cover of *Acropora* was only 0.6% due to high level of sedimentation (Rajasooriya 2008). The live coral cover at Kapparatota also decreased from 52% in 2004 to 22% in 2006. As per the current information it was reported that live coral cover at Polhena is confined to 21.2% while 6.45 % at Madiha due to anthropogenic activities such as coconut retting, ornamental fish collection and reef walking (*Synthesis Report on Coastal Habitat 2014*).

The Synthesis report on coastal habitats 2014 indicates that the coral reefs located in the Northern and the Eastern part of the country are in better condition with compared to the southern part of the country. It was reported that live coral cover at Punkudativu and Mandativu island in the Jaffna peninsular was 45% with 29% of limestone substrate (*Synthesis Report on Coastal Habitat 2014*). The condition of the coral

reef in Dutch Bay in Trincomalee is reported as relatively in good condition and constitute with branching *Acropora spp*., foliose *Monitipora and Echinpora lamellose.* According to the previous monitoring reports, the live coral cover of this reef was 52% and 20% coral rubble. As a result of 2004 tsunami, the reef sustained extensive damages and currently supports 38.8% live hard corals with 40.23% rubble cover. The shallow coral reef at Pigeon Island in Trincomalee is dominated by branching and tabulate *Acropora* spp and no damages were reported due to 2004 tsunami. Thus the live coral cover of 54.38% in 2003 has been increased up to 74.25% by 2005. According to the monitoring studies carried out by NARA, the live hard coral cover has increased from 40% in 2004 to 70% in early 2007 in the Bar Reef Marine sanctuary at Kalpitiya. This increase is mainly due to rapid growth of *Acropora Cytherea* that constitutes more than 75% of the live hard corals.

Sea grass beds

Sea grasses are flowering plants that thrive in shallow oceanic and estuarine waters and are descendants of terrestrial plants that re-entered the ocean between 100 and 65 million years ago. They have leaves, stems, rhizomes and roots. Sea grass beds often occur in sheltered waters combined with coral reef ecosystems or estuaries and lagoons.

Sri Lanka's coastal waters have extensive sea grass beds,often occurring in association with coral reef ecosystems or in estuaries and lagoons. They are particularly found in the basin estuaries and lagoons of Puttalam, Mundal, Negombo,Mawella, Rekawa, Koggala, Kokilai, Jaffna and Batticaloa. A total of 16 sea grass species belonging to 10 genera have been reported from Puttalam Negombo, Mundal and Rekawa lagoons. Extensive seagrass beds have been reported from the Dutch bay (in Kalpitiya) to the western end of the Jaffna Peninsula,and from Mannar to the northwest across the Palk Bay and to Rameswaram Island on the Indian coast(Samarakoon and Pinto 1988). However the distribution of sea grasses along the coast from north east to south east is limited and no records are available. Thus, it is difficult to get a clear picture of total composition and distribution of sea grasses in coastal zone of Sri Lanka. However, in 2008 the extent of sea grass beds in Sri Lanka has been reported as 23819 ha (Gunathilleke at el).

Sea grasses, the marine angiosperms, are considered to be among the most productive submerged ecosystem. They serve as a source of energy for a complex food web; provide habitats for endangered dugong (Dugong dugong) and other aquatic organisms including epiphytes to consolidate sediment produce detritus, and area source of dissolved and particulate organic carbon for the aquatic food webs. In addition they also serve as nursery functions for a large number of fish, crustaceans and bivalves that use these habitats as a refuge, particularly in the larval stage of their life cycles that are vulnerable to sudden environmental changes and susceptibility to predation (Silva EIL et. al 2013). In Sri Lanka Bristle worms (Polychaetes) are harvested from sea grass beds as brood stock for feed aquaculture. In addition to temperature, light and nutrients, sheltered zone with substrate constitute with sand mud and dead, corals ideal for dense growth of sea grasses that are rich in species diversity. Sea grass also act as filters for coastal waters and stabilizes the floor of the coastal seas, In addition sea grass absorb carbon dioxide from the ocean when they photosynthesis (Miththapala, S, 2008).

Sea grass beds are subjected to various threats due to anthropogenic activities such as destructive fishing practices, collection of invertebrates or shellfish harvesting, construction of physical structures, altering tidal influx, intrusion of agro-chemicals, emergence of macro-algal stands, regulation of water inflows, effluent discharges from shrimp farms and solid waste disposal. The Table 3.2 shows sea grass species from different coastal sectors in Sri Lanka.

Table 3.2 Sea Grass species from different Coastal Sectors in Sri Lanka.

Species	North	South	West	North West
Cymodocea rotundata	x			x
Cymodocea serrulata	x			x
Enhalus acoroides	x			x
Halodule pinifolia	x			
Halodule uninervis	x			x
Halophila beccarii			X	
Halophila decipien		x		x
Halophila minor			X	
Halophila ovalis		x	X	x
Halophila ovata	x	x		
Potamogeton pectinatus		x	X	
Naja marina		x		
Ruppia maritima	x	x	X	
Siringodium isoetifolium	x		X	x
Thalassia hemprichii			X	x
Sostrea sp		x		
Total	**8**	**7**	**7**	**8**

(*Source*: Silva EIL et. al 2013)

Estuaries and Lagoons

A coastal lagoon is a shallow coastal body of water, separated from the ocean by a barrier. This barrier can be formed by a coral reef, barrier Island, a sand bar or a spit, shingle or less frequently found rocks. An estuary is a point at which a river and the sea meet. Estuaries are therefore a dynamic ecosystem where sea water is brought in by the tides but is diluted by freshwater flowing in from rivers and streams.

Sri Lanka's coastline is characterized by a series of estuaries and lagoons which are transitional ecosystems of diverse tropic statuses, scenic beauties, rich rare and endemic species, aquatic bio-diversity and ecosystem productivity. They are complex socio-ecological systems containing a diversity of species and a variety of coastal habitats including, mangroves, salt marshes, seagrass beds and mud flats. The heterogeneous nature and complexities of lagoons and estuaries are primarily determined by geomorphology, climate and weather, tidal fluxes and fluvial inputs and cohesive interactions with land based activities (Silva E.I.L et. al 2013). By and large, the range of eco system services provides by the lagoons and estuaries are undervalued and their multiple use and benefits have not been adequately taken into consideration for policy formulation and decision making process. Beside the primary features, the knowledge of the ecological significance of the lagoon and estuaries are negligible. A total of 82 lagoons with a shoreline (perimeter) of 2791 km are located in the coastal region and considered to be highly productive and contained economic value associated with biological production of aquatic and semi-aquatic habitat and mangrove vegetation. Meaningful approach to management of barrier built estuaries and lagoons must combine bio-physical, socio-economic and political considerations. Therefore, estuaries and lagoons are regarded as Socio-Ecological Systems (SES), (Samarakoon et.al (2012).

Table3.3gives the number of lagoons located in each coastal sector with the lagoon area and perimeter**.**

Table 3.3 Number of Lagoons located in each Coastal Segment

Coastal segment	Lagoon Area (sq.km)	Lagoon perimeter(km)	Number of Lagoons*
North	804	1,221	17
Northeast	182	411	04
East	44	174	14
Southeast	29	149	16
South	23	109	10
Southwest	20	166	09
West	46	151	03
Northwest	372	410	09
Total	**1,520**	**2,791**	**82**

(*Source*: Silva E.I.L et. al 2013)

There are two different types of estuaries; Riverineestuaries where the rivers or streams discharge directly into the sea through relatively narrow channels(e.g. the Kelani Ganga, Maha Oya, Kalu Ganga and Nilwala Ganga estuaries), and barrier built basin estuaries where the river or stream first discharges into a relatively shallow basin before entering the sea (e.g.Puttalam, Negombo, Jaffna, Batticaloa estuaries). In some places riverine estuaries open into a bay that opens to these a (e.g. the Kala Oya riverine estuary opens to Dutch Bay; the Mahaweli estuary opens to Koddiyar and Thambalagam Bays, and the Polatu Modara estuary to Weligam Bay). Overall, there are 45 estuaries of which 28 are of the riverinetype and 17 of the basin type. The total extent of basin estuaries in the country amounts to 90,965ha (basin area only), and riverine estuaries cover about 2,110 ha.There are around 82 lagoons ranging from 3 ha to7,589 ha in extent, of which 8 cover more than 1,000ha each. Total extent of lagoons amounts to about 36,000 ha. Lagoons are more abundant along the north, south, southeastern and eastern coasts where the littoral drift causes an accumulation of sand to form barriers and spits at river mouths through which the freshwater discharge is low.

Salt Marshes

Salt marshes are found close to the landward margin of the inter-tidal zone where the soil salinity is relatively high due to insufficient fresh water supply to flush out the accumulated salts. Salt marshes consist of herbaceous, salt resistant plants growing in sandy or mud tidal flats in arid areas and are periodically inundated by the sea.

The existing information revealed that there are around 27,520 ha of salt marshes in the country (*Synthesis report on coastal habitats 2014*).Extensive salt marshes also occur in the Mannar area (mainly on tidal flats and containing about 56 species of marsh vegetation) in the coastal belt from Mantai to Vankalai. Patchy salt marshes also occur mainly in sedimented lagoon/estuarine areas such as Hambantota, Puttalam, Kalpitiya and Mundel.

Mangroves

Mangroves are woody, seed- bearing, highly specialized plants ranging in size from shrubs to tall trees. These shrubs and trees adapted to grow in inter tidal zones of lagoons, estuaries, and sheltered bays in tropical and some sub-tropical regions in the world. Mangrove eco systems consist of inter tidal zones of muddy shores in bays, lagoons and estuaries dominated by highly adapted woody halophytes associated with continuous water courses, swamps, and back waters, together with their population of plants and animals.

Mangroves are highly productive but extremely vulnerable eco systems confined to intertidal zones of coastal environment including lagoons. Sri Lanka's mangrove areas amounted to about 15669 ha in extent in 2013 (Forest Department 2013). As per the estimates prepared in 2014 using GIS and remote sensing, the extent of mangrove areas are about 11656, tidal variation in Sri Lanka is being low and rarely exceeding 75 cm, Therefore, mangroves generally occur as a narrow belt in inter-tidal areas of lagoons, estuaries or associated islands and river mouths.

However, they do not occur in all inter-tidal areas and are confined to areas with low wave action.Although mangroves rarely extend beyond 1km landwards from the mean low water tidal level they may spread up-river to the upper limit of brackish water intrusion in some riverine estuaries, evenup to a distance of 20 km (e.g. Galatara in the Kalutara District). In addition to the tacit value and environmental services rendered by mangroves, it supports the depending communities by providing fish resources, fuel wood, building materials and dyes for coloration of fish nets. (Silva, E.I.L at el 2013). Mangroves serve to reduce the effects of floods while functioning as filters to sift out pollutants that reach the coastal area from inland and trap sediments. It is also important in carbon sequestration.

The major mangrove areas in Sri Lanaka are located around Jaffna, Vadamarachchi (Thondamanar) lagoons,Nanthikadal lagoon in North coast Kokilai, Nayaru, Trincomalee, Kathiraveli, Upparu Lagoon, Valachchenai, Batticaloa Lagoon, Pothuvil in Eastern coast, Weligama, Gintota, Balapitiya, Bentota in Southern coast, and Panadura estuary, Negombo and Chilaw lagoons, Mundal lake, Puttalam lagoon, Dutch bay, Portugal bay and Mannar in Western and Northwestern coast. According to Amarasinghe (1986), 29 mangrove species are found in Sri Lanka.

Barrier Beaches, Spits and Dunes

Barrier beaches are accumulations of unconsolidated sediments transported a shore by waves and moulded into a form that lies across a body of water, isolating it from the sea. **Spits** are incipient barrier beaches that projects from the shore in the direction of the dominant drift and are free at one end. **Sand Dunes** are wind-blown accumulation of sand which are distinctive from adjacent land forms such as beaches and tidal flats mainly due to the fact that dunes do not get the effects of tides.

Sri Lanka's wide and sandy beaches along much of the 1620 km coastline are famed for their scenic beauty and support a distinct littoral fauna and flora. Beaches have been formed by accumulation of sediment deposited on the shore. Among them, barrier beaches, spits and dunes are the most delicate and vulnerable due to their changing nature.

Barrier Beaches

Coastal areas around the island contain barrier beaches that isolate lagoons and swamps from the sea (e.g. the beaches at Rekawa, Kosgoda, and Panama). Barrier beaches are found mainly between Bentota and Balapitiya on the southwest coast. Along the Southern coast there is a barrier beach at Weligama Bay, and several between Dondra and Ambalantota. Thambalagam Bay, awestward embayment of Koddiyar Bay, is almost entirely cut off as a barrier beach which gets partially breached during the Northeast monsoon. Some barrier beaches are free at both ends and form Islands (e.g. at Karaitivu).

Spits

Spits are frequently observed along the Western and Eastern coasts of the country and are associated with estuaries. Examples are the shoal that builds seasonally at the mouth of the Negombo estuary and the sand spit at the Kalu Ganga estuary. Some of the barrier beaches and spits have extensive dunes associated with them asseen at Kalpitiya. Most spits appear to be unstable, especially those which protrude into estuaries (e.g. the Kalu Ganga spit).Consequently they shift position from time to time, causing changes in the form and precise location of the inlets of estuaries. For example, the inlet of the Batticaloa estuary has shifted northward to its present position from a previous location 5 km to the South. Some spits are formed seasonally at estuarine inlets and tend to obstruct the natural water flow patterns, often resulting in the inundation of low-lying lands (e.g. the Kalu Ganga and Maha Oya estuaries).

Dunes

Coastal dunes are unique terrestrial eco-system located in the transition zone between the ocean and the continent. These habitats are naturally dynamic. Therefore highly fragile and vulnerable to the impacts of human induced activities.

There are three types of dunes that have been identified in the country.They are:

- low, flat to slightly undulating, isolated platforms of sand less than 1m in height (e.g. incipient dunes found at Koggala, Matara, Akurala and Uswetakeiyawa);
- transverse primary dunes, consisting of single fore- dune ridges of undulating sand masses associated with stable beaches, exceeding 5m in height (e.g. dunes at Mannar, Pooneryn, Kalpitiya and along the Southeastern coast).
- secondary transgressive dunes; usually exceeding 3m in height (e.g. dunes at Mannar, Pooneryn, Kalpitiya and Jaffna); most of which are longitudinal,some are parabolic, and a few are complexin form.

The most prominent sand dunes lie along the Northeastern, Northwestern and Southeastern coasts of Sri Lanka. These extend from Mullaitivu and Point Pedro, Elephant Pass and Chavakachcheri across MannarIsland towards Kalpitiya and Ambakandawila. On the Southeast, they extend from Ambalantota(Godawaya) in the Hambantota District to Sangamankande Point in the Ampara District. The latter is identified as the longest stretch of dunes in the world, close to the equator.

Sand dunes in Sri Lanka are essential components of the coastal vistas and bio-diversity. The materials in sand dunes protect the land behind them from storm erosion and potential sea level rise. Dune vegetation also traps sand and prevent it from being blown further inland. When there are storm surges and waves, sand dunes prevent flooding inland. According to prevailing information, intact sand dunes were the most effective barrier against tsunami waves that affected the coastal region of Sri Lanka in 2004 (Bambaradeniya et al. 2006).

3.2 NATURE OF THE PROBLEM

Despite the management measures adopted by Government, Non-Government and Civil Organizations in the country, a significant amount of coastal habitats in Sri Lanka have undergone degradation in different degrees in different locations in the pastresulting in the decline of their resources as well as extents at an unprecedented rate. Underlying the apparent degradation of coastal habitats is the fact that they are very fragile and vulnerable to many dynamic processes occurring on land and in the sea, due to both natural causes and human interventions. These factors could be categorized into three. Firstly, the quality and quantity of coastal habitats have been degraded due to over exploitation parallel to population growth in the coastal region, for the purpose of economic benefits. Secondly, natural chronic and episodic disasters such as coastal erosion, cyclones (1978) and tsunami (2004) "El Nino" Southern Oscillation effect (1998) directly created a negative impact on most of the coastal habitats located within the coastal region. Thirdly, the thirty year conflict situation that prevailed in the country until 2009 caused much damage to some of the coastal habitats, especially in the North and the Eastern coastal region.

3.2.1 Issues and Threats

Damage and destruction of coral reefs

The value of environmental services of coral reefs in providing benefits to the society is very significant and identified as most valuable shallow water marine habitats in Sri Lanka. However, these reefs are now degraded at many sites, due to both natural causes and human impacts. The degraded reef eco-system can be seen especially in the near-shore areas of western and southern coastal segments.Prior to tsunami event experienced in 2004, the principal cause for coral reef destruction was the large scale mining of corals for the lime industry. This is despite the ban imposed in 1988 on mining, collecting, transporting and processing of sea coral.The available data show a perceptible decline of sea coral mining between 1984 and 1998. After the tsunami event, mining of sea corals for lime industry in the south and south western coastal region was tremendously decreased to a negligible level. Apart from the regulatory measures, public awareness and monitoring procedures implemented by the Coast Conservation and Coastal Resources Management Department as well as self-realization of the importance of coral reefs among the coastal communities led to this situation.

Among the other factors that cause damage to coral reefs is use of destructive fishing methods such as use of dynamite, use of moxy nets to catch ornamental fish, and bottom set nets on coral reefs to catch lobsters,have been reported. Use of unregulated fishing gears such as "surukku" and "lyila" nets also reduced valuable and rare fish species inhabiting the reefs.

The growth of the coastal tourist industry has also directly and indirectlycaused damage to the coral reefs, particularly those in the southern, northwestern and eastern coastal areas. Direct habitat loss or damage was evident in these areas due to stepping on the reef, placing anchors on coral reef areas, ramming of glassbottom boats against the reef and collection of reef materials as souvenirs. In addition, indirect impacts such as pollution due to incorrect siting of sewage disposal systems related to tourist facilities, inadequate or poorly designed infrastructure are quite evident in these areas.

Beside human interventions, coral destruction in most shallow areas was evident in 1998 due to mass bleaching caused by high water temperature associated with 'El Nino" Southern Oscillation (ENSO) effect in many areas. In recent years El Nino events have become more frequent, with the interval reducing from 12 years to 7 years although the time frame is too short to confirm this trend. As per the prevailing records, there were somewhat significant bleaching events that occurred in 2000, 2002, 2003 and 2005 in various parts of the country but not on the scale of 1998. However, the magnitude of the bleaching event that occurred

in 2002 in the southern part of the island was similar to the 1998 bleaching event (Synthesis Report 2014). In addition, proliferation in plagues of coral predators such as crown of thorns starfish (*Acanthaster planci*) also damaged the coral reefs significantly. Such plagues are increasingly reported close to large human populations, where there is evidence of over fishing and/or increases in nutrient runoff from the land. There are more reports of damage to coral reefs from the predatory gastropod mollusk, *Drupella.* Beside predators, some of the major reefs were observed with massive algal growth (*halimeda Sp*) specially in Pigeon Island and Polhena Reefs. Spreading of invasive species is now being recognized as a major potential threat to the ecological balance of the coral reef. The invasive species which have damaged reefs in the western part of the country are suspected of being introduced via the ballast water or hulls of cargo ships or from ill-informed release of aquarium specimens (Synthesis Report on Coastal Habitats 2014).

As per the rapid assessment carried out by NARA in 2005, the impacts of 2004 tsunami on the coral reefs and the damages were reported as relatively high level in some areas and described as widespread and patchy. According to this assessment, in one location on the southwest coast, zero impacts were recorded for coral reefs, while for most other locations the impacts were reported as medium or high. The greatest impacts were reported from Dutch Bay where reef damage was considered extreme and fish life was reduced drastically (http://www.fao.org/docrep/010/ai000e/AI000E07.htm)FAO 2007). In addition coral reefs located in the southern coast of Tangalle, Kudawella, Kapparatota/Weligama Polhena, Unawatuna and Hikkaduwa were also substantially damaged. The degree of damage was patchy and frequently caused by the movement of rubble from corals affected due to 1998 bleaching event (Synthesis Report on Coastal Habitats 2014).

Table 3.4: The 1999-2000 live coral cover reflects the situation of reefs after bleaching (Rajasooriya 2003)

Location	Depth (m)	Pre-bleaching Live coral cover	1999–2000 Live Coral cover	2001–2002 Live Coral cover
Bar reef marine sanctuary	0-3	78.5%	Nearly 100% Mortality	New growth present
Bar reef marine sanctuary	7-8		Nearly 100% Mortality	14%
Kandakuliya	0-5	22%	New growth after bleaching	New growth destroyed by Halimeda
Hikkaduwa	0-4	47%	7%	12%
Weligama	0-2	92%	30%	54%
Rumassala	1-5	45%	19.6%	23%

Degradation of lagoon and estuarine habitats

The Lagoons and estuaries are valuable coastal eco-systems in Sri Lanka that act as economic drivers by providing sources of income for the fisher communities, contained rich bio-diversity and provided anchoring facilities for the fishing crafts. For example the yearly earnings from fisheries in three most productive barriers built estuaries, Negombo, Puttalam and Batticaloa alone exceed two billion rupees (Samarakoon J, at el 2012). However, the lagoons, estuaries and the biodiversity they contained are under heavy stress and confronted profound changes due to population growth in the coastal region, pollution due to the inflow of

sewage, untreated industrial effluents, urban wastes and waste oil, spreading of invasive plant species and climate change repercussions. In the northwestern coastal belt, lagoons and estuaries are polluted due to discharges from shrimp farms. Some of the lagoons/estuaries are degraded by coconut husk retting, sand mining and anchoring of fishing crafts (e.g. Madu Ganga estuary, Bolgoda estuary, Negombo estuary). Other adverse impacts felt are increased siltation due to development activities inland such as irrigation schemes, soil disturbance from agriculture, deforestation, mining and construction. The salinity regimes in several lagoons/ estuaries have been affected by changes in natural flows due to irrigation schemes. This sometimes triggers off the growth of invasive plant species such as Najas marina and Salviniamolesta. These habitats are also affected by indiscriminate harvesting of commercially important species.

Other issues connected with these habitats are the loss of functional lagoon/estuarine water area due to unauthorized encroachment and land reclamation (e.g. Bolgoda, Negombo estuaries, Mawella and Lunawa lagoons). There has also been loss of ecological and aesthetic value in some of the estuaries and lagoons (e.g. Bentota, Madu Ganga estuaries and the Bolgoda lagoon). All these adverse impacts hamper the use of lagoons/estuaries for fishery, tourism, scientific research and education. This is of concern as, for instance above 30,000 part-time and full-time fishermen are engaged in the lagoon/estuarine fishery in Sri Lanka.

In general the resources in the majority of the lagoons in Sri Lanka still remain either satisfactory, somewhat good or very good status. Lagoon resources in the Mannar district are reported to be in a better condition than the lagoons in other coastal districts. However lagoon resources in the Hambantota, Colombo and Galle District have been categorized as “bad” or very bad” (Silva E.I.L. at el 2013).

Damage to sea grass beds

The current information on the status of sea grass beds in Sri Lanka has not been updated in the recent past. However as per the existing information, the sea grass beds in lagoons and around the coral reefs are often damaged due to destructive fish harvesting techniques. Trampling or using fishing gear that rakes up sea grass are also damaging. Push nets and drag nets cause immense damage to sea grass meadows in coastal wetlands (Miththapala.S 2008). In Sri Lanka large scale commercial trawling and drift netting over the seagrass beds that occur between Puttalam and Jaffna and beach seining in certain sections of the coastline also affect seagrass beds. The reported mass scale poaching in the form of trawling operations by Indian fishermen in the northern coastal waters also created severe damage to the sea grass beds. In certain areas commercial polycheate harvesting as broodstock feed for shrimp hatcheries also causessevere damage to seagrass beds (e.g. Negombo and Chilaw estuaries). Other adverse impacts are from siltation resulting from offshore sand mining, land-based activities such as changes in catchment hydrology through irrigation schemes. Sandbar formation, either through natural causes or those induced by human activity may also cause degradation of seagrass beds. Damage to sea-grass beds in Sri Lanka due to 2004 Tsunami has been reported as a minor incident (FAO 2007). In addition, higher water temperatures related to climate change also will directly effect on the growth, reproduction and general metabolism of sea grases (Miththapala.S 2008).

Damage and destruction of mangrove areas

A substantial damage to the mangrove swamps especially those located in the Northern and Western provinces in the country has been caused by the conversion of large extent of mangrove areas to shrimp farms and salterns. In addition, lowland agriculture, housing construction and expansion of human settlement also contributed in a significant manner to damage the mangrove areas. The mangroves associated with Negombo Lagoon environment diminished to 253 ha. in 2010 indicating loss of nearly 100ha. over a period of 20 years, due to man induced causes(Kasige at el 2012, EML). In the northwestern province, loss of mangroves

occurred primarily because of expansion of shrimp farms, but smaller scale losses have also taken place due to expansion of human settlements and industries. By and large, there has been a significant reduction of the mangrove cover between 1986 and 2009 largely due to human interventions. There is also over-use of mangrove resources. For example, the extraction of poles and wood for domestic use and twigs for brush pile fishery is beyond sustainable levels. Mangrove eco-systems are also degraded by water pollution and siltation. In addition to man induced causes, natural causes such as Tsunami and spreading of invasive species also damaged the mangroves in the recent past. As a result of 2004 Tsunami event, large patches of mangroves have been destroyed in Valachenai, Akkaraipattu, Sallitivu, Vakarai and Panama coastal segments. The invasive alien species such as *Annona glabera*, *Typha angustifolia, Salvinia molesta, Pistia stratiotis* and *Naja marina* also created a negative impact on the mangrove eco-systems (Synthesis Report on Coastal Habitats, 2014).

Destruction of salt marshes

Salt marshes mainly occur in regions where the dry season is prolonged as in the north, northwest, northeast and the southeast in the country. Salt marshes provide many vital ecological functions including resting and feeding areas for migrant and resident wild life (Synthesis Report on Coastal Habitats 2014). The salt marshes have been reduced quite considerably in the District of Puttalam where they have been converted for establishing shrimp farms and salterns. It is reported that the extent converted was nearly 2,960 ha between 1986 and 2002. (Dayaratna et al 1997) reported that about 50% of the salt marshes around Puttalam lagoon area have been lost within a ten year period (1981 -1992) largely on account of shrimp farms. The salt marshes located in the eastern province have been subjected to pollution from waste-water, chemicals from agriculture and industrial activities, sewage and solid waste (Synthesis Report on Coastal Habitats 2014).

The salt marshes located in the northern region especially in the Mannar District were unaffected during the last three decades due to the conflict situation that prevailed in the areas. Unlike the other coastal habitats, absence of proper environmental valuation of the salt marshes has created an ambiguous status about the usage.

Degradation of sand dunes, barrier beaches and sand spits

The degradation of sand dunes, barrier beaches and sand spits in Sri Lanka are mainly due to encroachments for construction of dwellings, expansion of human settlements, siting of hotels and related infrastructure,and transformation to agricultural lands for cultivation of coconut, chili, onion and other crops. Consequently, the littoral woodland zone'which typically has a thick growth of shrubs and low tree species is now greatly reduced in many areas. It is also evident in some areas of the southern and eastern coasts that some beaches and spits, as well as mangroves, have been lost due to impacts of floods, tsunami (2004), cyclones and sea erosion.

This problem has been aggravated by coral mining, improperly sited coastal structures and sand mining on beaches and in the rivers. Another problem is that beaches are treated as dumping grounds for solid waste, particularly in urban areas. Beaches are also polluted due to accumulation of tar balls formed when bilge waters from ships get washed ashore as reported from Wadduwa to Mirissa on the western and southern coasts. (This may also adversely affect other coastal habitats such as coral reefs and sea grasses). In some coastal areas (e.g. Batticaloa and Hambantota Districts) exotic plant species have been introduced for beach and dune stabilization; and concerns have been expressed of their adverse effects.The main beaches along the southern coast from Kosgoda to Palatupana, Palaitivu Islands in the northern coast and Arugam Bay in the eastern coast provide nesting sites for five turtle species that come ashore for nesting. These habitats

are getting degraded at a rapid rate due to indiscriminate allocation of land for construction of hotels, the proliferation of slums and shanties, incorrect siting of tourist facilities and ribbon development.

3.2.2 The Impact of Conflict Situation on the Coastal Habitats

The natural characteristics of the coastal environment in the northern and the eastern region in Sri Lanka have been rapidly changed during the conflict situation and the post conflict rehabilitation process. The impacts of the conflict situation that prevailed in the northern and the eastern provinces in the country for a long thirty year period neglected the conservation of coastal habitats such as mangroves, sand dunes, coral reefs and sea grass beds. The impact of the conflict situation on the quality and quantity of coastal habitats has not been assessed yet. However it was evident that direct impact has been created on the sand dune ecosystems located in the Manalkadu and Pooneryn areas in the Northern Province. In addition field observations revealed that mangroves have been cleared in some areas. These impacts have appeared due to the security requirement such as clearing mangrove forest areas, extraction of sand for construction of safety measures, use of explosives and heavy weaponry during the war situation by the government security forces and the terrorist groups. However the extent and the cost of destruction of coastal habitat due to conflict situation has not yet evaluated in economic terms.

3.2.3 The Impact of 2004 Tsunami on Coastal Habitats

The Asian Tsunami that struck on 26th December 2004 was probably the worst natural disaster in the Sri Lankan history because of the numbers of people affected, its extent and complexity. Many reports been written about its impact on the coastal habitats during the rebuilding process. Among the other coastal habitats, mangroves are the most affected habitat due to Asian tsunami in 2004. As per the post tsunami assessment, mangrove vegetation in Valachchenai, Akkaraipattu, Sallitivu, Vakarai and Panam in Batticaloa and Ampara Districts were severely damaged in the eastern coastal segment while significant damage has been reported from Tangalle, Rekawa, and Kahanda modera in the Hambantota District. The damage on the mangroves was mainly observed in the form of uprooting (Synthesis Report on Coastal Habitats 2014).

The impact of Tsunami on coral reefs was highly variable and range from almost unaffected to extremely damaged. The reefs located on the east and the northeast coast was severely damaged while reefs on the northwest coast were generally unaffected. Almost total destruction of a reef was reported from Dutch Bay off Trincomalee town in the eastern province. Most of the damages reported were mechanical, with breakage of fragile corals, notably Acropora and Montipora spp., and larger massive colonies toppling over. With respect to southern coast, coral reefs were damaged at all sites on the reefs of Tangalle, Kudawella, Kapparatota/Weligama, Polhena, Unawatuna and Hikkaduwa (Synthesis Report on Coastal Habitats 2014).

Impact on fish population seems correlated with reef damage, most likely due to loss of fish habitat. The impact on larger reef fish species such as groupers (*Serranidae)*, snappers (*Lujanidae*), sweetlips (*Haemulidae*), emperors (*Lethrinidae*) seemed low whilst smaller reef dwelling species such as damselfish (Pomacentridae), butterflyfish (*Chaetodontidae*), gobies (*Gobiidae*) and wrasses *(Labridae*) seemed high, in damaged areas.The impact of tsunami was significant where coral mining has been reported.According to a research conducted by University of Notre Dame, Illinois USA (2005) using a tsunami simulation model with coral reefs, a direct linkage between coral mining in the southern coast and the devastation of tsunami (Rodrigo Malaka 2005) was found.

The impact of Tsunami on salt marshes was mainly reported as confined to filling of debris and sand deposition. The black mud deposited on the marsh vegetation had a fatal effect on plant life. It also killed aquatic life in smaller bodies of water (Munasinghe 2005). Among other coastal habitats, sand dunes served as a protective barrier against the tsunami, in most of the coastal areas with uninterrupted dune

systems. This was mainly evident in areas such as Panama, Pothuvil, in the eastern coast and Mirijjavila in Hambantota district where tsunami damage was minimal in the landward of the dune system. In contrast, in the same locations where sand dunes have been destroyed, massive destruction was created due to the tsunami (Arugam bay, Bombu ela area in Hambantota,)

The damage on the sea grass beds due to the tsunami has been reported as minor and mostly due to shifting of rubbles, deposition of dibris. No uprooting was reported (Synthesis Report on Coastal Habitats 2014). With respect to lagoons, the International Tsunami Survey Team (ITST) reported that, sand eroded from the shore face and the beaches had deposited as a sheet in inland areas including lagoons (Silva E.I.L at el 2013).

3.2.4 Climate Change Repercussions and the Status of Coastal Habitats

The coastal environment and its habitats are changing more rapidly and more broadly in the country than ever before due to both human induced and natural causes. The climate change related factors have been identified as major potential factors leading to changes in the composition, bio-diversity and the quality of coastal habitats. The climate change repercussions could be clearly seen from the sensitive and fragile coastal habitats such as coral reefs and sea grass beds.

3.2.5 Coastal Habitats are undervalued resulting in Unsustainable Use

The actual economic values of the coastal habitats are not comprehensively estimated yet. Thus there is a tendency to under estimate the total economic value of the coastal habitats when siting development activities within the coastal zone. In the phase of rapid development taking place in the coastal region in the areas of road development, commercial and fisheries harbour development, reclamation and island development and coastal tourism, it is important to incorporate environmental valuation in the decision making process.

3.2.6 Balancing Conservation and Development

The aftermath of the 2004 tsunami and the thirty years of the conflict situation that prevailed in the country, the requirement of rapid economic development, the enhancement of the per capita income level was considered the most priority condition. Major development thrust directed on coastal region, negative impacts on the coastal habitat are inevitable. Thus the balancing of conservation needs with the economic development requirements have to be carried out in a more realistic manner emphasizing total economic value of the coastal habitats. In compliance with the current economic attempt being applied by the GOSL on skipping from the middle income trap, much emphasis have to be placed on conservation needs and mitigatory measures, when using the coastal areas.

3.3 ADDRESSING HABITAT CONSERVATION

3.3.1 Policies, Plans, Laws and Institutional Arrangements

Current rate of depletion and degradation of coastal habitats in the country highlights the requirement of conservation and adaptive management. The management of coastal habitats in a comprehensive and holistic manner was initiated by the CCCRMD through formulation and implementation of CZM Plans of 1990, 1997 and 2004. The policy arena with respect to habitat management initiative was further strengthen through “Coastal 2000: Recommendations for a Resource Management Strategy for Sri Lanka’s Coastal Region” produced in 1992. These initiatives led to formulation and adoption of several management

strategies covering regulation, education and awareness creation, planning and policy development, monitoring, research and coordination. Conservation of coastal and marine habitats and their bio-diversity are also addressed in the National Bio-diversity Conservation Action Plan implemented by the Ministry of Environment and Natural Resources. The legal provisions in the Coast Conservation Act No. 57 of 1981and its subsequent amendments No: 64 of 1988 and No.49 of 2011 also promote the conservation of coastal habitats through regulatory measures. The expansion of the legally defined coastal zone through 2011 Coast Conservation Act amendments covering the riparian land of the coastal water bodies has placed more emphasis on conserving the coastal habitats through regulatory process.

The National Strategy and Action Plan published by the IUCN, Sri Lanka Office for the National Steering Committee of the "Mangrove for the Future" Programme, Sri Lanka, proposes an eco-system based on integrated Coastal Management in Sri Lanka. This is based on an evaluation of the 30 year record of coastal management in Sri Lanka, and postulates that "a more systemic approach is perceived to be imperative". Whilst some of the recommendations that can be accommodated within the current legal mandate of the CC & CRMD have been included in this plan, a shift to eco-system based integrated coastal management would require a major re-orientation of the Coast Conservation Act which would in turn depend on the official acceptance of the proposed Strategy and Action Plan at the highest levels of policy making.

If so accepted, due regard shall be paid to this aspect in the revision of this plan within the next five years as mandated by the Coast Conservation and Coastal Resource Management Act.

Table 3.5 Key Management Strategies adopted by the CC&CRMD for Coastal Habitat Conservation

Regulatory	• Banning of all activities pertaining to sea coral mining • Permits from CC&CRM made mandatory for all development activities in the Coastal Zone • Expansion of coastal zone covering riparian land of the coastal waterbodies • Legal provisions introduced to declare"conservation areas" and "Affected areas".
Education and awareness	• Dissemination of knowledge through printed materials on the value of coastal habitats, and issues pertaining to them • Inclusion of facts about problems affecting coastal habitats into the secondary school curriculum • Conducting awareness programmes on different coastal habitats for school children, teachers and key stakeholders.
Planning and policy development	• Conservation of coastal habitats through Special Management Area Plans in selected sites • Institutionalization of SMA process.
Monitoring	• Implementing a monitoring programme on coral and sand mining
Research	• Supporting research on coral reefs and mangroves
Co-ordination	• At the national level: Coast Conservation Advisory Council. • At the local level: The Coast Conservation Coordinating Committee, Steering Committees and SMA Community Coordinating Committees (CCCs) • Supported through IUCN- MFF programme

3.3.2 Institutional Mechanisms and Key Initiatives

There are several ministries, government departments and other agencies that are responsible for the conservation and management of coastal habitats. The CC&CRMD, the Ministry of Fisheries and Aquatic Resources, The Ministry of Environment and Renewable Energy, the Department of Wildlife Conservation (DWLC), The Forest Department, the National Aquatic Resources, Research and Development Agency (NARA), the Central Environmental Authority (CEA), Marine Environment Protection Agency (MEPA) and the Urban Development Authority (UDA). Each has a specific role to play in the conservation and management of various coastal habitats. In addition the coastal Provincial Councils also should play a key role in managing coastal habitats in their respective provinces. The activities of the Irrigation and Agriculture Department also have major impacts on coastal habitats, as do the activities of the respective Provincial Councils, Pradeshiya Sabhas and Divisional Secretariat Offices.

3.3.3 Future Trends in Management Practices

Attempts at adopting an integrated approach to management of coastal habitats in the past indicated a need for closer co-ordination among institutions that have jurisdiction over various coastal resources. Future strategies for conservation and rational management of coastal habitats should take due cognizance of the constraints encountered in the past. The management measures adopted by the CC&CRMD in respect of coastal habitats have relied considerably on regulatory initiatives. Strength eninginstitutional integration and community participation should receive high priority, since they have been identified as the weak links in implementing coastal resources management plans. Community participation is vital to resolve user conflicts encountered in different eco-systems, and Special Management Area initiatives should be adopted as a tool where possible to promote community participation in dealing with specific coastal habitats and the various issues connected with them.

The adoption of an integrated approach is required for law enforcement and the implementation of recommendations in other action/management plans pertaining to coastal habitats (e.g. the Bio-diversity Conservation Action Plan prepared by the Ministry dealing with the environment). There should also be adequate institutional co-ordination and co-operation in the preparation of all Coastal Resources Management Plans. For instance, integrated coastal habitat management involves close links with watershed management thus all agencies in the relevant discipline should get involved in the management process. It is also extremely important to ensure that development activities are regulated through appropriate procedures to address the crucial issue of coastal pollution that have significant impact on coastal habitats. Public awareness is also considered to be an effective tool for habitat conservation. Therefore adequate emphasis has to be givenin this respect in future management practices.

Future approaches for coastal habitat management should also be geographically specific and based on well-explained links between human activities and changes within the natural systems. The overall management objectives in respect of coastal habitats in the future should be to ensure the sustainable management of coastal habitats and for the preservation and enrichment of their natural features. Achieving this requires addressing the issues pertaining to each habitat separately in view of their specific characteristics and requirements. Care has to be taken to ensure that all policies and actions for conservation of coastal habitats comply with the National Physical Development Plan, the National Environmental Action Plan and the National Bio-diversity Conservation Action Plan and the other national planning initiatives. It is important to implement coastal habitat management on a prioritized basis as some habitats are faced with severe threats that require immediate attention. While no attempt has, however, been made to prioritize coastal habitats for management action in this document, this could be an important aspect to be addressed in implementing the CZMP. In the preparation of plans, especially for the Special Management Areas, care

should be taken that the linkage between the individual habitat and the eco-system unit in which they are nested is not lost site of.

In order to address the future requirements for coastal habitat conservation, this chapter has identified a range of actions after analysis of the gaps in interventions adopted in the past as well as the current management requirements. Specific conservation issues have been identified for each habitat, and the policies, strategies and actions required to remedy these situations are provided accordingly in view of their present status and associated uses.

3. 4 MANAGEMENT OBJECTIVES, POLICIES, STRATEGIES AND ACTIONS

Objectives 1

Coral reefs are conserved to enhance bio-diversity, non-extractive values, provide barrier against coastal hazards such as erosion, tsunami, storm surges, permit sustainable use of bio-resources and sustain fisheries and other economic activities.

Policy 1.1

The degradation and depletion of coral reefs in quantitative and qualitative manner due to human induced activities within and outside the Coastal Zone will be minimized.

Strategy 1.1.1

Enforce existing legislations and regulations effectively to minimize/eradicate damage to and destruction of coral reefs through human induced activities.

Proposed Actions

1. Continue to enforce existing laws/regulations to prevent the degradation of coral habitats.

2. Continue implementation of the provisions of the Coast Conservation and Coastal Resource Management Act against sea coral mining to improve current condition more effectively.

3. Assist relevant authorities to control mining of inland corals and to minimize negative impacts.

4. Continue awareness creation programmes for identified target groups such as coral-based lime users, coastal dwellers, ornamental fish collectors, fishermen, tour guides and glass-bottom boat operators on laws/regulations relevant to preventing damage to coral reefs.

Strategy 1.1.2

Promote the use of alternative sources of lime to meet the requirements of the construction industry and agriculture.

Proposed Actions

1. Provide appropriate publicity to uses of alternative substitutes and construction technology for coral-based lime to enable to conserve coral reefs.

2. Encourage and advocate for introducing market instruments to promote the use of substitutes to coral-based lime among different user groups.

3. Continue implementation of the policy on the restriction of the use of coral-based lime in state construction works.

Policy 1.2

Mainstream concerns regarding climate change and other natural events into management of coral reefs where possible.

Strategy 1.2.1

Implement recommended policy guidelines under climate change adaptation for coral reefs.

Proposed Actions

1. Facilitate and support monitoring activities conducted on status and trends of the health of the Coral Reefs by NARA.

2. Ensure continuous compliance with the climate adaptation policies.

3. Carry out appropriate action to improve post event of coastal environment to facilitate fast recovery of coral reef habitats.

Policy 1.3

The bio-diversity of coral reefs will be conserved/enhanced through adherence to sustainable fishery management practices.

Strategy 1.3.1

Prevent/minimize through appropriate management practices, over-exploitation of reef organisms such as aquarium fish, lobsters, chank, sea cucumber etc.

Proposed Action

1. Encourage and facilitate continuation of implementation of the recommendation related to fish stock assessment conducted by DFAR / NARA on lobsters, chanks, ornamental fish and sea cucumber.

2. Monitor effectiveness of implementation of guidelines and regulations enforced by DFAR on fish stocks.

3. Support implementation of actions proposed in the Bio-diversity Conservation Action Plan as relevant for conservation of coral reef associated bio-diversity.

Policy 1.4

Scientific research relevant to coral reef restoration/rehabilitation and conservation will be promoted.

Strategy 1.4.1

Promote and support coral reef surveys and restoration through collaborative research on these habitats and their resources and promote measures for sharing/effective dissemination of information.

Proposed Action

1. Conduct survey to determine actual extent, status and value of coral reef habitats associated with the coastal waters of Sri Lanka.

2. Identify and disseminate information regarding priority sites for coral restoration, and the methods and the technology for reef restoration.

3. Initiate a programme in collaboration with local/foreign funding organizations and research institutions/ universities to replant, corals in areas where heavy destruction of corals is evident with community participation.

4. Initiate a mechanism to enhance capacity and promote collaborative research on coral reef organisms that could enhance quality of life (e.g. organisms of medicinal value).

5. Promote investigations on development of starfish population on spatial basis and carry out a 'Crown of Thorns' starfish (*Acanthasterplancii*) eradication programme.

6. Assist NARA to regularly update the meta-database developed on corals and establish an inter-institutional meta-database on coral reefs and establish a mechanism to provide access to this information.

7. Improve socio-economic data collection on reef resource uses to facilitate management of reef harvesting and other uses.

Policy 1.5

Management of tourism, recreational and other development activities associated with coral reefs shall ensure the health of the coral reefs.

Strategy 1.5.1

Manage tourism and other development activities to minimize negative impacts on coral reefs and the resources they contain through collaborative measures.

Proposed Action

1. Promote participation of private entrepreneurs in managing coral reefs located in the respective tourism development areas with required community participation.

2. Control discharges and sedimentation from development activities through regulatory measures (permits, EPL, EIA/IEE) in collaboration with relevant agencies.

3. Enhance livelihoods of the coastal communities through non-extractive uses of the coral reefs in tourism areas in collaboration with the private sector involvement.

4. Initiate community surveillance programmes with DWC to minimize negative impacts on coral reefs related to tourism, recreation and fisheries activities.

5. Initiate collaborative programmes with hotels/Tourist Board to provide interpretative facilities in hotels in areas with potential for coral reef viewing to increase enjoyment of the resource and for conservation.

6. Promote awareness among tourists and tour guides on the conservation status of reefs and reef organisms through collaborative programmes with the Tourist Board, hotels and tour operators, Customs and Airport authorities.

7. Coordinate and support customised training programmes and reference material to assist with identifying coral reef organisms prohibited for export for relevant state officials.

8. Promote and conduct coral reef transplantation programme in coral reef degraded areas with the assistance of NARA, universities and associated communities.

Objective 2

Lagoons and estuaries are conserved to sustain and enhance ecological functions, promote socio-economic activities and non-extractive values while maintaining resource sustainability.

Policy 2.1

The degradation of estuaries and lagoons due to man induced causes and development activities within and outside the Coastal Zone will be minimized / eradicted.

Strategy 2.1.1

Minimize the discharge of untreated industrial effluents and sewage into estuaries/ lagoons through monitoring and enforcing compliance with existing regulations and guidelines.

Proposed Action

1. Expand existing coastal water quality monitoring programme of the CC&CRMD covering lagoons and estuaries to determine the impacts of industrial effluents (including effluents from shrimp farms) and sewage discharged into them.

2. Initiate and implement or support existing programmes in collaboration with Local Authorities and other relevant agencies to develop mitigatory measures to minimise adverse impacts of industrial pollution and curtail direct discharge of sewage from dwellings into lagoons and estuaries.

3. Formulate a compliance monitoring programme to ensure that all industries within the Coastal Zone adhere to the conditions/guidelines imposed through Development Permits, EPL and EIA/IEE.

4. Implement existing provisions of the relevant legal enactment to curtail, pollutant discharges into lagoons effectively.

Policy 2.2

Lagoons and estuary mouths/outlets and adjacent banks will be managed based on sound scientific information.

Strategy 2.1.2

Minimize reduction of functional area of lagoons and estuaries due to encroachments, reclamation, removal of vegetation and other development activities.

Proposed Actions

1. Survey and demarcate the boundaries of the lagoons and estuaries with the assistance of relevant agencies.

2. Implement development permits procedure to control development activities covering riparian land and the water area lying within the coastal zone.

3. Adopt legal provisions of the CC&CRMA pertaining to SMA to control development activities associated with the lagoons and estuaries.

4. Enforce prevailing regulatory measures against encroachments and reclamation.

Policy 2.3

The economic, ecological and social values of estuaries and lagoons will be recognized and enhanced.

Strategy 2.3.1

Promote sustainable management of resources in estuaries and lagoons through eco-system service valuation and with community participation.

Proposed Action

1. Prepare eco-system service valuation model for selected politically, economically significant barrier built estuaries (Negombo and Puttalam).

2. Ensure that the fishery in estuaries/lagoons is at sustainable levels by regulating gear, methods and effort.

3. Formulate programme to promote use of ecological, aesthetic and recreational value of estuaries/lagoons and their natural environs with the relevant stakeholders while maintaining the sustainability of the resources.

4. Encourage and assist to implement the relevant recommendations of the National Biodiversity Conservation Action Plan implemented by the Ministry of Environment.

5. Study the impacts of sand bar formation/removal on selected estuaries/lagoons and identify measures to mitigate adverse effects.

Strategy 2.3.2

Minimise changes in estuarine/lagoon environments from adverse impacts of water diversion and irrigation schemes through collaborative programmes.

Proposed Action

1. Develop a mechanism to integrate lagoon and estuary management with watershed management to minimize pollution/siltation/salinity changes caused by upstream development activities, including irrigation works.

2. Study the impacts of water diversion/irrigation on selected estuaries/lagoons and identify measures to mitigate adverse effects.

Objective 3

Seagrass beds are conserved to sustain ecological functions and socio-economic values.

Policy 3.1

Direct and indirect damage to sea grass beds from activities will be minimized.

Strategy 3.1.1

Minimise negative impacts of activities that damage seagrass beds through existing regulatory measures with relevant agencies.

Proposed Action

1. Enforce existing regulatory measures to prevent pollution, sand mining, destructive fishing methods and other activities that damage seagrass beds.

2. Implement EIA/IEE procedures to avert potential negative impacts of dredging and mining in the coastal waters.

Policy 3.2

Research and community awareness on sea grass beds in Sri Lankan waters will be promoted.

Strategy 3.2.1

Initiate inter agency collaborative research and monitoring and awareness programmes that will help enhance management of sea grass beds.

Proposed Action

1. Initiate programme to carry out systematic mapping of critically threatened seagrass beds in Sri Lankan waters.

2. Declare vulnerable/threatened sea grass beds as conservation areas under the provisions of the CC&CRMA.

3. Initiate a programme to study the adverse effects of catchment hydrology and sand bar formation on seagrass beds and propose management measures.

4. Carry out public outreach programme on conservation of sea grass beds and associated habitats among target groups.

5. Address, conservation of sea grass meadows in the lagoons through SMA process.

Objective 4

Mangrove eco-systems are conserved and managed to maintain biodiversity, sustain eco-system services and socio-economic activities.

Policy 4.1

Depletion and degradation of mangroves due to unplanned development activities will be prevented/ minimized.

Strategy 4.1.1

Formulate and implement programme to prevent or minimise damage to mangrove systems.

Proposed Action

1. Identify vulnerable mangrove areas where management is urgently needed, and prioritize for conservation.

2. Declare conservation areas based on the priority list with the assistance of Forest Department.

3. Formulate guidelines for mangrove replanting schemes to rehabilitate identified degraded mangrove areas.

4. Regulate new development activities in mangrove areas through EIA/IEE procedures and permits.

5. Introduce a monitoring mechanism to identify the adverse impacts of present and future development activities within mangrove ecosystems and formulate suitable mitigatory measures.

6. Identify suitable sites where sustainable extraction of mangrove resources can be permitted, and formulate and implement guidelines for such uses.

Policy 4.2

The sustainable use of mangrove resources connected with economic activities will be supported.

Strategy 4.2.1

Support and promote sustainable management of mangroves for economic activities through agency collaboration and community participation.

Proposed Action

1. Promote private entrepreneurs to establish ecotourism projects in suitable areas with community participation.

2. Identify non–destructive uses of mangrove resources at community level and disseminate such information to stakeholders.

3. Establish a suitable mechanism to ensure inter-agency co-ordination and participation to promote sustainable use of mangrove resources.

4. Formulate and implement programmes through SMA process to ensure sustainable use of mangroves.

Policy 4.3

Protect mangroves within the CZ in compliance with the existing legal provisions.

Strategy 4.3.1

Encourage and promote enforcement of legal provisions to protect mangroves within the coastal zone.

Proposed Action

1. Formulate and implement education and awareness programmes on the prevailing legal provisions among stakeholder groups.

2. Encourage community participation in obtaining information on contraventions of the legal provisions.

Objective 5

Barrier beaches, spits and sand dunes are conserved to sustain ecological functions and socio-economic and aesthetic values**.**

Policy 5.1

Coastal development activities that degrade barrier beaches, spits and sand dunes will be regulated.

Strategy 5.1.1

Minimise adverse impacts of development activities on barrier beaches, spits and sand dunes through regulatory measures and establishment of Dune Protection Lines (DPLs).

Proposed Action

1. Declare barrier beaches, spits and sand dunes located in front of low-lying areas as Sensitive Zones and control all activities detrimental to these declared areas.

2. Declare and implement siting criteria for new development activities close to barrier beaches, spits and sand dunes.

3. Make EIAs mandatory for siting new development in or in close proximity to barrier beaches, spits and sand dunes where necessary in areas outside the Coastal Zone.

4. Enhance co-ordination with relevant agencies to ensure compliance of all regulations pertaining to new development in or in close proximity to barrier beaches, spits and sand dunes.

5. Collaborate with concerned organisations to prevent allocation of crown land adjoining barrier beaches, spits and sand dunes for development purposes.

6. Establish Dune Protection Lines (DPL) in important dune areas based on a land survey considering the setback standards stipulated in this document.

7. Prohibit all new development activities, and further expansion of already existing structures within the DPLs.

8. Devise effective programmes to communicate with key stakeholders on the importance of maintaining DPLs.

9. Manage and regulate exploration/extraction of commercially valuable minerals and mineral sands from barrier beaches, spits and sand dunes in conformity with the Minerals and Mines Act, No. 33 of 1992 and in consultation with the GSMB and enforce legal action against violators.

Policy 5.2

Sand dunes will be protected to minimize impacts of episodic coastal hazards such as tsunamis and cyclones.

Policy 5.3

Coastal pollution that degrades barrier beaches, spits and sand dunes will be minimised/ prevented.

Strategy 5.3.1

Mobilise Local Authorities and stakeholders to minimise dumping of solid wastes and dredged material on barrier beaches, spits and sand dunes.

Proposed Action

1. Assist and encourage the Local Authorities to relocate existing dumping sites located within the barrier beaches, spits and sand dunes.

2. Launch beach cleaning campaigns with the participation of all stakeholders and Local Authorities.

3. Formulate management groups among dwellers in beach areas and jointly develop guidelines to maintain barrier beaches, spits and sand dunes and prevent pollution of these areas, and ensure that the guidelines are adhered to.

Policy 5.4

Activities that promote degradation of biodiversity in barrier beaches, spits and sand dunes will minimised.

Strategy 5.4.1

Minimise human activities that lead to the reduction of biological diversity through inter-agency collaboration.

Proposed Action

1. Prohibit removal and destruction of fauna and flora from barrier beaches, spits and dunes.

2. Promote and launch a programme in collaboration with the Forest Department to plant suitable indigenous flora in damaged areas.

3. Identify areas important as nesting sites for sea turtles and take collaborative action to conserve such areas.

4. Take necessary collaborative action to prevent and mitigate problems of invasive species such as Prosopisjuliflora.

Objective 6

Salt marshes are conserved to sustain ecological functions and socio-economic values.

Policy 6.1

Coastal development activities that degrade salt marsh areas will be minimised/ prevented.

Strategy 6.1.1

Ensure compliance with guidelines/regulations for new development by strengthening co-ordinated action between relevant agencies.

Proposed Actions

1. Identify critical and importance of salt marsh areas in terms of their ecological and socio-economic importance and formulate guidelines for planning and development activities in them.

2. Determine carrying capacity/potential and prepare appropriate detailed zonal plans for prospective development in salt marsh areas jointly with relevant agencies and communities.

3. Regulate new activities and expansions (eg. for salterns, shrimp ponds) in salt marsh areas according to existing laws, regulations and permits.

4. Develop a mechanism for relevant agencies to co-ordinate development activities within and around salt marsh areas.

Policy 6.2

CC&CRMD shall co-ordinate with other agencies to conserve salt marshes within and outside the coastal zone.

Strategy 6.1.2

Promote sustainable development of salt marshes through planned communication for relevant stakeholders.

Proposed Action

1. Formulate and implement customized programmes for communicating about salt marshes and their values to key stakeholders to enhance commitment for conservation.

2. Supply informations about pollution control and technology suppliers of pure industries to the industries make negative impacts in the coastal zone.

REFERENCES:

1. Coast Conservation and Coastal Resource Management Department (2004), Revised Coastal Zone Management Plan 2004.
2. Coast Conservation and Coastal Resource Management Department, (2014); Updating and preparation of a synthesis report on Coastal Coral Reefs, Sea Grass Beds, Salt Marshes, Lagoons and Estuaries and Barrier Beaches within the coastal region of Sri Lanka.
3. Government of Sri Lanka, Coast Conservation and Coastal Resources Management Act, No.57 of 1981.
4. Ministry of Environment and Natural Resources, 2009, National Action Plan for Haritah Lanka Programmer
5. Miththapala, S. (2008) Mangroves, Coastal Ecosystem Series Volume 2 P1-28 + iii, Colombo Sri Lanka; Ecosystem and Livelihood Group Asia, IUCN.
6. Miththapala, S. (2008) Seagrasses and Sand dunes, Coastal Ecosystem Series Volume 3, Colombo Sri Lanka; Ecosystem and Livelihood Group Asia, IUCN
7. Miththapala, S. (2013). Lagoons and Estuaries. Coastal Ecosystems Series (Vol 4). vi + 73 pp. IUCN Sri Lanka Country Office, Colombo.
8. Silva, E.I.L; Katupotha, J.; Amarasinghe, O.; Manthrithilake,H.; Ariyaratne,R. 2013. Lagoons of Sri Lanka: from the origins to the present. Colombo, Sri Lanka; International Water Management Institute(IWMI).
9. Samarakoon, Jayampthy; Saman Samarawickrama (2012) An appraisal of challenges in the sustainable management of the Micro tidal Barrier built estuaries and lagoons in Sri Lanka, IUCN, Sri Lanka Country Office, Colombo.
10. Web sites used :
http://www.fao.org/docrep/010/ai000e/AI000E07.htm

CHAPTER 4

4. CONTROLLING COASTAL WATER POLLUTION

4.1 INTRODUCTION

4.1.1. Significance of the Problem

The National Environmental Act of 1980 defines pollution as "Any direct or indirect alteration of the physical, thermal, chemical, biological or radioactive properties of any part of the environment by the discharge, emission or the deposit of wastes so as to affect any beneficial use adversely or to cause a condition which is hazardous to public health, safety or welfare of animals, birds, wildlife, aquatic life or to plants of every description."

The findings of the recent monitoring studies carried out by CC&CRMD shows deterioration of coastal water quality in economically sensitive coastal segments. In view of the remarkable attraction on development of coastal tourism and other important economic activities within the coastal region, the degree of pollution should be closely monitored and effectively managed

As a result of growing population pressures, urbanization and development activities taking place in the coastal region, the problem of water pollution has been increasing over the past few decades. In 2012, population in coastal district was estimated as 11,392,903. Colombo metropolitan area has the highest rate of urbanization growing from 3.9 million in 1981 to 5.8 million in 2012. Ocean waters, coastal surface waters comprising rivers, streams, estuaries and lagoons - and ground water in coastal areas receive significant level of pollution loads from un-regulated industries, development activities and human settlements located in and outside the Coastal Zone. Out of all industries in the country (small, medium, large scale) 61.6 percent of industrial units are located in the coastal region and discharge effluents with little or no treatment. By and large, the sustainability of fisheries, tourism and other industries and livelihoods of local communities depend considerably on the productivity of the diverse habitats and resources within this area. The near shore waters in particular are used extensively for, fishing and recreation etc. for which different levels of water quality are required

The impacts of pollution on the coastal and marine ecosystems and their resultant biological as well as socio-economic implications are many and varied. The existing information revealed that the cost of coastal water pollution in Sri Lanka is on the increasing side. For example, the cost to human health from coastal water pollution in the Colombo Metropolitan Area is estimated to have increased from SLRs. 2 million in 1992, to SLRs. 4 million in 1997 and SLRs. 14 million in 2002 respectively (CZMP – 2015). There are also losses associated with decreased biological diversity, reduced aesthetic, recreational, cultural and archaeological value; declining land prices and reduced revenue from tourism, fisheries and other development activities. There are also some definite links between increasing levels of pollution and loss of coastal land values and fishery productivity. For example, the estimated annual loss of income from fish sales in the Lunawa lagoon prior to rehabilitation due to pollution is approximately SLRs 1,963 million and the total annual land value decline in the area is estimated to be SLRs 712 million. In addition the total direct cost incurred on rehabilitation of Lunawa lagoon during the period between 2004-2007 under the ADB funded CRMP and Lunawa Environmental Improvement Project was approximately US$ 95 Million. Thus, the benefits expected from coastal water pollution management are substantial; reducing water pollution in the coastal region is of paramount importance.

Pollution of ground water

Although an accurate assessment of water pollution caused by agricultural run-off has not yet been carried out, some studies indicate a link between the two. In the Kalpitiya peninsula, characterized by highly permeable soils and a shallow water table, the irrigation wells in extensively cultivated areas have high nitrate concentrations (i.e. in excess of the WHO guideline of 10 mg/1) and a chloride concentration ranging from 50-200 mg/1. In contrast, domestic wells located outside these areas have nitrate levels less than 2 mg/1 and chloride concentrations less than 100 mg/1**.** There is widespread ground water contamination in the Jaffna peninsula attributed to agricultural run-off and the extensive use of pit latrines. High concentration of nitrates has been recorded in the ground water of the Jaffna peninsula resulting in the "*methaemoglobinaemia*" or blue baby syndrome among those who use the contaminated waters (CZMP 2004).

MORE ON COASTAL WATERS AS THE CONDUIT OF POLLUTION

C**oastal near shore waters in some coastal segments** receive considerable pollutants by way of sewage, industrial, agricultural and domestic waste water, sediment and solid materials from land-based activities. They are released directly into the ocean or are conveyed through rivers, estuaries and lagoons. This is of concern particularly as the designated uses of near shore waters are dependent on specific levels of water quality.

Coastal waters in **estuaries and lagoons** are subject to heavy pollution loads, though the level of pollutants in them changes due to dilution and flushing by riverine flow or tidal action. Pollution of these waters has an impact on the health of the important habitats associated with them and the diverse and economically important fauna and flora they contain.

Sri Lanka has 103 rivers that radiate from the central hills and flow down to the coast. These rivers are subject to different pollution stresses; some carry very high pollution loads consisting of organic and inorganic pollutants, faecal matter, waste oil and visual pollutants. The degree of pollution in rivers may differ temporally as well as spatially as pollution loads entering them at various points vary considerably.

Ground water is derived mainly from rainwater seepage and the recharge from surface water bodies such as streams, canals and reservoirs. The estimated ground water availability in the island is around 7,250 million cubic meters[4]. The richest source of ground water in Sri Lanka is the Karst limestone aquifers in the coastal districts of Puttalam and Mannar extending to the Jaffna peninsula. Over the past years, ground water has been extracted increasingly for domestic, agricultural and industrial purposes, from both shallow dug wells and deep tube wells.

Serious threats to ground water have been observed in many coastal areas due to nitrate and bacterial contamination. The main pollution problems in the ground water of coastal areas are leachage of fertilizers causing nitrate pollution; seepage from faecal matter and pollution with heavy metals in industrial zones. Treatment of ground water is very costly so that preventing pollution is of considerable importance. Another concern is that higher rates of water extraction in coastal areas than is sustainable has led to brackish water intrusion into wells, particularly in the northern and north western coastal areas where well water is extensively used for agriculture. (CZMP 2004)

4.1.2 Nature of Castal Water Pollution

4.1.2.1 Key factors influencing coastal water pollution

The main factors influencing water pollution in the coastal region are the high human population densities particularly in the areas where industrial, agriculture and tourism related activities are predominant. Accordingly, the coastal districts of Colombo, Gampaha, Kalutara, Galle, Matara and Jaffna respectively recorded the highest population densities. Problems related to coastal pollution can be expected to increase further in the future as major social and economic development activities continue to take place along the coastal belt, if not properly managed. In this respect specific attention has to be placed on five metro regions proposed in Northern, North Central, Eastern, Southern and Western coastal regions under the Sri Lanka 2030 National Physical Plan. In addition Mannar, Jaffna, Kuchchiveli and Kalpitiya coastal segments will be developed as new tourism development areas. Thus, higher tendency towards occurring coastal pollution has to be expected in the future.

4.1.2.2 Types of Pollutants and their Sources

Although the level of coastal water pollution has not been fully studied yet, the current information revealed that coastal waters are polluted mainly due to the release of untreated or partially treated wastewater and toxic substances from industries, tourist resorts and shrimp farms, the dumping of solid waste in coastal areas, the receipt of raw sewage and contamination with waste oil released from fishing boats, ships, coastal service stations and oil spills. These waters also receive fertilizer and agro-chemical run-off from agricultural lands, and waste from squatter settlements and other domestic sources. The pollutants that reach coastal waters vary from faecal matter, visual pollutants that float or are in suspension, nutrients rich in nitrogen and/or phosphorus, toxic and non-toxic organic substances and heavy metals, waste oil and thermal discharges **(Table 4.1).** They may originate from specific point sources such as industries, urban sewers or sewage treatment plants and coconut husk retting sites, and (a) be transported through coastal waterways such as rivers, streams and estuaries, or (b) through direct leakage and seepage. They may also originate from non-point sources (run-off) that are more difficult to control, such as agricultural lands, sewage from built-up areas and mines.

Table 4.1:Type of Pollution, Sources and Main Adverse Impacts

Type of pollution	Key sources	Adverse impacts
Faecal pollution	Municipal sewage Industries Tourist sector Aquaculture Squatter settlements	Water related diseases Affects the growth of marine flora and fauna Foul odours, spoils scenic value May lead to anaerobic environments.
Visual pollution	Industries Tourist sector Agriculture and aquaculture Squatter settlements Municipal and domestic solidwaste	Spoils scenic value Affects habitats and breeding grounds of fauna Affects growth of marine vegetation such as sea grass by reducing light penetration.

Type of pollution	Key sources	Adverse impacts
Enrichment with nutrients such as nitrogen and phosphorus	Municipal sewage Industries Tourist sector Agriculture and aquaculture Squatter settlements Municipal and domestic solid waste	Stimulates algae growth Causes change or decline of biodiversity Changes water quality
Organic (non-toxic and toxic) and heavy metal pollution	Industries Tourist sector Agriculture and aquaculture Squatter settlements Municipal and domestic solid waste	Bio-accumulation of substances that are carcinogenic or causes health hazards in marine fauna Decline of biodiversity Persistence in the marine or coastal environment for long periods Affects growth and reproduction of marine fauna
Oil pollution	Industries Boats, ships, oil spills and service stations	Spoils scenic value Destroys marine fauna and flora Affects benthic fauna with the formation of oil slicks and tar balls.
Thermal pollution	Power sector, Industries	Affects migration patterns of fauna Affects the growth of marine flora and fauna Causes changes in ecosystems Stimulates algae growth.

(CZMP 2004)

4.2 ISSUES AND THREATS

4.2.1 Inadequate Municipal Sewage Disposal Facilities

Faecal pollution is a major problem in some coastal waters due to the direct discharge of untreated municipal sewage into land and water ways. Colombo is one of the few cities in Sri Lanka with an installed sewerage system. A part of the sewer connection is diverted to the sea at Mutwal through a long sea outfall located north of the Colombo Port, and the rest is sent out through another long sea outfall at Wellawatta. The capacity of the sewerage system is inadequate to cater for the entire Colombo city as it is about 100 years old, and needs frequent repair. Another problem is the illegal sewage connections to sewerage lines and unauthorized connections to storm water drainage systems and combined sewers.

As per the current estimates the generated wastewater in coastal area was approximately 1,822,864 m^2 per day and significant amount of domestically generated wastewater discharge into coastal zone through canals, drains and pipes. According to a study carried out by MOFE in 2001, out of total 370, 000 m^2 of daily wastewater generated in the greater Colombo area only 90,000 m^2 is discharged through ocean outfalls. The balance amounts of 280,000 m^2 reenter the environment as wastewater. The waste water discharge through marine outfalls contained high organic content, high nutrient content and high content of coliforms.

Sewage disposal facilities in the Greater Colombo Area

Wellawatta and Mutwal outfalls belonging to Colombo Municipality discharge wastewater to sea using High Density Polyethylene (HDPE) pipes, Long sea outfalls use grift removal methods to remove larger materials and further treatment process are not applied. During the past few years, water skin diseases were recorded in Wellawatta coastal area and it might have resulted due to the discharge of sea outfall (Information Compendium on Coastal Pollution, 2014).

4.2.2 Inadequate Facilities for Waste Disposal in Underserved Settlement

Many highly populated coastal low-lying areas have a shallow water table and a high vulnerability for flooding. Inadequate drainage facilities and ad hoc development in these areas have further intensified the impacts of inappropriate sewage disposal in low-lying flood prone coastal areas, leading to severe faecal pollution in internal and near shore waters

The problem of sewage disposal in Colombo is compounded by the inadequacy of urban infrastructure for the city's poor. At the turn of the last century there were about 1,500 shanty settlements in the city, comprising around 66,000 households sheltering about 51 per cent of the city's population**.** These settlements are under-served in respect of sanitation, safe water and waste disposal facilities. Pollution from these sources cause reduction of dissolved oxygen in the canals and streams, resulting in an anoxic environment and a foul odour that is harmful to human health and aquatic organisms.

4.2.3 Industrial Effluents

There are nine Export Processing Zones (EPZ), three Industrial Parks (IP) and one Export Processing Park (EPP) operating under the purview of the BOI. Of these, two EPZs (Katunayake and Koggala) and one IP (of 20 ha in Mirijjawila) are located in the coastal region. In addition, there are seventeen other Industrial Parks managed by the Ministry of Industries Of these, three parks - at Bata-atha, Ratmalana and Udukawa -are located in the coastal region. Four other IP s at Panadura, Weligama, Ekala and St. Martin Estate Chilaw are also located in the coastal region (CZMP, 2004)

Industrial effluents that have undergone little or no treatment are frequently received by near shore waters, lagoons and estuaries through run-off, leakage and seepage. Most of the industries located in the coastal area belong to either the medium or low polluting category. In 1994, Sri Lanka had 336 industries with a high or medium pollution potential in the Coastal Zone**.** Industries that contribute most to water pollution are those dealing with textiles, paper, tanning, metal finishing and engineering, paints, chemicals, cement, food and beverages and distilleries. Small Industries that deal with coconut fiber retting also have highly localized impacts on water pollution as they result in high BOD and COD values.

Majority of the industries are not yet equipped with the basic infrastructure for waste treatment, while others are constrained in the use of available waste treatment facilities due to the high costs involved. Only the Export Processing Zones at Katunayake (KEPZ) and Biyagama (BEPZ) have facilities for central treatment of wastewater prior to discharge. During the past few years, many water quality issues occurred due to discharge of untreated industrial wastewater. Industrial wastewater contained POP (Persistent Organic Pollution) and heavy metals which are not decaying with time. Due to high cost involved in treatment methods, many factories don't use treatment to remove POP and heavy metals. In this respect tanning factories could be considered as one of the significant pollution sources.

Table 4.2 shows the number of industries located in coastal areas with their respective wastewater loads. These include those set up under the Board of Investment (BOI). **Table 4.3** depicts the tolerance limits for industrial and domestic discharges into coastal waters

Table 4.2: Industries located in coastal areas with high or medium pollution

Type of industry or process	No. of units	Total	Estimated pollution load (kg/day)		
			BOD	COD	Total toxic metals
Textiles	41	7100	4970	11360	-
Food and beverages	47	4111	6166	12333	-
Desiccated coconut	53	1200	4200	7200	-
Rubber processing	229	4840	9670	29040	-
Tanning[+]	15	750	2000	5200	-
Metal finishing and preparation	76	6692	-	-	669
Paints and chemicals	33	928	-	-	92.8

(*Source*: MEPA 2013)

Table 4.3: Tolerance limits for industrial and domestic effluents discharged into marine coastal areas

Determinant	Tolerance Limit
Total Suspended Solids, mg/l, max	
(a) For process waste waters	150
(b) For cooling water effluents	total suspended matter content of influent cooling
Particle size of	
(a) Floatable solids, max	3 mm
(b) Settlable solids, max	850 mm
P^H range at ambient temperature	6.0-8.5
Biochemical Oxygen Demand (BOD_5) in 5 days at 20^0C	100
Temperature, max (^0C)	45^0C at the point of discharge
Oils and grease, mg/l, max	20
Residual Chlorine, mg/l, max	1.0
Ammoniacal Nitrogen mg/l, max	50.0
Chemical Oxygen Demand (COD) mg/l, max	250
Phenolic compounds (as phenolic OH) mg/l, max	5.0
Cyanides mg/l, max	0.2
Sulfides mg/l, max	5.0
Fluorides mg/l, max	15
Arsenic mg/l, max	0.2
Cadmium total, mg/l, max	2.0
Chromium total, mg/l, max	1.0
Copper total, mg/l, max	3.0
Lead total, mg/l, max	1.0
Mercury total, mg/l, max	0.01
Nickel total, mg/1, max	5.0
Selenium total, mg/l, max	0.05
Zinc total, mg/l, max	5.0
Radio active material	
(a) Alpha emitters, μ curie/ml, max	10^{-8}
(b) Beta emitters, μ curie/ml, max	10^{-7}
Organo-Phosphorus compounds, mg/I	1.0
Chlorinated hydrocarbons, mg/I max**.**	0.02

Source: Gazette Extraordinary 595/16 of 02.02.92

Every effort should be made to remove colour and odour from effluents. These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution. The limits have been prescribed by regulations published in *Gazette Extraordinary* No. 595/16 of 02.02.1992 under the National Environmental Act No. 47 of 1980 as amended by Act No. 56 of 1980 as amended by Act, No. 56 of 1988.

The Impact of industrial pollution in the Lunawa Lagoon

The Lunawa lagoon is a coastal water body seriously affected by industrial pollution prior to rehabilitation under the CRMP and LEIP. About 07 large scale and 14 small-scale industries for dying and finishing of textiles/garments, washing plants and manufacturing foot wear directly discharge their effluents into the lagoon. As a result, the once flourishing fishery in this lagoon has almost ceased; and it is now a mosquito-ridden body of stagnant water with a dense growth of water plants and thick sludge at the bottom. (CZMP 2004)

Source: Ministry of Urban Development, Construction and Public Utilities, 2001

4.2.4 Pollution from Tourist Establishments

At present 74.4% of Sri Lanka's tourist arrivals are for pleasure. This type of tourism depends highly on the quality of the environment, especially as tourists today are increasingly sensitive to pollution or environmental degradation at their travel destinations. For tourism in the coastal zone to be sustainable, coastal pollution has to be managed to prevent adverse impacts on the industry.

Current information revealed that higher percentages of tourist hotels registered with the Tourist- Board are located within the coastal region. In year 2013, tourist arrivals to Sri Lanka were approximately 100,000 per month and generated monthly wastewater volume has been estimated as 19,000 m3. A recent study conducted among 276 hotels, revealed that 92 percent of large hotels had wastewater treatment plants while only 17 percent of the small and medium hotels had such plants. However, the negative aspects of uncontrolled expansion of tourism at the start of the tourist boom are now becoming apparent in many coastal resorts where there are clusters of restaurants and guesthouses, and other major tourist centers. The near shore waters receive untreated sewage, sullage in the form of kitchen and laundry wastewater, and solid waste including plastics. This causes pollution problems, as apparent in most major tourist centres along the south, southwest and east coasts. Tourism expansion in Hikkaduwa, Beruwala, Unawatuna and Arugam Bay areas has led to water quality degradation as well as visual pollution of beaches and near shore waters. As per the ongoing coastal water quality monitoring studies carried out by the CC&CRMD, it is clearly evident that the qualities of the near shore coastal waters in the vicinity of tourism centers have been significantly degraded due to discharge of effluents. The problem of sullage is particularly perceived as a problem associated with the larger hotels. Squatter settlements connected with tourism for concern as it contributes to faecal pollution which is a severe threat to recreational activities such as contact sports in coastal waters.

4.2.5 Pollution from the Power Sector

Sri Lanka's energy requirements are met from six different types of resources. At present thermal power plants contribute 50.3 percent of total electricity requirement in the country which surpass the hydropower contribution

(40.3 percent of the total installed capacity of 3368.0 MW) mainly dominated in the past. The thermal power plants are mainly located in the coastal region. These plants are located in Kerawalapitiya, Norachcholai and Puttalam. Kerawalapitiya and Puttalam plants use furnace oil as the energy source while coal is used by Norachcholai plant. Although the hydropower contributed major share to the total installed capacity, its inputs towards annual power generation are steadily decreasing. The shortfall between power demand and the present hydropower output is being fulfilled by thermal power generation using petroleum, coal and natural gas. Establishment of these plants in the coastal region can result in the thermal pollution of coastal waters. The discharge of hot water and desalinized water are the main threat for the coastal water quality from the thermal power plants.

4.2.6 Pollution from the Fisheries Sector

A total of 72 fish landing sites and 20 fishery harbours located in the coastal zone contributes to pollution of coastal waters due to improper disposal of burned oil and bilge water from fishing vessels to the harbor waters. In addition, production of substantial amount of organic waste from fish degutting, market floor runoff , cleaning and garbage dumping also cause higher COD levels in the affected coastal waters. Although the CFHC has provided burned oil reception facilities at the harbours, discharge of waste oil into the harbor basins are being continued, posing environmental threats. .

4.2.7 Unsanitary Disposal of Solid Waste

> ***Solid wastes include non-liquid garbage and refuse from domestic, institutional, market, medical, commercial and industrial sources, and street and garden wastes. This also covers discarded organic wastes (i.e. food, vegetation, paper, cardboard, rubber, leather, discarded clothing, etc.); packaging in the form of metals, plastics or glass; and cut pieces from garment factories***
> (CZMP2004)

Solid waste is one of the major sources of coastal pollution. Environmental and health hazards related to solid waste have been growing in Sri Lanka during the last few decades, and continue to be a problem. The rate of waste collection by the Local Authorities island-wide is estimated to be about 2,694 today but the problem is essentially urban and major percentage of the waste is generated in the Western Province. According to the study carried out by CEA, 46 major dumping sites have been identified. Out of all, more than 80 percent of dumping sites are located in the North and Eastern Provinces. Approximately 95 percent of these dumping sites are being operated without environmental approval. Most of the dumping sites are open dumps and 4 percent of dumping sites have used bare land and other sites are located in wetlands and marshy land directly or indirectly connected to the coastal zone. There is also the problem of garbage littering beaches near squatter settlements and tourist resorts and indiscriminate solid waste dumping within the shore area. Accumulation of solid waste on beaches results in degradation of water and floatable visual pollutants along the shoreline.

The main constraint faced by many local authorities is inadequate facilities for safe disposal of solid waste due to the lack of environmentally safe dumping sites.**Table 4.4** depicts the amount of daily solid waste collected by municipalities in coastal districts.

Table 4.4: Amount of Solid Waste collected in Municipalities in Coastal Districts

District	Gross weight of waste collected per Day(Ton)	District percentage (%)
Puttalam	97	3.4
Gampaha	313	11.0
Colombo	1257	44.3
Kalutara	93	3.2
Galle	103	3.6
Matara	68	2.4
Hambantota	28	1.0
Ampara	57	2.0
Batticaloa	119	4.2
Trincomalee	56	2.0
Mullaitivu	09	0.3
Kilinochchi	01	0.0
Jaffna	71	2.5

Source: Data base of municipal solid waste management 2005, CEA

4.2.8 Pollution from Agriculture and Aquaculture

Agriculture

The current information revealed that the use of chemical pesticides, herbicides and fungicides in agriculture is in significant level and some of which are persistent. These substances degrade the soil as it absorbs contaminants in the leachage, culminating in pollution of ground water. Polluted ground water used for agriculture and the resultant run off from agricultural lands contaminates coastal surface waters. In addition, the excessive use of fertilizers causes nitrate pollution in coastal areas. As per the current estimates 396888.8 Mt of Urea, 144776 Mt of MOP (Muriate or Potash), and 109708Mt of TSP (Triple Super Phosphate), have been imported for agricultural purposes in 2012. Most of the pollutants from agriculture sector come to the coastal areas through radial river network in the country. In this respect Kelani river has been identified as the largest transporter of the fertilizer and pesticide runoff to the coastal areas from the tea estates. It is also reported that Mahaveli river estuary has been polluted with agro chemicals discharged by Mahaveli "H" region.

The impact of agriculture on water pollution

One of the adverse impacts of the green revolution is the trend towards the high use of agrochemicals due to the use of new high yielding varieties in agriculture that are very susceptible to various pests and diseases and have increased nutrition requirements. Consequently, the artificial fertilizer importation and use in Sri Lanka has increased significantly. According to the 2012 figures, 396888 Mt of urea, 144776 Mt of MOP and 109708 Mt of STP have been imported for agricultural purposes. These figures demonstrate the magnitude of the chemical fertilizer usage in the country and possibility of coastal water pollution.

Aquaculture

Shrimp farm effluents reaching the Dutch Canal are high in total suspended solids (200-600 mg/l) and have high BOD levels (60-180 mg/l). These effluents cause heavy siltation in the canal, increasing turbidity. High sulphides and ammonia levels in these waters are also attributed to shrimp farm effluents.

Much of the coastal pollution in the North western Province has been attributed to *ad hoc* development of shrimp farming leading to the discharge of high loads of effluents from shrimp ponds. This has caused considerable Pollution in the Dutch Canal and the surrounding coastal areas. Discharge of effluents into the Dutch Canal also led to spreading of diseases and collapse of the shrimp industry in the North western Province. High levels of nitrates and phosphates released from shrimp farms into the coastal waters have caused eutrophication of nearby water courses in the region and pollution of ground water. In considering the importance of eradicating the pollution level of the Dutch Canal, Government had to spend approximately Rs. 130Million on rehabilitation measures. Table 4.5 depicts the status of water quality during the final part of the pond harvesting.

Table 4.5 Water Quality in Farm Effluents during the Final Part of Pond Harvesting

	Small scale farms	Medium scale farms
Salinity	07- 45	08-43
pH	8.1-9.6	7.9- 9.5
Total ammonia (ppm)	0.628 - > 3.5	0.52- > 3.5
Nitrite (ppm)	0.624 - 4.92	0.65- 5.78
Nitrate (ppm)	2.6 - 5.2	2.5 - 4.8
Phosphate (ppm)	2.9 -3.3	2.5 - 3.6
Sulphide (ppm)	5.6- 7.2	4.4 - 6.8
Dissolved oxygen (ppm)	1.6 - 2.6	1.8 - 2.4
Total suspended solids (ppm)	522 - 1380	496- 1240

(*Source*: COREA – ASLE 2009)

4.2.9 Pollution from oil spills and other discharges

Seven major commercial ports located around the island contribute to pollution of coastal waters due to accidental release of oil. Poor reception facilities for waste oil, ballast and bilge waters cause the port waters to be polluted. Such facilities, as well as pollution abatement plans, are a vital requirement to ensure pollution free Ports

Sri Lanka has seven commercial ports around the island and oil pollution is a common pollution identified. Waste oil from oil tankers, discharge of oil in bilge and ballast waters, cleaning out of fuel tanks and repair and maintenance work by motorized fishing boats and ships around ports and fisheries harbours, cause minor oil discharges and slicks. According to few studies carried out on water quality in Galle and Colombo harbor areas, it was revealed that the levels of BOD, COD, N and faecal coliform are higher than the proposed standard value for nature conservation (Information Compendium on Coastal Pollution, 2014). Although the minor oil discharges and slicks may not cause serious impacts, they result in visual pollution leading to depreciation of the aesthetic quality of the beaches for recreation. There have also been four moderate spills of crude oil reported in Sri Lanka marine waters and intrusion of tar balls on to the beaches. As they pose a risk to coastal habitats and species, abatement plans for oil discharges are required. Waste oil from service stations also ends up in coastal waters, underlining the need for service stations to intercept the oil with interceptors. Currently most lack these devices, and even when present they are often defective. There are specific arrangements for the disposal of waste oil from ships that call at the Port of Colombo during loading or unloading of cargo. About 36 private companies are registered with the Marine Environment Protection Authority (MEPA) to collect the oil waste, which is pumped into bowsers directly from the ships. Table 4.6 depicts the waste oil collected by the operators over the past five years at the Colombo Port. Even so the final disposal of this oil is not monitored by any regulating authority.

Table 4.6: Amounts of Waste Oil Collected or Removed By Collectors in the Colombo Port

Year	Quantity
2008	5,092m^3
2010	17,000m^3
2011	18,988m^3
2012	19,422m^3
2013	22,632m^3

(*Source*: MEPA 2013)

4.2.10 The Development of Maritime, Energy and Tourism Hubs and Potential Threat of Pollution

As per the Government Policy framework, three main economic hubs vis. Maritime, Tourism, Energy hubs are to be mainly located in the coastal region. According to the current projections, it is envisaged that increasing current tourist arrival of 654,000 up to 2.5 million by 2016 and developing current room capacity 22745 up to 45,000 rooms by 2016, to develop a tourism hub in the country. The activities related to the development of maritime hub mainly deal with development of commercial harbours and related facilities on mass scale. In this respect the existing commercial harbours such as Colombo, Hambantota, Trincomalee and Galle will be developed. The potential pollution threat from these developments cannot be ignored. Thus it is essential to incorporate proper pollution mitigation measures at the planning stage and related issues should be addressed comprehensively.

4.2.11 Current Status of Coastal Water Quality in selected Coastal Segments

Although the continuous and spatially specific data on coastal water quality parameters were not available, an attempt was made to determine the conditions of water quality in 25 sampling locations from Norachcholai to Nilaveli using data gathered from different sources by LHI under the study commissioned in 2014 by the CC&CRMD. Description of the sampling locations are given in Table 4.7.

Table 4.7 Description of Sampling Locations

Location	Description
Norachcholai	Close to coal fired thermal power plant
Chilaw Beach	Famous bathing site
Ambakandawila	Water intakes located near shrimp hatcheries
Marawila	Bathing site, tourism, industries, hatcheries
Negombo Beach	Bathing site, tourism activities
Kelani river mouth	River outfall
Mutwal	Waste water sea outfall
Colombo	Commercial harbor
Wellawatta	Waste water sea outfall
Mount Lavinia	Bathing site, tourism activities
Wadduwa	Bathing site, tourism activities
Kalutara - Moragalla	Bathing site, tourism activities
Beruwala	Bathing site, tourism activities
Bentota	Bathing site, tourism activities
Hikkaduwa	Bathing site, tourism activities
Galle	Commercial harbor
Unawatuna	Bathing site, tourism activities
Koggala	Industry, Tourism
Weligama	Tourism, Fishing activities
Polhena	Bathing site, Tourism activities
Bata-atha	Industry
Tangalle	Bathing site, tourism activities
Mirijjawila	Industry, tourism
Arugam Bay	Bathing site, tourism activities
Nilaveli	Bathing site tourism activities

During the water quality data analysis, attention was paid by the study team on analyzing parameters such as pH, Dissolve Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand(COD), Total Nitrogen (TN), Total Coliform (TC), Faecal Coliform (FC) and Oil and Grease. Accordingly it was revealed that pH levels in sampling locations stayed within natural coastal water quality conditions reflecting pH level of 7.8 and 8.4. The DO levels in the sample locations except Colombo do not indicate depletion below the standards. In terms of BOD levels, the analysis revealed that Mutwal, Wellawatta and Galle satisfy only the CEA non-consumption use standards while all other sampling locations do not satisfy

both bathing and non-consumption use standards,. As per the CEA standards for bathing, the recommended COD value must be lower than 20/mg^{1}l. However Mutwal and Kelani river mouth have satisfied CEA bathing standards and COD values of all other locations do not satisfy both standards. Although the CEA has not specified a standard, acceptable range is 2mg/l to 6 mg/l. According to the analysis, it was indicated that TN values measured in Kelani river mouth, Mutwal, Colombo and Wellawatta were not in an acceptable range. This situation may be due to discharge of untreated sewage and contamination by fertilizer. In accordance with CEA standard for bathing, TC value has to be lower than 1000 MPN/100ml while recommended value for non- consumption uses value has to be lower than 2000 MPN/100 ml. The analysis revealed that TC concentration values for non-consumption uses in all sampling locations are well within the non-consumption use standard. However, famous bathing sites such as Mount Lavinia, Kalutara, Unawatuna, Bentota and Polhena are not safe for direct contact activities. With respect to Faecal Coliform (FC), acceptable bathing standard has to be lower than 50 MPN/100ml and for non-consumption uses has to be lower than 600MPN/100ml. The analysis shows higher FC concentration than the acceptable levels for bathing in all sampling locations except in Beruwala, Galle and Mirijjawila sampling locations. Further, FC values in Norachcholai, Chilaw, Marawila, Wadduwa, Bentota, Koggala, Unawatuna, Weligama, Tangalle and Bata-Atha satisfy the non-consumption use standards. The oil and grease content of all sampling locations shows higher concentration in monsoon periods. However it has to be lower than 200 mg/l.

4.3 PLANS, POLICIES AND IMPLEMENTATION STRATEGIES

Although the coastal pollution is one of the major environmental issues in the coastal zone, it was not addressed in the first generation Coastal Zone Management Plan of 1990. However, in considering the importance and priority, it had been brought in to the revised CZMP's of 1997 and 2004. Besides policies, strategies and actions introduced through CZMP's there are many policies, laws and programmes in place that have a bearing on controlling coastal water pollution. For instance major development projects taking place in the Coastal Zone (except fishing) are subject to Environmental Impact Assessments. These include the prescribed projects listed in the National Environmental Act, No. 56 of 1988, with the CC & CRMD functioning as the Project Approving Agency.

The vital regulatory tools in place that could curtail industrial pollution up to some extent in coastal waters are the Environmental Impact Assessment (EIA) procedures and the Environmental Pollution Licensing (EPL) scheme. The latter is mandatory for the prescribed activities under the *Gazette* notification extraordinary No. 1159/22 dated 22nd November 2000. An EPL can be obtained from the CEA, BOI or a Local Authority and is valid for three years. Even so, lapses in enforcement of pollution control, and poor technology for pollution abatement in a large number of industries result in coastal water pollution from industrial sources.

Despite the pollution control activities being carried out by other institutions such as CEA, MC, NWSDB, MEPA, the CC&CRMD is also currently engaged in various corrective and preventive activities to either control or minimize water pollution in the Coastal Zone. Many of these activities require mechanisms for effective co-ordination and collaboration with other institutions and agencies. For instance the National Water Supply and Drainage Board (NWSDB) is responsible for providing good quality water and adequate sanitation in rural and urban areas at the national level. The problem of inadequate sanitation for under-served settlements in Colombo is also being addressed by many agencies.

Although water quality monitoring is essentially a pre-requisite for mitigation of pollution in coastal waters, there is so far no single institution mandated with legal responsibility for regular water quality monitoring in the near shore waters, lagoons and estuaries, and inland in the Coastal Zone. The MEPA is mandated to control the pollution of marine waters, but only when it involves offshore sources. Several agencies such as the BOI, the CEA and CC & CRMD, however, have the authority to monitor water quality in the Coastal Zone and to regulate discharges from development activities. Additionally, some line agencies such as NARA, NWSDB, SLRDC and ITI and the universities and other research institutions carry out monitoring and research from time to time.

Sri Lanka is yet to develop ambient water quality standards for different uses of coastal waters. The CEA has proposed ambient water quality standards for different uses of coastal waters, but these require review prior to finalization, as the changes of water quality due to seasonal effects have to be addressed more adequately. The government's decision to establish more industrial parks where facilities for pollution abatement will be provided will be a major step towards reducing pollution incidences in coastal waters. The government has also prepared a National Solid Waste Management Strategy based on suitable regulatory controls necessary for its implementation. Regulations for control of collection, storage, transport and disposal of hazardous waste have been gazetted in 1996, and the Ministry of Environment has introduced hazardous waste management system through the licesing scheme as per the regulations stipulated under Part 11 of the National Environmental (Protection and Quality) Regulations No.1 0f 2008**.** On the other hand, addressing non-point sources - including pollution from agro chemicals - is difficult as there are no specific policies and effective implementation mechanisms to address such problems.

4.3.1 Future directions for managing Coastal Water Pollution

To ensure sustainability of the economic development thrust put place on the coastal region, it is essential to manage coastal water quality to minimize pollution by formulating and implementing adequate strategies. In addition to the regulatory measures focusing on compliance, it is necessary to adopt comprehensive and effective programmes targeting awareness creation and water use zonation schemes.

Although the problem of coastal water pollution is a major issue to be addressed in the management of coastal resources, the CC&CRMD cannot tackle this problem alone. Taking cognizance of the large number of institutions and agencies that play a role in coastal pollution control, there is a clear need for integrated coastal zone management based on collaborative arrangements. This will require considerable strengthening of the capabilities of the Provincial Agencies and the Local Authorities to play an important role in monitoring coastal water bodies and compliance checking within their jurisdiction. A budgetary allocation to monitor coastal water pollution by each Provincial Agency/Local Authority is required for spatial and temporal water quality monitoring at pre-determined sites. Proper water quality indices should be developed to enable the ranking of coastal water resources, and engineering interventions are required to rectify conditions in coastal water bodies that are of poor quality.

Laws and regulations should be strengthened to regulate major sources of pollution; thereby reducing pollution loads entering coastal waters. More stringent enforcement mechanisms should also be in place to reduce the frequency and magnitude of major pollution incidences in coastal waters. Additionally, careful attention should be placed on formulation and introduction of a coastal water zoning scheme in compliance with the sensitive economic activities which are expanding in the coastal region.

4.3.2 Requirement of Coastal Water Usage Zoning Scheme and Specified Criteria

To minimize issues pertaining to coastal water pollution and to ensure sustainability of economic activities in the coastal region, water usage zoning should be introduced based on sound socio-economic and ecological information. Zoning is commonly employed as a land and water use planning and regulatory tool to guide and direct the type of development most favorable or advantageous to the growth and development of an area considering the ecological constraints and the socio-economic objectives. Water zoning scheme can ensure that different development activities take place at the sustainable level that maximizes the benefits and limits negative impacts on the environment. In addition zoning can be used to separate different incompatible uses and to minimize user conflicts while conserving the coastal habitats.

Requirements for successful implementation of water zoning scheme

(i) Presence of legal mandate and adequate legal provisions

(ii) Sound ecological and socio economic information on the target environment

(iii) Local participation in enforcement

(iv) Shared governance and partnership

(v) Ensuring sustainable financing

(vi) Involving all stakeholders in zonal planning process

(vii) Acknowledging multiple uses of marine and coastal zones early in the planning process

(viii) Law enforcement agencies need to be made aware of the zones.

To prevent pollution in sensitive areas of coastal waters, it is necessary to classify it into different zones as indicated in the Table 4.8.

In view of the current economic development pressures and the rapid population growth taking place in the coastal region, it is necessary to pay careful attention to adopting coastal water zoning scheme in the near future. Thus, an attempt has to be made to fulfill the important pre-requisites to formulate coastal water zoning scheme through this plan. Until water zoning is adopted, the new legal provisions introduced on "effected areas" and "conservation areas" through Coast Conservation Amendment Act, No. 49 of 2011 could be used to achieve similar objectives at least up to some extent.

Table 4.8 Proposed Classifications for Coastal Water Usage Zoning

Description	Usage
Nature Conservation	Ecosystem conservation, Science and education, Aesthetic enjoyment
Fishery of Shellfish	Fishery of shellfish (Mollusca) Aquaculture of shellfish (Mollusca) Salt pans Water contact recreation Ornamental production
Fishery of Finfish	Fishery of finfish Aquaculture of finfish Fishery of non-mollusk invertebrates Aquaculture of non-mollusk invertebrates
Non-consumptive uses	Non-water contact recreation Navigation Harbour Waste disposal Sand mining

4.4 MANAGEMENT OBJECTIVES, POLICIES, STRATEGIES AND ACTIONS

Objectives 1

Acceptable water quality for different beneficial designated users is maintained by adhering to regulations/ guidelines stipulated on the discharge of untreated or /and partially treated effluents from development activities to coastal and marine waters.

Policy 1.1

All existing development activities will be managed in terms of water quality in accordance with CEA emissions standards.

Strategy 1.1.1

Ensure that all exiting development activities in the coastal region comply with CEA standards for effluents through regular monitoring of coastal water quality.

Proposed Actions

1. Expand, strengthen and continue ongoing water quality monitoring programme of CC&CRMD to check ambient water quality in the coastal waters to capture high incidence of pollution and help identify polluting development activities in the area.

2. Direct findings of the monitoring studies to the relevant institutions for necessary actions.

3. Identify low and high polluting development activities in the coastal region and prepare a database in collaboration with the CEA.

4. Take necessary and appropriate actions to ensure that development activities likely to pollute the coastal zone and coastal waters adhere to CEA standards on disposal of effluents.

5. Promote the formulation of effluent standards for those development activities that do not have disposal standards (e.g. for Aquaculture), in collaboration with the relevant authorities.

Policy 1.2

High polluting industries will be scrutinized so as to ensure that the ambient water quality is not impaired.

Strategy 1.2.1

Identify high polluting industries and facilitate their access to technology for controlling emission of effluents degrading ambient water quality of coastal waters; encourage and assist relevant authorities responsible to scrutinize such industries regularly.

Proposed Actions

1. Co-ordinate with the relevant authorities and stakeholders by providing necessary information on high polluting industries through regular monitoring of coastal waters.

2. Facilitate access to information on technology providers for pollution abatement and on cleaner production technologies among industries affecting the Coastal Zone.

3. Assist the relevant agency to provide possible financial incentives to industries to enable them to obtain better pollution abatement technologies.

4. Conduct outreach programmes to create awareness among high polluting industries located in the coastal region on the importance of maintaining pollution free coastal environment.

Policy 1.3

Development activities resulting in the emission of effluent/waste-water to be discharged into designated environmental sensitive areas/conservation areas will be managed strictly adhering to special conditions pertaining to ambient water quality.

Strategy 1.3.1

Carry out periodic monitoring of coastal waters at selected sites to check whether new development can be permitted in them without exceeding the maximum permissible levels of ambient coastal water quality standards/parameters stipulated in the guidelines prepared by CCD/CEA for various designated uses.

Proposed Actions

1. Select coastal sites of critical economic/ecological importance and establish ambient water quality for each site with spatial and temporal water quality monitoring.

2. Identify potential designated use/s within conservation areas and affected areas to be declared under the provisions of the CC amendment Act, No. 49 of 2011 in consultation with other relevant authorities/ stakeholders and make regulations to control other uses/development activities.

3. Identify sites where new development can be permitted, based on designated use/s and ambient water quality of the site.

4. Carry out a study to identify likely sources of pollution at 'critical sites'/conservation areas where ambient water quality of coastal waters does not match designated use/s, and propose appropriate interventions for pollution abatement to enable further development.

Objective 2

Coastal and Marine Water Quality is enhanced by Management of Pollution Sources.

Policy 2.1

Any types of waste or foreign matter either disposed in the coastal zone directly or disposed elsewhere but the impact is felt within the coastal zone will be managed so as not to affect water quality adversely.

Strategy 2.1.1

Encourage and mobilize relevant authorities to prepare solid waste management plans to reduce adverse impacts on coastal water pollution**.**

Proposed Action

1. Formulate and implement a programme to prepare plans at appropriate levels (i.e. local/regional/national) to control the dumping of solid waste in the Coastal Zone by Local Authorities.

2. Identifying urban centres, industries, coastal tourist centres, fishing harbours and other areas emitting solid waste for which solid waste plans are urgently needed.

3. Assisting Local Authorities to identify alternate dump sites in environmentally less vulnerable locations for relocation of coastal dump sites.

4. Monitoring the environmental degradation of sites located within the Coastal Zone affected by dumping of solid waste.

5. Encouraging and assisting relevant Local Authorities to implement environmentally sound ways of waste minimisation (as an alternative to haphazard dumping of solid waste in the Coastal Zone) through projects for composting, biogas generation, etc.

6. Frame regulations to curtail dumping of solid waste into designated 'conservation areas', "affected areas" and declared "Special Management Areas".

Policy 2.2

Faecal pollution of coastal and marine waters will be managed with collaborative action with Local Authorities and other relevant agencies.

Strategy 2.2.1

Identify coastal waters/ sites where faecal pollution exceeds specified threshold levels for designated uses and address the problem in collaboration with Local Authorities.

Proposed Actions

1. Decide on critical sites where faecal contamination should be curtailed in the Coastal Zone, using selection criteria.

2. Monitor such sites that are extensively used for various designated uses such as contact.

3. Make the Local Authorities aware of the problem and the sites and assist them in reducing faecal contamination.

4. Provide findings of the monitoring studies carried out on coastal water quality at respective sites to the Ceylon Tourist Board, hoteliers and relevant civil societies as appropriate, so that they can assist in taking corrective action.

Policy 2.3

Oil spills at shoreline will be managed so as to minimize the degradation of coastal Resources.

Strategy 2.3.1

Identify the major sources of oil discharge in coastal waters and formulate curative/remedial action in collaboration with relevant authorities.

Proposed Actions

1. Coordinate with MEPA to identify sources of oil discharges into the coastal zone.

2. Formulate and implement programmes with relevant authorities to reduce or capture oil discharge into the coastal waters, particularly in harbours and SMA planning sites.

3. Promote and assist CFHC to implement the green harbor concept.

4. Conduct awareness programmes together with MEPA, CFHC, DFAR and PA to make stakeholders aware of need of minimizing oil pollution.

Policy 2.4

Salinization of the coastal waters will be managed within the coastal zone in a manner that will not create adverse impacts on ambient water quality.

Strategy 2.4.1

Identify the major sources of nitrate pollution and causes of high salinization and implement collaborative remedial action.

Proposed Actions

1. Decide on likely areas with high nitrate pollution and salinization, based on objective criteria.

2. Monitor sites so affected and collaborate with relevant authorities in order to reduce pollution mentioned above.

3. Make the Local Authorities aware of the problem and assist them in reducing faecal contamination at sites that are known to be highly polluted, sites of high economic value, critical habitats, places of scenic beauty or of archaeological and cultural value.

Objective 3

Pollutants entering coastal and marine waters are estimated through regular monitoring and research & development.

Policy 3.1

. Identify pollution loads in major surface waters entering the coastal zone, and enable improving water quality in collaboration with relevant agencies.

Strategy 3.1.1

Identify pollution loads in major surface waters entering the coastal zone, and enable improving water quality in collaboration with relevant agencies.

Proposed Action

1. Identify the surface water bodies that are conveying pollutants into coastal waters and estimate the pollution loads during dry and wet weather flows.

2. Assist Local Authorities /CEA and other relevant authorities to take necessary steps to reduce high pollutant loads by providing the necessary information.

3. Collaborate with other competent agencies for possible research on water quality improvements in such water bodies.

Policy 3.2

Collaborative activities will be carried out to reduce pollution of coastal ground water.

Strategy 3.2.1

Collaborative activities on surveillance of ground water quality and quantity will be undertaken in the coastal zone in order to ascertain the likely changes.

Proposed Action

1. Select critical sites of high economic value, and monitor water quality of such sites in relation to designated water uses.

2. Assist relevant authorities to abate incidences of coastal ground water pollution.

Objective 4

Coastal pollution is managed through education and the dissemination and sharing of information using strategic communication.

Policy 4.1

Collaborative programmes will be undertaken with relevant agencies/NGOs to educate stakeholders on pollution sources, effects & impacts and control mechanisms.

Strategy 4.1.1

Undertake collaborative programmes with competent agencies for training and skills development for improvement of water quality.

Proposed Action

1. Carry out a needs assessment to identify the target groups and specific issues and needs that are to be addressed.

2. Identify pressure groups and communication mobilisers to collaborate with for effective training and awareness creation programmes and formulation of collaborative programmes.

3. Train relevant personnel from the target groups for professional development on water pollution abatement and provide awareness on pollutions sources/types, level of pollution and abatement methods.

Policy4.2

Target groups directly or indirectly involved with pollution emission will be identified and made aware about the adverse impacts of coastal pollution and pollution reduction mechanisms.

Strategy 4.2.1

Carry out appropriate awareness programmes in collaboration with relevant partner organisations/communication mobilizers to educate target groups (school children, people polluting the environment, Local Authorities. Policy makers, etc) connected with coastal pollution.

Proposed Action

1. Together with communication partners /relevant organisations carry out a needs assessment to gauge the target groups and specific issues for which awareness creation/communication activity is required.

2. Formulate and carry out customised training/awareness programmes for selected target groups based on communication needs.

3. Organise workshops and campaigns for school children to reduce the pollution incidences in the Coastal Zone.

4. Put up signboards and distribute leaflets to get public participation in coastal pollution control efforts.

REFERENCES

1. Arjuna's Atlas of *Sri Lanka*, ed. T. Somasekaram, M.P. Perera, and H. Godellawatta, Dehiwala: Arjuna Consulting Co. Ltd., 1997.
2. Bandarathilake, K. G. D. 1999. Hazardous waste management in Sri Lanka. *Paper presented at Sub Regional Training Seminar for the Implementation of the Basel Convention on the Control of Transboundary Movements* of *Hazardous Waste and their* Disposal. Mar. 15-19, 1999. Colombo.
3. Central Bank of Sri Lanka, 2001. *Annual Report of 2000*. Colombo: Central Bank of Sri Lanka, Sri Lanka.
4. Central Bank of Sri Lanka, 2002. *Annual Report of 2001. Colombo*: Central Bank of Sri Lanka, Sri Lanka.
5. Central Environmental Authority , 2005, Data base of municipal solid waste management.
6. Coast Conservation Department, 2014, Information Compendium on Coastal Pollution, (Unpublished Report).
7. Coast Conservation Department, *Revised Coastal Zone management Plan* 2004
8. Corea ASCE, 2009. Trends in *Water Quality changes in Main Water Sources for shrimp culture and the need for Standards for Shrimp Farms Effluents*
9. Corea, A.S.L.F., J. M. P. K. Jayasinghe, S. U. K. Ekaratne and S. D. Johnston, 1995. *Environmental impact of prawn farming on Dutch canal: the main water source for the prawn culture industry in Sri Lanka, AMBIO (24): 423-427*
10. Department of Census and Statistics, 2001. *Census of Population and Housing 2001: preliminary release*. Colombo: Department of Census and Statistics.
11. Department of Government Printing, 2008 Gazette Extra Ordinary 1534/18 Dated 01.02.2008.o.
12. Department of Government Printing,1992, Gazette Extraordinary 595/16 of 02.02.92
13. Jayaweera, M. 1999. *Environmental improvement study, Port of Colombo*. Unpubl. Sri Lanka Ports Authority.
14. Manchanayake, E.P. and C. M. Madduma Bandara, 1999. Water Resources of Sri Lanka. Colombo: National Science Foundation.
15. Marine Pollution Prevention Authority, 2002. Database on accidental spills in Sri Lankan waters.
16. MOENR. 2002. *State of the Environment in Sri Lanka: a Report for SAARC*, compiled and ed. J D S Dela. Colombo: Ministry of Environment and Natural Resources.
17. MOFE (1999). *Database of Municipal Waste in Sri Lanka. Colombo*: Ministry of Forestry and Environment.
18. MOFE, 2000. *The National Strategy for Solid Waste Management.* Colombo: Ministry of Forestry and Environment, Sri Lanka.
19. MOFE, 2001. *State of the Environment. Sri Lanka.* Colombo: Ministry of Forestry and Environment.
20. Mubarak, A.M. 2000. Water Pollution. In: *Natural Resources of Sri Lanka 2000*. Colombo: National Science Foundation.
21. UDA, 1994 b. *Colombo Environmental Improvement Project*, Colombo: Urban Development Authority, 1994.
22. UDA, 1994a. *Environmental Management Strategy for Colombo Urban Area – (III)* : Colombo, Urban Development Authority.
23. University of Moratuwa, 2001. *Feasibility study report for establishment of a central wastewater treatment plan for Ratmalana/Moratuwa industrial/residential areas,* Unpublished. University of Moratuwa.

CHAPTER 5

5.0 SPECIAL MANAGEMENT AREA (SMA)

5.1. INTRODUCTION

> "In respect of any area of land within the "Coastal Zone" or adjacent to the "Coastal Zone" or comprising both areas from the "Coastal Zone" and the adjacent area of land, declare such area by order published in the Gazette to be a "Special Management Area" where there is a need to adopt a collaborative approach to planning resources management within the defined geographic area"
>
> Coast Conservation (Amendment) Act No.49 of 2011

5.1.1 The Concept

The Concept of Special Management Areas (SMA's) previously referred as Special Area Management (SAM) has been identified as one of the important management tools in the field of Integrated Coastal Resources Management (ICRM) when the coastal resources are subject to increasing pressure from economic development, increasing population and poverty conditions in the coastal region in Sri Lanka. In addition, requirement of a new policy for integrated collaborative management approach with specific attention on social and economic needs of the coastal resource users and other stakeholders lead to the concept of SMAs. Furthermore, the need for active involvement of the stakeholders of the coastal resources on site specific basis was further advocated by various quarters due to inadequate outcomes of the other national CZM policies. Thus Special Management Area Planning was conceived as a "bottom-up" approach for managing coastal resources that complements the "top-down" regulatory approach practiced by CC&CRMD since its inception. The concept of Special Management Areas (SMA's) evolved based on the co-management principles and involves a collaborative, adaptive and flexible approach to resource management within a defined geographic area, was formally introduced as an auxiliary CZM policy through the National Coastal Zone Management Plan of 1997. Prior to formal adoption, the concept was tested on the ground in two pilot sites vis. Hikkaduwa and Rekawa under the Coastal Resources Management Project funded by USAID in 1992. The pilot initiative contributed to demonstrate the potential of adopting SMA process as an effective tool to manage coastal resources in a collaborative manner. Based on the experience gained from the pilot testing of SMA, the report "*Coastal 2000; Resources Management Strategy for Sri Lankas Coastal Region"* also recommended the design and implementation of Special Management Area Plans for the specific coastal sites with special ecological and economic significance. Although SMA planning has been tested and formally adopted by the 1997 National CZMP, there were no legal provisions to formulate and implement the SMA Plans in a formal manner until the new legal provisions were introduced through the Coast Conservation (Amendment) Act No.49 of 2011. Thus, at the initial phase of the process, administrative arrangements had been made to formulate and implement SMA Plans with the involvement of stakeholders constituting the community, local support institutions such as Pradesiya Sabas, Divisional Secretariats, outside local beneficiaries, central government institutions such as DWLC, Forest Department, and the external stakeholders

5.1.2 Evolution and Operational Experience

The experience gained from the implementation of first generation CZMP prepared in 1990, calls for a greater emphasis on local level stakeholder participation in managing coastal resources. This requirement stemmed mainly from the strong relationship that exists between the coastal resources and the resources users. The necessity for stakeholder participation further flared up with the nature of the open access regime of the coastal resources. Thus the SMA planning and implementation process has been adopted with the participation of resources users, considering their social and economic needs, complementary to the heavy emphasis on command and control measures adopted in managing coastal resources.

The initial phase of the SMA planning and implementation in Sri Lanka was preceded by two pilot projects at the Rekawa Lagoon and the Hikkaduwa Marine Sanctuary in 1992. This initiative was carried out by CC&CRMD with the financial and technical assistance provided under the Coastal Resources Management Project (CRMP) of USAID. The viability of the SMA concept in the local scenario was tested at both sites. Based on the attractive outcome and novel experience gained from these initiatives, the second generation CZMP of 1997 endorsed the SMA process by recommending the formulation and implementation of Special Management Area (SMA) Plans for 23 selected coastal sites. In addition "Coastal 2000" Strategy for coastal Resources Management also advocated the SMA concept. The SMA site selection was based on the following criteria:

(*a*) The severity of social, economic and environmental issues.

(*b*) Relative richness and abundance of coastal ecosystems.

(*c*) The feasibility of management based on size, location, legal and institutional factors.

(*d*) The existing or potential value of economic development in the area.

In addition to the site selection criteria, planning steps to be followed in the planning process were also spelt out in the 1997 CZM Plan. In 2005, CC&CRMD and International Union for Conservation (IUCN) with the financial assistance provided by the Global Environmental Facility (GEF) under the United Nations Development Programme (UNDP) has formulated and implemented a Special Management Area Plan for Rekawa, Ussangoda, Kalametiya (GEF- RUK) coastal ecosystem covering 20 coastal GND's. The goal of this SMA plan was to ensure sustenance of the natural resources of the RUK coastal ecosystem while optimizing the social well being of the communities residing in the Special Management Area.

Subsequently, the CC&CRMD, under the supports of the CRMP of 2000-2007funded by ADB has extended the second round of fully fledged SMA process to several sites, namely the Bar Reef, Negombo Estuary/Muthurajawela Marsh, Lunawa Lagoon, Madu Ganga Estuary, Hikkaduwa Nature Reserve and environs, Unawatuna Bay including Koggala Estuary, the Mawella and Kalametiya Lagoons, and the coastal reach in Hambantota.

In addition to the SMAP formulation and implementation in compliance with the 1997 CZMP, CC&CRMD has introduced the concept and related activities into district level projects. This has led to the incorporation of SMA planning activities in the Hambantota Integrated Coastal Zone Management Project (HICZMP) funded by NORAD, where SMAP activities focused on the Hambantota dunes and the Mawella Lagoon - Kudawella (Blow hole) coastal area. A main difference in the application of the concept here was that whilst the basic principles were the same, operational and administrative procedures were not necessarily similar. Another salient feature here was the implementation of some identified activities of the SMA process during the planning phase.

5.2 LESSONS LEARNT AND DRAWBACKS

By and large, the SMA planning and implementation initiatives related to Coastal Resources Management in Sri Lanka were largely driven by the government sector which was being led by the Coast Conservation and Coastal Resource Management Department. A total of 12 SMA plans have been formulated and implemented by CC&CRMD since 1992, under four distinct foreign funded projects. As per the evaluations/reviews carried out by Lowry K et al., (1997), Ingegerd Landstorm (2006) De Silva Sanjive et al., (2012), Evaluation of SMA Programme in Sri Lanka (2014) and the in-house discussions were carried out among the CC&CRMD officials. The lessons learnt and drawbacks identified from the past experience could be highlighted in the main areas of legal and institutional, effectiveness and impacts, sustainability and challenges.

5.2.1 Legal and Institutional

In terms of the legal and institutional aspects of the SMA, following lessons and drawbacks have been experienced in the past and are summarized as;

- All the formulated and implemented SMA plans demonstrate and clearly evidence that administrative or collaborative arrangement itself is not effective without proper legal framework.

- The Community Coordinating Committees which have oversight on the implementation of the SMA plans are not legally recognized in the CC Act or any other statute. The failure to either statutorily or administratively recognize the CCC's emasculates their authority to implement SMA plans The functionality of the Community Coordinating Committees (CCC) setup under the planning and implementation process of the SMA were at a standstill in all sites in the absence of catalytic role and the financial and technical resources of the respective projects.

- The key roles played by the Divisional Secretaries in the planning and implementation process at the initial stages have disappeared during the post project process over time due to absence of legal and institutional recognition of their role. In addition, capacity, resources and orientation of the local level officials also did not match with the envisaged roles to be played by them during the post project period.

- The auxiliary institutional arrangements made through forming new NGO's and strengthening of existing non-government institution to ensure continuation of SMA process had failed in many instances.

- After completion of the project phase, the CCC's have to be fully dependent on external donor support for post project implementation, especially with respect to implementation of large interventions. The spontaneous switch between totally financial dependent status to totally independent status does not provide an interim period for consolidation and evolution of institutional capacities and process.

- Absence or lack of prospects of statutory authority, recognition as well as individual benefits for the community created negative impacts on participation in the SMA implementation process.

- Lack of transparency in local organizations structure and operation has negatively influenced the decision making process and distributing/sharing benefits.

- Failed to appreciate the influence of community and intragroup heterogeneity on building participatory and consensus based resource governance.

- Past SMA planning experience reveal that process of negotiations with multiple stakeholder groups, a broad range of differentiating factors influence on participation and consensus building in the planning and implementation process.

Although the national policy documents provide guidance for a locally driven collaborative management process in SMA planning, central agencies retain the decision making functions within their own agencies and strong local organizations have not emerged due to lack of institutional follow-up and effective social mobilization.

5.2.2. Effectiveness and Impacts

- The past experience revealed that to ensure long term sustainability and effectiveness, SMA should be a part of the comprehensive national level CRM planning and management effort.

- The overall status of SMA process in majority of the sites indicated adequate effectiveness (Evaluation of SMA Programme in Sri Lanka 2014).

- The status of conservation measures initiated by other agencies has improved as a result of the SMA process (Evaluation of SMA Programme in Sri Lanka 2014).

- The overall awareness of the importance of coastal resource management among stakeholders has been increased notably.

- SMA planning and implementation process has created a sense of ownership among stakeholders and community enthusiasm enhanced.

- By and large the livelihood development initiatives carried out under SMA process to ensure social and economic well being of the communities have created little impact due to the sustainability issues encountered.

- While ensuring sustainability, greater impacts have been created through implementation of interventions that create common/ individual benefits among stakeholders.

- In terms of objectives of the SMA plans vs. the actual achievements, it was revealed that majority of the investigated SMA sites achieved more than 50% of the spelled out objectives (Rekawa 59%, Mawella/Kudawella 54% , Negombo 55%, Bar Reef 60%, Lunawa 66%, Puttalam Lagoon 56% , Batticaloa Lagoon 54%) , RUK 31% (Evaluation of SMA Programmes in Sri Lanka 2014).

5.2.3 Sustainability and Challenges

As per the evaluation carried out on the selected SMA sites in 2014, sustainability was measured using the following criteria;

1. Functioning of CCC after the project period.
2. Continuation of Institutional mechanism set up by the project.
3. Continuation of financial support from other sources for SMA.

4. Continuation of projects and , programmes introduced by the SMA process.
5. Involvement of CC&CRMD after the project.

- It was revealed that irrespective of lead agency involved in SMA, all the CCC's setup under the projects were not functioning after the project period.
- No financial support for SMA process has been continued after the project period, except in a few instances.
- Majority of the projects and programmes have not been continued after the project period except in a few instances.

Apart from the above, following inadequacies also contribute to lack of sustainability of the SMA process in the past;

- Lack of pertinence of technical solutions adopted in conservation measures created negative impacts.
- The impacts of policies related to the other sectors have negatively impacted on the SMA process creating threats to the sustainability.
- The CBO's and NGO's actively involved in the SMA process has limits that prevent achievement of major objectives.
- Accommodating new economic policies in SMA planning and implementation is a major challenge due to inadequate application of environmental valuation.
- Setting up of an institutional mechanism, in compliance with the existing legal provisons will be a great challenge for ensuring sustainability of the SMA process.

5.3 NEW LEGAL PROVISIONS FOR SPECIAL MANAGEMENT AREA (SMA)

Although, the SMA has been adopted by the CC&CRMD , there were no proper legal provisions for formulating and implementation of the concept until 2011. Absence of proper legal provisions under the Coast Conservation Act or any other statute has created negative impacts on the sustainability of the SMA process. Even though the absence of proper legal provisions has created constraints, an administrative or and institutional arrangement has been adopted by the CC&CRMD in formulating and implementing the SMA planning process in the past with the collaboration of Divisional secretaries and the other relevant agencies.

When the required provisions have been introduced through the Coast Conservation (Amendment) Act, No. 49 of 2011, new opportunities are created for continuation of Special Management Area planning and implementation as a sustainable and effective supplementary planning tool for coastal resources management in Sri Lanka. As per the new provisions (Section 22E (1)), Special Management Areas could be declared covering land within the coastal zone or adjacent to the coastal zone or comprising both through Gazette notification. The new legal provisions also recognized the adoption of collaborative approach for planning resources management in the defined SMA's. According to the new legal provisions, Special Management Areas could be declared only if such areas are included in the Coastal Zone and Coastal Resource Management Plan prepared under the provisions of the Amendment Act.

To formulate effective institutional structure for planning and management of Special Management Areas, new regulations have to be prepared in compliance with the legal provisions provided through Part 111c Sub Section 2 of the Amendment Act No. 49 of 2011. To achieve the desired objectives of SMA planning, regulations should be framed and brought before Parliament as soon as convenient. If the regulations are not approved it is deemed to have been rescinded without prejudice to any act done under the regulation. The new regulations have to be

formulated prescribing the manner and mode in which and the persons by whom, such Special Management Area should be administered, the persons entitled to have access to these areas and the activities which can be carried out within such areas.(under the provision in Section 22E (2).

Accordingly, the existing legal provisions have to be used with the effective participation of stakeholders comprised of the relevant community and those who are directly attached to the SMA site, local institutions both government and non-governmental, outside beneficiaries and the central government institutions.

5. 4 WHY SMA SHOULD BE STRENGTHENED AND ADVOCATED

Special Management Area concept that is based on the co-management principles could be considered as an effective and viable approach to integrated coastal resources management in Sri Lanka. In comparison to other approaches, it properly acknowledges the complex relationship among coastal and marine uses and the coastal ecosystems. SMA process also promotes linkage and harmonization among varied types of coastal activities and the physical processes of nature. The flexibility of management system pays proper attention on both coastal resources systems as well as human systems. The main influencing factors behind the requirement of SMA as a complementary tool for Integrated Coastal Resources Management are summarized below;

SMA process is viewed as an effective means of promoting sustainable management of coastal resources within a defined geographic setting and makes it possible to deal more comprehensively and effectively with the complex management issues.

- The decentralization policies have been pursued since late 1980s, positively contributed in adopting collaborative management.
- Recognition of a need to formalize indigenous or traditional sustainable resources management practices within the legal and wider governance framework to minimize coastal resource depletion, overexploitation and user conflicts.
- The characteristics of public or state owned nature of coastal resources and the prevailing status of open access to it present formidable challenges to manage coastal resources.
- Coastal habitats being rapidly degraded due to both man induced causes and natural phenomenon. Thus, a user centered management approach is vital.
- To pay systematic and effective approach to counter spreading of poverty and over exploitation of marine and coastal resources.
- To facilitate local level management interventions and to maintain consistency and compliance with national level coastal resource management policies and regulations.
- Community demand for greater legitimacy and transparency in resource management decision making.
- Counter increasing user conflicts parallel to new development activities taking place in the coastal region.
- Requirement of empowering and building sense of ownership among civil society, communities and community based organizations to enable to manage coastal resources in a sustainable manner.

- To address gender issues related to coastal resources uses.
- To incorporate a sustainable livelihood perspective to address site specific coastal environmental issues.
- To build resilience and reduce vulnerability among coastal communities against natural coastal hazards.
- To enable positive community perception of decentralization policies being pursued in the recent past in administrative and political fields, and to provide an enabling environment for effective and sustainable coastal resources management through SMA.

5.5 REQUIREMENT OF MOVING FROM A PROJECT BASED APPROACH TO A MORE PROGRAMMATIC APPROACH

The two and half decades of planning and implementation of Special Management Area process carried out by the Coast Conservation and Coastal Resource Management Department and the other agencies in Sri Lanka were entirely on a project oriented basis. As a result of this, the outcomes of the SMA planning and implementation process and the long term sustainability of it posed a problematic situation. This situation was further complicated due to absence of a proper legal and institutional framework. Thus the long term commitment of the main facilitating agencies came to a standstill when the projects were terminated. Similarly, the local level organizations such as NGO's which were involved in the process were also unable to continue the process due to financial constraints and lack of authority, capacity and legal and administrative recognition. The past implementation experience revealed that the post project implementation including monitoring and scaling up of conservation and livelihood activities have come to a halt with the closure of the project. Therefore, based on the new legal provisions and the regulations to be framed on Special Management Areas, the planning and implementation process has to be moved to a more programmatic approach based on collaborative resources management principles and guidelines. In this respect careful attention has to be placed on balancing conservation objectives with the development needs in the legally declared SMA sites. In view of the above requirement, a programme based approach has to be adopted while recognizing to practically get involvement of the communities at the sites. The SMA programme will be formulated in compliance with legal provisions and the new regulations as per the following guidelines:

(*a*) A separate Special Management Area Unit will be established within the Coast Conservation and Coastal Resource Management Department under the Director/Coastal Resource Management.

(*b*) A separate financial vote will be created to ensure adequate funding from the central government for the SMA planning and implementation.

(*c*) New regulations will be framed to ensure legitimacy of community participation and provide decision making authority to the community at the designated sites.

(*d*) The need to establishing legal recognition for the SMA Committees and grass root process will be recognized in selecting representatives for the SMA's.

(*e*) Operational rules or code of conduct will be formulated under the new regulations for SMA Committees.

(*f*) Arrangements will be made to share experience on co-management with the regional countries with a view to enhance the planning and implementation of SMA's.

(*g*) The list of SMA sites will be prepared based on the new criteria introduced and incorporated into this plan.

5.6 IMPROVING EFFICACY FOR SPECIAL MANAGEMENT AREA (SMA)

Even though, there were some drawbacks and deficiencies experienced in planning, implementation and continuation of the SMA process, the two major rounds of SMA planning and implementation process carried out by the Coast Conservation and Coastal Resources Management Department has recognized its appropriateness and effectiveness as an ICM tool. Similarly, the required modifications to produce better outcomes through SMA plans also identified by the CC&CRMD through lessons learnt. Although this approach is clearly perceived as an effective one for managing coastal resources and its environment in complex settings, several constraints and drawbacks as indicated in the preceding sections have prevented the realization of maximum benefits from this management process. In addition, sustainability of the SMA approach posed into a complex situation. The two major rounds of SMA planning and implementation conducted in 12 sites under the external financial support (USAID and ADB - GoN) in project oriented nature and the other SMA interventions carried out under HICZM and GEF-RUK provide valuable lessons to improve and strengthen future SMA planning and implementation process in other designated sites. Further the in-depth reviews and evaluations conducted by a number of scholars on the concept of SMAP as well as planning and implementation in Sri Lankan context were also useful in formulating new guidelines and procedures. In addition most importantly, the new legal provisions provided through Coast Conservation (Amendment) Act, No. 49 of 2011 have given ample opportunity to enhance efficacy for SMA.

In addition the National Strategy and Action Plan prepared by the IUCN, Sri Lanka office for the National Steering Committee for Mangroves for the Future Programme, Sri Lanka in 2009, recommends that an eco-system based Integrated Coastal Management Policy be adopted in order to overcome the threat that a habitat based approach leads to driving the focus away from the eco-system unit in which such habitats are nested. Such a change will have to await acceptance of the recommendation at higher levels of policy approval and consequent re-orientation of the CC Act. This should be the focus of the CZM Plan revision that will be done within the next few years as required by the CC Act.

Improving the efficacy of SMA planning requires addressing several key issues based on an understanding of the basic requirements for SMA planning:

Pre-Planning Phase

1. Necessary action has to be taken to move from project based approach to programme based approach for planning and implementation of the overall SMA programme of the country.

2. As per the new legal provisions of the Coast Conservation (Amendment) Act, No. 49 of 2011, a list of appropriate candidate sites for SMA should be selected based on the new criteria and incorporated into this plan.

3. A preliminary situation analysis report should be prepared for each site to determine priority and to identify legal boundaries of SMA.

4. In compliance with the new legal provisions, new regulations for SMA should be prepared and finalized with wider stakeholder consultation and approval for gazetting should be obtained as soon as possible.

5. Coast Conservation and Coastal Resource Management Department should take the lead facilitator role for SMA with formulating separate section for SMA.

6. SMA guide book has to be prepared based on the new legal provisions, regulations in considering the existing and future social environmental and economic trends in the coastal zone.

Planning Phase

7. There is no blue print for SMA. Each site should be considered unique, requiring application of specific integrated methodology; planning should be based on site-specific issues, extent of area to be covered etc.

8. Equal opportunities should be emphasis on social and institutional profile when situation analysis is carried out.

9. There is a greater possibility of success when the area is smaller. Thus legal boundaries of the SMA should be determined by the SMA Committee based on the information provided through preliminary situation analysis and with the consultation of the other relevant stakeholders prior to declaration of the site as a SMA site through Gazetting. However, the linkages between the SAM site and the eco-system in which it is nested should be clearly identified.

10. SMA committee should be established in accordance with the new regulations for SMA and grass root independent selection process should be adopted in selecting representatives for the SMA Committee to ensure protection of local interest.

11. Formulate operational rules or code of conduct in line with the regulations to govern the SMA committee. The operational rules should be placed specifically on tabling issues, decision making, disbursement and management of funds, obtaining assistance from the Provincial Councils and the Central Government Agencies and International NGO's.

12. All discussions, decision making process and SMA Committee meetings and information compendiums should be prepared in suitable local language (Sinhala/Tamil) where possible.

13. All decisions made during planning and implementation should be clear and well documented; binding decisions must be clearly communicated to all involved in the process and abided by all to prevent mistrust which will jeopardize the SMA process.

Implementation Phase

14. Agencies and NGO having an implementation and monitoring role in SMA plans should be obliged to include activities in fulfillment of that role, in their annual work programmes.

15. Attempt should be made on strengthening local organizations, structure and operating rules to enhance transparency in leadership, membership and decision making process.

16. Full and active participation of representative stakeholder groups at all stages directly underpins success of SAM planning and implementation, and is critical to counteract adverse influences.

17. When institutional development commences at the local level during the planning phase, attention should be placed to establish /strengthen both vertical and horizontal linkages between newly formed/existing organizations and local /central government agencies.

18. Instead of establishing local organizations/institutions across livelihoods and resources bases, community element should be promoted.

19. Local communities should have opportunities to derive tangible benefits from the initial stages of the SMA process if they are to be motivated to manage natural resources.

20. Communities should be supported at the initial stages of the SMA process with financial and technical assistance to strengthen their organizational capacity for plan implementation; they may also require long-term financial assistance for socio-economic development of the area.

21. Mechanisms should be built into SMA plans for promoting self reliance in order to minimize the dependency on external support.

22. Wherever possible SMA processes should be incorporated into district and provincial development plans or regional projects of the government to be in harmony and in compliance with National and Regional Development Plans.

23. All SMA plans should have a mechanism for participatory monitoring and feedback systems, based on indicators identified at the outset of project planning for continued improvement of the implementation process and to make the results tangible.

5.7 MECHANISMS FOR SMA PLANNING AND IMPLEMENTATION

Identification and agreement on SMA sites: The past experience through 1997 and 2004 Revised CZMP's

After formalization and acceptance of Special Management Area (SMA) as a supplementary ICM tool, 23 sites have been identified through CZMP of 1997 as potential SAM sites with specific complex issues to be resolved. After identification of potential SMA sites, each site has been rated with respect to "four factors of concern" or the criteria for ranking and the sites with highest cumulative values have been recommended as high priority sites for implementation. In view of the importance, three additional criterions have been incorporated into the criteria used for ranking SMA sites.

Criteria used for ranking potential SMA sites for implementation

(*a*) The severity of social, economic and environmental issues prevailling in the sites.

(*b*) The relative richness and abundance of coastal eco-systems.

(*c*) The feasibility of management based on size, location, legal and institutional factors.

(*d*) The existing or potential value of economic development in the area.

(*e*) Level of exposure/vulnerability to climate change impact.

(*f*) Vulnerability to coastal disasters both episodic and chronic.

(*g*) Significance of archaeological and historic values of the site.

The 1997 list of potential SMA sites is considered as an incomplete one and it does not adequately represent the sites located in the north and the eastern coastal region of the country. This was due to the difficult ground situation on account of the armed conflict which prevented access to these areas for public consultations and site identification. It was further compounded by the scarcity of information on possible sites within these regions.

SMA sites to be declared under the legal provisions of the Coast Conservation & Coastal Resource Management

The SMA sites identified through 1997 Revised CZMP as well as 2004 CZMP including level 11 sites have no legal recognition for implementation unless those sites are also considered and termed as SMA sites. Therefore all potential sites including those in which the SMA process had already been initiated under different projects and the appropriate

level 11 SMA sites have to be included into this document and termed and declared as SMA (Special Management Areas) under the legal provisions of the Part 111 Section 22E of the Coast Conservation & Coastal Resource Management Act, to establish legal recognition. In this respect following procedures/process will be adopted by the Coast Conservation and Coastal Resource Management Department.

Re- designation and revitalization of SMA sites already implemented through project based approach:

Declaration of SMA Sites

As indicated in the following Table 5.1 and 5.2, all eleven Special Management Area (SMA) Sites in which planning and implementation process initiated will be re-listed as Special Management Areas and action will be initiated to declare as SMA sites through a government gazette notification in compliance with the legal provisions of the Coast Conservation (Amendment) Act, No. 49 of 2011.

Establishment of legal boundaries

In this respect the legal boundaries of the SMA sites should be re-demarcated emphasizing the following;

- Status of conservation of coastal habitats.
- Degree of outcomes of the implementation of previous initiatives in accordance with the issues prevailed.
- Social and economic profile of the site.
- Balancing conservation objectives with economic needs.
- Exposure and vulnerability to climate change impacts.

Formation of Special Management Area Coordinating Committees (SMACC)

In accordance with the new regulations to be framed under the provisions of the Coast Conservation & Coastal Resource Management Act, Special Management Area Committees (SMACC) will be formulated replacing former CCC's. The SAMC will be represented by central government and local government agencies, local level organizations and other relevant stakeholders. The representatives from the local organization will be selected through grass root selection process as specified in the new regulations. The SMAC will be co-chaired by the Divisional Secretary and the Director General /CC&CRMD, and an appointed Senior Officer from the Coast Conservation and Coastal Resources Management Department. The SMACC will operate in compliance with the code of conduct formulated as per the new regulations for SMA.

Review and updating existing SMA Plans

Special Management Area coordinating Committee will review and update the existing SMA Plans consistent with the conservation objectives and development needs of the re-designated SMA site. In this process, the situation analysis report should be prepared as appropriate in consultation and guidance of the SMACC.

Formulation of sustainable financial mechanism

To ensure long term sustainability of the SMA process, a sustainable financial mechanism shall be established by the SMACC in consultation with the other stakeholders. In this respect contributions will be envisaged from central government agencies, local government agencies as well as respective provincial councils.

Monitoring and impact analysis

To assess and evaluate results and impacts of the SMA process, monitoring mechanisms should be established by the SMAC. In this process emphasis should be placed on monitoring, process, outputs and outcomes.

Table 5.1 Sites at which the SMA process was initiated through project based approach

District	Project	Site
Colombo	CRMP 11	Lunawa Lagoon
Galle	CRMP 11 CRMP 1/11 CRMP 11	Madu Ganga Estuary Hikkaduwa Nature Reserve and environs Unawatuna Bay and Koggala Estuary
Hambantota	HICZMP HICZMP/CRMP1 CRMP 11 CRMP 1	Hambantota sand dune stretch Mawella Lagoon Kalametiya Lagoon Rekawa Lagoon Rekawa, Ussangoda, Kalametiya (RUK)
Gampaha	CRMP 11	Negombo Estuary/Muthurajawela Marsh
Puttalam	CRMP 11 BMZ,IUCN,FAO-UNDP	Bar Reef Puttalam Lagoon
Batticaloa	NECDEP_ADB GEF	Batticaloa Lagoon
Ampara	GEF	Panama Sand Dunes
Trincomalee	GEF	Pigeon Island

Table 5.2 A list of sites to be declared as Special Management Areas under the legal provisions of the Coast Conservation & Coastal Resource Management Act

District	Site
Colombo	o Lunawa Lagoon o Bolgoda Lake o Dehiwala Mt.Lavina Beach
Kalutara	o Kaluganga Estuary
Galle	o Madu Ganga Estuary o Hikkaduwa Nature Reserve and environs o Unawatuna Bay and Koggala Estuary o Bentota –Beruwala Coastal Stretch o Dodanduwa Lake
Matara	o Polhena Beach o Weligama Ba
Hambantota	o Rekawa Lagoon o Rekawa-Ussangoda-Kalametiya Cluster o Kalametiya - Lunama Lagoon complex o Mawella Lagoon-Kudawella blowhole
Ampara	o Panama dunes –Arugam bay o Periya Kalapuwa-Korai Kalapuwa o Komari lagoon
Batticaloa	o Batticaloa – Kayankani esturay / lagoon o Uppar - Panichankerni estuary o Kalkudah – Passikudah bay, Thanadi bay, Valachachanai Estuary o Sallitivu Island and associated coastal area
Trincomalee	o Trincomalee Bay o Nilaweli beach, Pigeon Island, Periyakarachchi and Sinnakarachchi Estuaries o Kuchchaveli-Poduwakattu
Mullaitivu	o Nanthikadal Lagoon o Nai Aru Estuary
Jaffna	o Manalkadu Dunes o Jaffna Estuary (town area) o Thondaimanaru Lagoon o Kankesanthurai and Keeramalai coastal area o Mandativu, Delft, Nainativu Islands o Karainagar (including Casuarina beach) coastal area o Navali Coastal Area
Mannar	o Gulf of Mannar o Thalaimannar coastal area o Sillavathurai , Arippu and Aruvi Aru coastal area and Bay of Kondachchi o Weeditaltivu coral reef and associated ecosystem
Puttalam	o Puttalam Estuary o Chilaw Estuary o Mundal Lake & Puttalam Corridor Channel

5.8 GUIDELINES FOR THE SMA PROCESS

In addition to the specific guidelines spelt out in the preceding section for the purpose of reformulating the ongoing or already initiated SMA's the following general guidelines are given for planning and implementation of SMA process in the new sites. These guidelines have been developed based on the new legal provisions introduced for SMA through Coast Conservation Coastal Resource Management Act No.57 of 1981 as Amended by Coast Conservation Act No.49 of 2011 and taking into consideration the lessons learnt in the past. However, they have to be adapted to meet the needs of the specific sites.

1. **Selection and declaration of a site**

   As per the new legal provisions, only SMA sites listed in this CZMP **(Table 5.1 and 5.2)** can be selected by CC&CRMD for declaration and gazetting as a Special Management Area, to adopt a collaborative resource management process.

2. **Establish legal boundaries**

   In conformity with the legal provisions and the regulations made under such provisions, legal boundaries of SMA site should be determined taking into consideration both land within the coastal zone and adjacent areas as required.

3. **Establishment of a Special Management Area Committee (SMAC)**

4. **Prioritization of identified issues and preparation of an environmental profile or situation/site reports**

5. **Conduct of analysis**

6. **Preparation of the draft SMA Plan**

7. **Adoption of the Special Management Area Plan**

8. **Implementation of Selected Activities Simultaneously with Planning Process**

9. **Establish Sustainable Financial Mechanism**

10. **Monitoring and Evaluating of Plan Implementation**

5.9 MANAGEMENT OBJECTIVES, POLICIES STRATEGIES AND ACTIONS

Objective:

SMA processes oriented towards continuous enhancement of the value of natural assets of the eco systems and improve livelihoods in the designated area through application of appropriate management tools.

Policy 1.1:

The Special Management Area (SMA) process will be implemented at the District /Divisional / local level including terrestrial and associated coastal waters with identified stakeholder collaboration.

Strategy 1.1.1

Prepare comprehensive SMA plans in compliance with the legal provisions of the Coast Conservation Coastal Resource Management Act No.57 of 1981 as Amended by Coast Conservation (Amendment) Act No.49 of 2011 and regulations framed under it for identified priority sites with the collaboration and effective participation of local communities, non-governmental and governmental agencies.

Proposed Action

1. Select sites that should be managed as SMA sites.

2. Establish legal boundaries and declare such sites through gazette notification as SMA sites

3. Establish institutional mechanisms as per the guidelines provided in this CZ&CRMP in the planning of the SMA process with local collaboration and facilitate the implementation at local/district/divisional levels.

4. Establish sustainable financial mechanisms.

5. Develop participatory monitoring plans to assess the progress and impacts of the SMA process.

Strategy 1.1.2

Develop a mechanism to enhance local collaboration and participation in SMA planning, implementation and post implementation processes.

Proposed Action

1. Conduct stakeholder analysis in respective sites to identify and determine factors helping or hindering stakeholder collaboration and participation in the process.

2. Develop a communication plan to ensure better collaboration and participation of all stakeholders in SMA process.

3. Establish both vertical and horizontal link between central government / local government agencies, SMACC and the stakeholder groups.

4. Develop an incentive scheme to encourage local collaboration and participation by ensuring tangible benefits to communities.

Policy 1.2:

Re-designate and revitalize SMA sites already implemented through project based approaches in the past.

Strategy 1.2.1

Declare SMA sites already planned and implemented on a project based approach as SMA sites through gazette notification to strengthen and rectify the weaknesses experienced during implementation.

Proposed Action

1. Establish SMACC as per the new regulations framed under the Coast Conservation (Amendment) Act No.49 of 2011.

2. Follow guidelines given in section 5.2.

3. Identify main constraints, analyse lessons learnt, carry out a situation analysis and find solutions to rectify the shortcomings experienced in the implementation of ongoing SMA plans and facilitate continuity of the process.

4. Institutionalize a programme to monitor and evaluate SMA projects, and establish a feedback mechanism to assist enhance the management efficiency.

Policy 1.3

All SMAP should be formulated and implemented in compliance with national level legislations.

Strategy 1.3.1

Ensure maintaining consistency in planning and implementation of SMA plans /planning process with other relevant national level legislation.

Proposed Action

1. Prepare guide book describing procedures, means and ways to maintain consistency of SMA planning and implementation process with the national level legislation.

2. Conduct awareness programmes on SMA process among provincial, district and divisional level stakeholders.

Policy 1.4

The capacity of local authorities and concerned state agencies will be strengthened to enhance implementation of SMA Plans.

Strategy 1.4.1

Enhance the SMA implementation capacity of Local Authorities and concerned state agencies through training and awareness programmes and effective legislation.

Proposed Action

1. Promote training and awareness programmes on SMA processes.

2. Further strengthening of legal framework for SMA planning.

3. Promote collaborative management of coastal habitat conservation through SMACC.

4. Include guidelines for and responsibilities of communities, government/semi-government organisations, District Secretariats and SMACCs for implementation of the SMA Plans.

5. Strengthen capacity of local level officials for SMA planning.

Policy 1.5

The Special Management Area process will be harmonized with national and regional development efforts.

Strategy 1.5.1

Incorporate and integrate planning and management of SMA sites into development plans of regional/ integrated national development projects where appropriate.

Proposed Action

1. Coordinate with the Ministry of Economic Development to identify a mechanism to incorporate SMA Plans in regional projects/ integrated national projects.

2. Establish a mechanism to facilitate private sector participation in activities of SMA processes.

Policy 1.6

SMA planning and implementation shall utilize comprehensive valuation and incorporation of hitherto un-recognized economic value of eco-system services.

Strategy 1.6.1

Recognition and due consideration will be placed on real economic value of the eco-system services when decisions are made with respect to environmental conservation, development and livelihood initiatives while balancing conservation objectives with development needs.

Proposed Action

1. Conduct environmental valuation with respect to services of the eco-systems to determine effective and fruitful decisions where possible.

2. Carry out outreach programme to highlight importance and value of the hidden or un-recognized services of the coastal eco-systems.

3. Enhance capacity of the collaborative institutions to conduct environmental valuations.

Policy 1.7

The livelihoods of the communities in the SMA sites will be enhanced / up- scaled to ensure sustainable utilization of the coastal resources.

Strategy 1.7.1

The issues related to livelihoods and the coastal resources management will be comprehensively investigated and the required mechanism to improve livelihoods of the communities on a sustainable manner will be incorporated into the SMA process.

Proposed Action

1. Investigate issues related to utilization of coastal resource and livelihoods of the communities at the SMA sites.

2. Formulate and implement sustainable livelihood enhancement strategies based on past experiences to minimize issues identified.

3. Promote private sector participation in developing and scaling up of livelihoods in the SMA sites.

4. Adopt appropriate monitoring mechanism to evaluate, process, outputs and the outcomes of the livelihood development programmes implemented.

REFERENCES:

1. Coast Conservation and Coastal Resource Management Department, (2014), Evaluation of Special Management Area (SMA) in Sri Lanka (unpublished).
2. Coast Conservation and Coastal Resource Management Department, (2004), Revised Coastal Zone Management Plan.
3. Government of Sri Lanka, (2012) Coast Conservation and Coastal Resource Management Act, No.57 of 1981.
4. Government of Sri Lanka, (2011) Coast Conservation (Amendment) Act, No. 49 of 2011.
5. Clemett, Alexandra; Senaratne, Sonali; and Banda, R; (2004) Can Coastal Zone management in Sri Lanka Sustain Local livelihoods and Eco-systems? Policy Process Analysis Paper 2, Improving Policy Livelihood Relationship in South Asia, Stockholm Environmental Institute (SEI), York, UK.
6. De Cosse, P.J., and Jayawickrama, S.S. 1996. Co-management of resources in Sri Lanka: Status, Issues and Opportunities. USAID/Sri Lanka Natural Resources and Environmental Policy Project, Colombo.
7. De Silva, Sanjiv; Senaratne, Sellamuttu, Sonali;, Kodituwakku, Dekshika Charmini; Atapattu, Sitara S;(2011) Governance Performance in Integrated Coastal Management in Sri Lanka, Country Report, Colombo IUCN Sri Lanka.
8. CCD. 1997. Revised Coastal Zone Management Plan, Sri Lanka, 1997. Colombo: Coast Conservation Department. Ministry of Fisheries and Aquatic Resources Development.
9. Jayatilake, A.,; Pallewatta.,' N.,; and Wickramanayake, J. 1998. The practice of community based conservation in Sri Lanka. In Community and Conservation: Natural Resource Management in South and Central Asia. Ed. A.Kothari, N. Pathak, R.B. Anuradha, and B. Taneja, New Delhi: Sage Publication.
10. Landstorm Ingegerd (2006), Towards Collaborative Coastal Management in Sri Lanka? a study of Special Area Management in Sri Lanka's Coastal Region.
11. Lowry, K.,; Pallewatte, N.,; and Dainis.A.P. 1997. Special Area Management Projects at Hikkaduwa and Rekawa.. A Preliminary Assessment. CRMP, Colombo.
12. Lowry, K., Pallewatte, N., and Dainis, A.P., 1999. Policy-relevant assessment of community-level coastal management projects in Sri Lanka. Ocean and Coastal Management 42 (8): 717 – 745.
13. Wickramaratne, H.J.M. and A.T.White. 1992. Concept paper on Special Area Management for Sri Lankan Coasts. Working Paper No.10, 1992. CRMP Colombo.
14. Senaratna, S. 2003. Factors influencing the sustainability of livelihoods in rural coastal communities in Sri Lanka. PhD Upgrade Report. Imperial College London.
15. HSAMCC/CCD/NARA/Department of Wildlife Conservation/DWLC/CRMP/, 1996. Special Area Management Plan for Hikkaduwa Marine Sanctuary and Environs Sri Lanka. Hikkaduwa Special Area Management and Marine Sanctuary Coordinating Committee, Coast Conservation Department, National Aquatic Resources Agency, Department of Wildlife Conservation and Coastal Resources Management Project.
16. RSAMCC/CCD/NARA/CRMP. 1996. Special Area Management Plan for Rekawa Lagoon, Sri Lanka. Rekawa Special Area Management Coordinating Committee/ Coast Conservation Department/ National Aquatic Resources Agency/ and Coastal Resources Management Project.

CHAPTER 6

6. REGULATORY MECHANISM

6.1 INTRODUCTION

The regulatory framework of the Coast Conservation and Coastal Resources Management Act, No.57 of 1981 is being used as an effective management instrument by the Coast Conservation and Coastal Resources Management Department (CC&CRMD) for managing activities and the resources within the coastal zone. To address the major coastal issues and to ensure sustainability of the management measures, adopting other auxiliary management instruments such as Special Management Area (SMA), Inter-agency coordination, Compliance Monitoring, Research and investigation and Public education and awareness plays vital role. This is complementary to the regulatory instruments in the Coast Conservation and Coastal Resource Management Department's coastal resources management strategy in the recent past.

The Regulatory mechanism pertaining to the Coastal Zone constitutes the following:

- Implementation of a permit system
- Prohibition of activities whch permits are not issued
- Designation of set-back standards, variance and exemptions
- Compliance monitoring for development activities
- Control of development activities
- Controlroling unauthorized development activities
- Provision of standards and guidelines for specified development activities
- Requirement of Environmental Impact Assessment,(EIA) and Initial Environmental Examination (IEE)
- Designation and control of affected areas
- Declaration of conservation areas
- Designation and managing SMA'

Definition of the Coastal Zone

The definition of the "Coastal Zone" as defined in the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981 as amended by Act, No. 49 of 2011 is as follows;

"Coastal Zone" means that area lying within a limit of three hundred meters landwards of the Mean High Water line and a limit of two kilometres seawards of the mean Low Water line and in the case of rivers , streams, lagoons or any other body of water connected to the sea either permenently or periodically , the landward boundary shall extend to a limit of two kilometres measured perpendicular to the straight base line drawn between the natural entrance points thereof and shall include the waters of such rivers, streams, and lagoons or any other body of water so connected to the sea , and shall also include the area lying within a further extended limit of one hundred metres inland from the zero Mean Sea Level along the periphery";

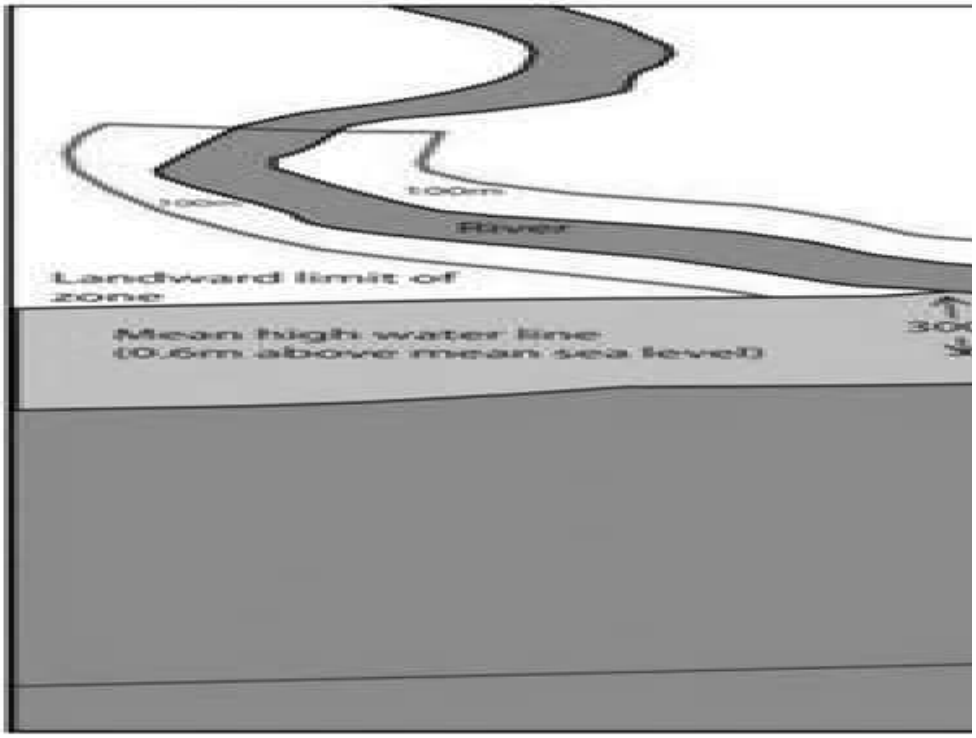

Figure 6.1 Coastal Zone as defined in the Coast Conservation and Coastal Resource Management Act No 57 of 1981 as ammended by Act No.49 of 2011

6.2 PERMIT SYSTEM

The principal regulatory tool used by the Coast Conservation and Coastal Resources Management Department in managing development activities of the "Coastal Zone "is the Permit Procedure. The main objective of this procedure is to direct development activities in the "Coastal Zone" in such a manner that negative impacts of development activities are averted or minimized. Through this procedure, activities that are harmful or not compatible to the coastal environment are controlled and the quality, stability and productivity of the "Coastal Zone" are maintained. Thus it is made mandatory under the Act for any person, whether in the private or the state sector or, intending to engage in a development activity within the "Coastal Zone" (except for the prescribed activities for which permits are not required) to obtain a permit issued by the Director General. Activities that may be engaged in without a permit have been prescribed by Coast Conservation Regulation No.1 of 1983 and published in *Gazette* No. 260/22 of 2nd September1983.

6.2.1 Development activities within the "Coastal Zone" for which the permit is required

Development activities within the "Coastal Zone" for which the permit is required from Director General of CC&CRMD are as follows;

- Condominiums, dwelling houses, parpet walls and related structures
- Industrial and othe commercial structures
- Tourism, recreational, swimming pools and water dependent structures
- Commercial and fisheries harbour structures and navigational channels
- Roads, bridges,tunnels and railway lines

- Public and religious structures
- Shoreline protection works to be carried out by any private individual or group
- Waste water discharge , sewage treatment facilities and ocean outfalls
- Aquaculture facilities and sea farming structures
- Disposal of solid waste
- Dredging, filling, grading or breaching sand bars.
- Landscaping and development of beach parks
- Mining and mineral extraction
- Power generation project
- Removal of sand seaweeds or seashells
- Reclamation and creation of islands and additional buffers
- Construction of conveyance lines
- Construction, mining, and breaching related to flood control or hazard control by any private individual or group
- Construction of structures to prevent bank erosion, and filling of any water area within the "Coastal Zone
- Any other activity likely to alter the physical nature of the "Coastal Zone".

6.2.2 Prescribed Activities that may be engaged in without a permit issued by the Director General – CC&CRM within the "Coastal Zone"

- Fishing
- Cultivation of crops that do not destabilize the coast
- Planting of trees and other vegetation (except beach area)
- Construction and maintenance of coast protection works by the CC&CRMD in compliance with the Coastal Erosion Management Strategy and the emergency procedures as outlined in Chapter 2.

6.2.3 Categorization of Permits

Three categories of permits have been introduced through CZMP's of 1990, 1997, and 2004 respectively. Accordingly major permit, minor permit and emergency permit have been issued. As per the 2018 CZ&CRMP guidelines, all development permits will be issued by the Director General of CC&CRM under two categories viz. "Type A" permit and "Type B" permit.

Type "A" Permit	Type "B" Permit
The development activity which requires EIA or IEE is referred to as "Type A" permit	Development activity that does not require EIA or IEE is referred to as "Type B permit. The permits issued to minimize adverse impacts during an emergency situation are also included under category "Type B".

The permits issued under emergency situation are as follows;

- Flood control measures or any other natural hazard control measures.
- Removal of sand bars to prevent floods.
- Construction of salt water intrusion prevention structures on a temporary basis.
- Intervention at a time when threat / destruction is caused to life of people, or public/private property, until such time a "Type A"/"Type B" permit is obtained.
- National security purposes

The duration of the permits issued under emergency situation is determined by the Director General of the Coast Conservation and Coastal Resources Management Department

The criteria that will be adopted in reviewing "Type A" and "Type B" Permits are as follows;

6.2.4 ***Criteria to be used by the Director General in Evaluating "Type A"and "Type B" Permits***

The proposed activity

- *Is consistent with the management policies spelt out in Chapter 2 – 5 and any supplementary guidelines.*
- *Is not prohibited by this Plan.*
- *Is in compliance with the stipulated guidelines for variances and exceptions for set-back standards where applicable.*
- *Meets with the National Standards set by the Central Environmental Authority for air/water quality, noise, vaibration.*
- *Will not infringe upon the right of public access to and along the beach and will ensure right of vertical and lateral public access to and along the coast.*
- *Ensure that existing fishing activities are not obstructed or impeded.*
- *Is consistent with the intent of the zoning schemes of concerned agencies and/or guidelines recognized by CC&CRMD.*
- *Should not be located within the coastal zone abutting Protected Areas as specified in Table 6.3.*
- *Should not be located within a radius specified by the Department of Archaeology for designated archaeological, historic or cultural sites.*
- *Should not be located in an affected area or conservation area declared under the CC&CRM Act.*
- *Will not be located in an unauthorized filled area.*
- *Complies with the planning requirements with respect to reservations for roads, canals, rivers, streams, etc.*
- *Will not denude beach front vegetation cover.*
- *If they include commercial structures, dwelling houses and industries in underserved areas shall have provision for efficient and adequate means to dispose liquid and solid waste*
- *No development activities should be carried out leading to disruption of the natural processes of the sand dunes*
- *Should be complied with the reservations delineated for the roads and cannals*

6.2.5 Guidelines for issuing Permits for Removal of Sand

The following guidelines shall apply to permits issued for sand removal for non- commercial use. It should however be noted that, in considering the dynamic nature of the coastal zone, site specific guidelines will be issued from time to time during the plan implementation period.

- Removal of sand shall be permitted confined to the locations that are specified by the Coast Conservation and Coastal Resources Management Department. These specified locations are subject to change from time to time as determined by the Department.
- Mining of sand will not be permitted in 500 m water area from the mouth of the rivers, lagoons and other water bodies connected to the sea.
- Permit will be issued/concurrence will be given to remove sand bars to prevent negative impacts of the floods under the direct purview of the District Secretaries of the respective areas, the Officials of the Irrigation Department and Disaster Management Center.
- Sand removal within the "Restricted Development Zone" (500m from the mouth of the water body) of the water areas lying within the extended coastal zone will be permitted to facilitate navigational activities or controlling floods.
- Sand removal should not be carried out in a manner that causes damage to the existing vegetation cover adjacent to the sand removal site
- Sand removal shall not have adverse impacts such as salt water intrusion.

Unless under exceptional circumstances, permits will not be issued for:

- Mechanical extraction of sand will not be permitted within the coastal zone
- Removal of sand from the non-accreting beaches, barrier beaches, and sand spits will not be permitted
- Removal of sand from the newly accreted beaches or artificially nourished beaches will not be permitted
- Permits will not be issued for specified locations where erosion has occurred within the past twelve months
- Sand removal will not be permitted where bank erosion is visible in the rivers and the streams and closer to the water intakes..
- Sand removal will not be permitted from the riparian land of the water bodies lying within the coastal zone.

In exceptional circumstances, such permits will be issued, and the permit shall specify the exceptional circumstances under which it is issued and specify conditions, if any.

6.2.6 Prohibited Activities Which Permit Do Not Issued

Activities prohibited by the CC&CRMD under the Coast Conservation and Coastal Resources Management Act within the "Coastal Zone" are**:**

- Removal of corals (note: in case of removal for research purposes and for establishment of nurseries for replanting, a permit may be issued by the Director General specifying type, quantity, location and period for removal).
- Removal of sand except in areas identified by the CC&CRMD as specified locations.
- Any development activity that will significantly degrade the exceptional scenic and cultural value.
- Development within designated protected areas as specified by the Department of Wildlife Conservation and Forest Department Development activities within a specified pherypery from the boundary of the archaeological, cultural, historic sites designated by the Department of Archaeology or "Coastal Zone and Coastal Resources Management Plan" .
- Development activites taking place within designat "Affected areas", "Conservation areas", unauthorized filled areas and sand dunes

6.2.7 Prohibited Activities in the "Affected Areas"

In accordance with the legal provisions of the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981as ammended by the Act, No. 49 of 2011, affected areas could be declared; within or adjacent to the coastal zone or falling within both such areas or within any water body or part of any water body or within any lagoon or part of any lagoon or any peripheral area of a lagoon could be declared through gazette notification as required.

As per the above provisions, any development activity carried out under Section 14 in an affected area is considered a prohibited activity. Further; filling, erection, obstruction, pollution or introduction of any waste matter or any act which will harm the aquatic or marine life in affected areas are prohibited.

6.2.8 Prohibited Activities in the "Conservation Areas"

In accordance with the legal provisions of the Coast Conservation and Coastal Resource Management Act, No. 57 of 1981 as ammended by the Act, No. 49 of 2011, any area in which special measures need to be taken for the protection of the coastal and aquatic eco system could be declared as a "Conservation Area"

As per the above provision no development activity or collection and extraction of aquatic resources shall be carried out in the conservation areas except for engagement in scientific study and research in such areas with a permit issued by the DG/CC&CRM.

6.2.9 Setback distances for Protected Areas

The setback distances specified in the Table 6.1 are not applicable in respect of Protected Areas where any protected area falls within coastal segment; it will be considered a "no build zone".

Protected Areas include; Ramsar Wetland sites,Buffer Zones, Sanctuaries, Reserved Forests, Conservation Forests, National Heritage Wilderness Areas, Strict Nature Reserves,National Parks, Nature Reserves,Jungle Corridors,Refuges,Marine Reserves

A 300 m setback shall be applied to Fisheries Management Areas, Fisheries Reserves or any other designated area or site declared by the Government of Sri Lanka.

A total of 200 m setback shall be applied to all coastal archaeological sites designated by the Department of Archaeology.

6.3 SETBACK AREAS

6.3.1 Revision of Setback Areas as per the New Legal Provisions

With the amendments made to the Coast Conservation and Coastal Resources Management Act, No. 57 of 1981 through the amendment Act, No. 49 of 2011, the definition of the "Coastal Zone" has been changed by inclusion of 100 meter riparian land of the water bodies. Accordingly, to minimize the impact of development activities taking place in the riparian land, the responsibility and the authority of managing such development activities are also vested with the CC&CRMD through the new amendments. Although, both areas have strong and close connectivity with each other, the bio- physical characteristics as well as the level of vulnerability of both areas are varied. Thus, when determining the criteria for delineating Setbacks or the buffer areas, different criteria have to be adopted.

6.3.2 Desired Objectives of Set-backs

- Protecting lives and properties from coastal erosion and cyclones
- Minimize public investment on coast protection structures
- Protecting and enhancing the scenic value of coastal environments ,protecting vulnerable coastal habitats and unique natural sites;
- Providing buffer zones around coastal archeological , historical and cultural sites within the coastal zone;
- Minimizing user conflicts among different activities taking place in the coastal zone;
- Ensuring public access to and along the coast;
- Maintaining consistency among national and regional laws and plans;
- Ensuring consistency between national development goals and environmental objectives

6.4 DEFINITION OF COASTAL SETBACK

A setback area is a geographycal strip or band within the Coastal Zone or within which certain development activities are prohibited or significantly restricted. It is comprised of the Reservation Area and the Restricted Area lying between the Seaward Reference Line and the Landward Reference Line of the particular coastal segment .

6.4.1 Coastal Setback Area for the development activities landward of the Mean High Water Mark:

With respect to the development activities taking place landwards of the Mean High Water Mark, an adequate setback area should be delinated. The entire setback band is divided into two segments viz. the Reservation Area and Restricted Area lying between the Seaward Reference Line and the Landward Reference Line of the particular segment.

1. **The Seaward Reference Line** The CC&CRMD recerved the right to demarcate the set-back from the permanent vegetation line on the beach front where Coconut (*Cocosnucifera),* Maharawana *(Spinifexlittoreus)*, Wetakeiya *(Pandanusssp)*, or Mudilla *(Barringtoniaspeciosa)* exist. However in the absence of a permanent vegetation line, CC&CRMD has the right to demarcate set-back fom seaward reference point such as an appropriate contour line above MSL, the landward toe of the dune or the seaward edge of the top of the cliff/rock outcrop, existing coast protection structure or dyke.

2. **The Landward Reference Line:** will generally be the landward boundary line of the Setback area, If not stated otherwise.

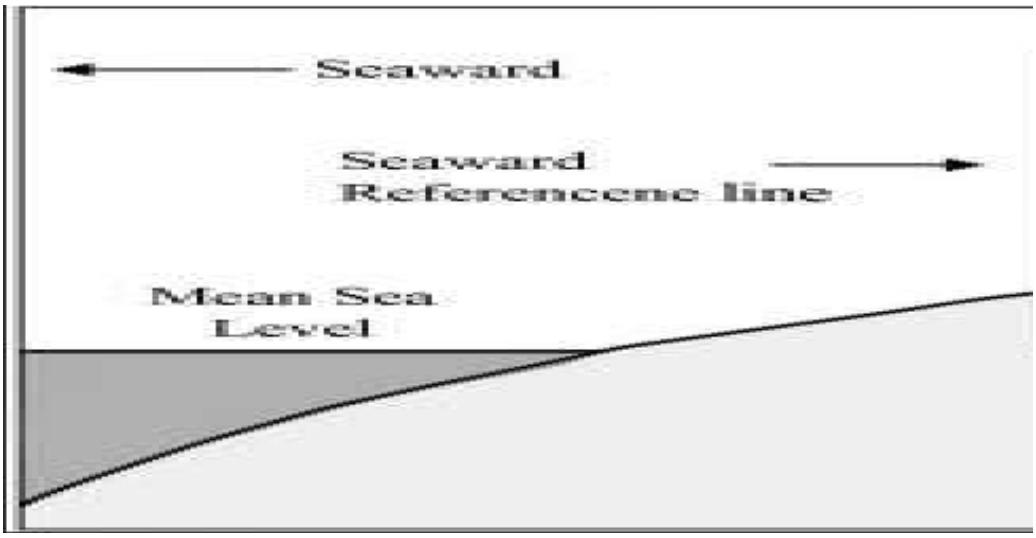

Figure 6.2 : Relative Locations of the Set-back within the coastal zone

The entire coastal set-back strip of the island has devided into 105 coastal segments. For each coastal segment numbers are assigned from 1 to 105 (Table 6.1) Each segment is further subdivided in to two areas; Reservation and Restricted (figure 6.2) Because it is nearest the shoreline, the reservation area corresponds to a no – build zone in which only uses which are absolutely essential are allowed the Restricted Area (soft zone) can be used for a few low - impacts activities which are indicated in this plan. The width of the Reservation and the Restricted Area will vary in accordace with vulnerability to erosion of the coastal segment in which it is located.

6.4.2 Reservation and Restricted Areas of Setback

Reservation area is nearest to the shoreline and corresponds to a “no build zone” in which only use/ activities which are absolutely essential are allowed.

Restricted Area (or soft zone) can be used for a few low impact activities . The width of the Reservation and Restricted Areas will vary according to the vulnerability of the particular coastal segment.

6.4.3 Criteria Used in Demarcation of Setback Areas

Criteria used by the CC&CRMD in delineating setbacks for the development activities landward of the mean High Water Mark:

- Coastal erosion rates.
- Level of user conflicts.
- Significance of cultural and archaeological sites.
- Level of the erosion rates of the wedge of the waterbodies of the "Coastal Zone"
- Statutory limitations.
- Legal status of the site.
- Extent of coast protection measures carried out.
- Protected Areas.
- Exposure to extreme natural hazards such as tidal waves,Ttsunami, cyclone, storm surge.
- Tidal variation, significant wave height and vulnerability to sea level rise.
- Geomorphological characteristics.
- Vulnerability of coastal habitats.
- Level of development.
- Significance of other natural characteristic such as scenic beauty, naturalist and recreational and environmental service values.
- National security considerations.

6.4.4 Permissible uses in the Reservation Area

Director General CC&CRMD may issue permits to persons engaged in the following activities if it can be proven that the activity concerned will not have any significant adverse impacts on the particular coastal segment or on the adjacent segments and shall not obstruct vertical and lateral access to and along the beach.

- Coast protection structures which comply with the coastal erosion management strategy of the CC&CRMD;
- Jetties, piers, cable lines, and slipways;
- Submerged sea water intakes, tube-wells and related structures;
- Removal of navigational obstructions;
- Extraction of minerals of commercial value;

- Submerged communication, waste disposal, power generation, sand replenishment, gas and oil distribution and other public facilities in the near-shore;
- Submerged navigational facilities in the near-shore;
- Conservation activities for enhancing aesthetic value and stabilization of the coastal areaasapproved by the CC&CRMD;
- Temporary structures for a period not exceeding six (6) months exclusively for fisheries activities at the gazetted Madel Padu (Beach Seine Fishing) locations identified in the *Gazette* Notification No.337/48 of February 21, 1985 provided the following criteria are met:
    - roof: cadjan, Illuk, canvas, cloth or tar sheets,
    - walls: cadjan, planks, plant leaves, bamboo, canvas, plastic or paper materials,
    - floor: sand, mud, clay (non processed) or wood,
    - foundation: no permanent foundation (piles, concrete or brick) and
    - other environmental friendly structures,
    - width of the structure: should be less than 30% of the width of the beach and the length of the structure should be less than 10 m (33 f).
- Facilities for Madel Padus planned and provided by DFAR;
- Reclamation to provide additional buffers;
- Water front development in compliance with the guidelines and criteria spelt out by the CC&CRMD in specified coastal segments;
- Tsunami domes, alarm towers, life saving observatory towers.

6.4.5 Permissible uses in the Restricted (Soft) Area

Whilst it is good management practice to leave the restricted area free from any development activity, this may not always be socially acceptable in view of the already existing land use patterns, very high population densities and the small land parcel sizes within the coastal zone. Hence a less stringent management strategy will be required. While industrial structures of any kind will not be permitted, constructions within the restricted area will be limited to dwellings and tourism related activities, provided however that such dwellings or tourism related development do not restrict vertical and lateral access

6.4.6 Setback Exemptions

An exemption implies a significant deviation from the intent of the setback guidelines stipulated in this Plan. Exemptions will only be granted if public interest warrants it. Exemptions may be granted by the Director General only if the Coast Conservation and Coastal Resources Management Advisory Council (CC&CRM AC) determines that there are compelling reasons for allowing an exemption and recommends such exemption.Exemptions are granted to engage in restricted activities within the setback area only if and when the applicant has demonstrated that they meet specific criteria. The following criteria will be considered for granting exemptions.

Criteria for granting setback exemptions

- The proposed activity should be served for a public purpose, which provides benefits to the public as a whole asopposed to individual or private interests. The activity must be one or more of the following:
  - Associated with public infrastructure such as utility, energy, communications, and transportation facilities;
  - Water dependent, generating substantial economic gain to the community, or provides better public access to the shore.
  - Associated with national security.
  - Related to environmental improvement interventions such as city beautification and landscaping
  - Hazard mitigation measure that leads to protect lives and property
- All reasonable steps will be taken to minimize negative environmental impacts and/or user conflicts
- There are no reasonable alternative location for serving the compelling public purpose stated.

6.4.7 Setback Variances

A variance implies a reduction of setback guidelines stipulated in this plan. Unlike in the case of an exemption, private interests may seek set back variations. However, they may be granted only if the following criteria are met. Variances may be granted by the Director General only if the Coast Conservation and Coastal Resources Management Advisory Council (CC&CRMAC) determine that there are compelling reasons for allowing a variance and recommends it.

The following criteria will be considered for granting variance from set-back requirements

Criteria for granting variances from setback requirements

- The proposed development activity is strictly limited to the Restricted (Soft) Area;
- The proposed alteration will not lead to any significant adverse environmental impacts or user conflicts. To establish the degree of environmental impact the Coast Conservation and Coastal Resources Management Advisory Council (CC&CRM AC) shall consider the following:
  - existing erosion rates in the area in which the proposed variance is requested;
  - the degree to which the activity for which the variance is proposed might reasonably be expected to accelerate erosion rates;
  - the degree to which impacts associated with the activity for which the variance is proposed will adversely affect coastal habitats in the vicinity;
  - the degree to which geomorphological characteristics of the site, such as rocks, vegetation, or dunesreduce, or amplify potential adverse impacts;
  - the elevation of the proposed site shall be considered based on the stability and land form of the particular site

- the reciprocal effects of the proposed activity and existing coast protection structures; and
- the type of precedent that is set by a decision on this variance application.

- Due to conditions at the site in question, the setback standard will cause the applicant an undue hardship.
- The variance requested by the applicant is the minimum necessary to relieve an undue hardship.
- The undue hardship is not the result of any prior action of the applicant.
- Degree of variance should not exceed 50% of the stipulated restricted area (other than water dependent activities).

6.4.8 Control of the public usage of foreshore

1. Prohibited activities of the foreshore

- All development activities for the private purposes
- Construction of fences within the foreshore
- Planting of trees
- Discharge of waste water and solid waste
- Construction activities using containers and non-operative fishing vessels or equipments

2. Permisable uses for public purposes and related to national development within the foreshoe

- Beach scene operation and huts for madal operation
- Ocean outfalls, inlets
- Structures related to Ports and fisheries harbours
- Life saving towers
- Underwater cables and communication lines
- Other projects approved by the CC & CRMD

6.4.9 Guidelines for Issuing Permits for Refurbishments and Expansion of Existing Structures

As consequence to the urban development and expansion, historic, cultural and sentimental values and the prevailing land scarcity and the higher land prices within the coastal zone, a tendency could be seen on expanding and refurbishing the existing buildings within the coastal zone. When CC&CRMD issues development permits for such development activities contradictions an ambiguity on prevailing set-back standards is inevitable. To avoid such situations, following guidelines shall apply for the refurbishment and expansion of existing buildings within the coastal zone.

(*a*) The present floor area of the ground floor of the existing building should not be increased or expanded.

(*b*) Expansion of the ground floor of the existing buildings will not be allowed if adequate space is not available for delineating the stipulated set-back of the relevant coastal segment.

(*c*) No septic tanks, swimming pools, seawalls or other structures will be located towards the sea side of the building.

(*d*) If the existing building structures possess historic religious or archeological value, prior approval of the Department of Archaeology is required for any modification or expansion.

(*e*) Approval of the refurbishments or expansion plans of the existing buildings should comply with the waterfront development plans and the coast protection plans if any.

6.4.10 Guidelines for Water front and Island development for tourism and recreational activities

The major environmental and socio-economic issues that could be appeared due to establishment of water bungalows and island development for tourism and recreational activities may vary and appear in the following areas;

- Low level of environment threshold (ability to withstand stresses) due to fragile nature of environmental resources.
- Limitation of the carrying capacities
- Potential effects of construction of coastal structures such as jetties, berthing facilities and other marine structures (obstructions to sand movement around the islands, alteration of current movement due to dredging, sedimentation of the corals, sea grass and other marine habitat, destruction of marine habitats due to dredging and other construction in the water areas).
- Construction of additional protective structures to minimize damages
- Removal of native vegetation causing changes to erosion and accretion pattern.
- Accumulation of solid and liquid waste
- User conflicts between traditional fishing activities and tourism related activities
- Absence of historical data and information on coastal process and changes of the islands

In view of the significant negative impacts that could be appeared due to establishment of water bungalows and island development for tourism and recreation within the “coastal zone” , following guidelines shall apply for issuing permits.

1. Permit will be issued for such development activity based on the findings of an EIA or IEE procedures adopted in compliance with the existing legal provisions (CC&CRM Act and National Environment Act) on case by case basis.
2. Based on the findings of an EIA or IEE an Environmental Management Plan (EMP) has to be prepared and implemented by the respective developer to ensure sustainable management of the coastal environment.
3. Water front development activities shall not be located in/or adjacent to the live coral reef areas and sea grass beds.
4. Water front development activities shall not be allowed within 1.6km radius of a National Park declared by the Department of Wild life Conservation.
5. Siting of waterfront development activities in sanctuaries or marine protected areas will be permitted by DWC case by case basis on the nature and the potential impacts of the project

6. Water front development will be restricted 500m of the water body and the riparian land from the riverine estuary, lagoon or a canal mouth.

7. All water front development to be located within rivers, streams and other water bodies under the purview of irrigation will be permitted subject to approval of the Department of Irrigation.

8. Approval should be obtained from the Central Environmental Authority for all development activities to be located within a designated "Environmental Protected Areas" (EPA's)

9. An Environmental Protection License (EPL) should be obtained from the Central Environmental Authority for discharge, emit or deposit any waste within the "coastal zone from" the water front development activities.

10. The traditional fishing activities, fishing grounds and fish migratory routes shall not be disturbed by the proposed waterfront development activities.

11. Waterfront development within small islands shall be permitted only if adequate service area is available in the main land (terrestrial area).

12. No waterfront development activities shall be permitted in the areas subject to security restrictions or specific measures imposed for national security.

13. The necessary approval should be obtained from the District Secretary and respective land commissioner for the use of the bottom or bed the lagoon or the sea.

14. Any development activity shall not be permitted within the "Conservation Areas" or "Affected Areas" declared under the Coast Conservation & Coastal Resources Management Act, No. 57 of 1981.

15. Special provisions should be provided to ensure public access within the islands.

16. All precautionery measures /Evacuation plans should be submitted by the developer to minimize the impacts of natural hazard

6.4.11 Guidelines for floating restaurants, Recreational Floats and overwater structures

The floating and over water structures for recreational activities within the coastal zone of Sri Lanka are not very significant yet. But with the current development trends and the diversification needs emerged pertaining to the tourism industry, emphasis will be placed on development such facilities in the near future. Although these structures are important for tourism and recreation, they also can have negative impact on traditional socio-economic activities, shoreline ecology, aesthetic and navigation. Therefore, to ensure the sustainable tourism and recreational activities within the coastal zone following guidelines will applicable for construction and establishment of floating restaurant, leisure homes(boathouse) or related overwater structures such as decks, piers and recreational floats.

1. The floating restaurants, leisure homes (boathouse) or related overwater structures such as decks, piers and recreational floats in the coastal waters within the coastal zone will allow only in the specific locations identified by the Coast Conservation and Coastal Resource Management Department (CC&CRMD).

2. The preliminary proposal should be submitted to the CC&CRMD prior to formulation of the detail proposal to avoid delays in the approval process.

3. All the proposals for floating structures related to tourism and recreational is subjected to EIA/IEE process.

4. Floating restaurants, boathouses and recreational platforms are not permitted rest on the lagoon or a sea bed (substrate)

5. No floating structures including recreational platforms for fishing and swimming is not permitted where coral reefs and sea grass beds are located and adjacent to the turtle nesting areas.

6. The floating restaurants, leisure homes (boathouse) or related overwater structures such as decks, piers and recreational floats will not be permitted in areas declared as conservation areas, affected areas and areas identified for mineral extraction including sand.

7. The floating structures for tourism and recreational activities will not be permitted close proximity to the beach scene areas or other traditional fishing practices (such as stake net and still fishing) taking place.

8. Dumping of solid or liquid waste into the coastal waters or adjacent water bodies will not be permitted.

9. Moorage facilities should not interfere with legal public access to the shoreline or use of the shoreline.

10. Wood treated with toxic compounds should not be used for decking, pilings or other in-water components.

11. Application of artificial night lighting should be avoided as much as possible by focusing the light on the dock surface, and using shades that minimize illumination of the surrounding environment.

12. All foam material whether used for floatation or for any other purpose related to the structure must be encapsulated within a shell that prevents breakup or loss of the foam material into the water and is not readily subject to damage by ultraviolet radiation or abrasion.

13. Floating structures should be located minimum 10 meters of native aquatic vegetation

14. To ensure safety of the coastal water users and to curtail safety hazards floating structures should be adequately marked with reflectors .

15. No floating resturants or recreational platforms are permitted to locate in close proximity to the defence establishment.

6.4.12 Set-backs for Artificial Island, Reclaimed Coastal Land

In view of the requirement of EIA or IEE for such development, appropriate set-back or the buffer area will be determined based on case by case basis.

6.5 Setback Area for the development activities in the riparian land of the water bodies:

In the case of riparian land of the water bodies (rivers, streams, lagoons etc.), setback area can be defined as an area in which certain activities are prohibited or restricted. The setback area for the riparian land of the water bodies is delineated from the Full Supply Level (FSL), Mean High Tide Levels, or edge of the bank of the water body towards landwards or as may be determined based on the site conditions.

A sufficient set-back shoud be delineated for the development activities within the riparian land of the rivers, streams cannels and lagoons.Traditionally, demarcating reservations for water bodies has been practiced by the Irrigation Department for development activities located in the riparian land of the water bodies. In considering the bio-physical characteristics of the water bodies, set-back areas are defined under the following three major categories;

- Lagoons and riverine estuaries connected to the sea
- Major rivers connected to the sea
- Other water bodies connected to the sea

6.5.1 "No Development Zone" and "Restricted Development Zone":

In view of the level of vulnerability and bio-physical characteristics of the estuarine water areas and the riparian land located in close proximity to the mouths of the rivers, lagoons and the other water bodies are designated as either "No Development Zone" or "Restricted Development Zone" as follows;

- The water area of 500m from the mouth towards upstream of the lagoons and major rivers are designated as "Restricted Development Zones" (RDZ).
- All rivers, lagoons and other water bodies located in the coastal zone of the protected Areas are designated as "No Development Zones" (NDZ).
- A 500 m linear segment of riparian land extending towards the interior area from the mouth of major rivers as specified in the "Restricted/No Development Zone".

6.5.2 Set-back for riparian land of the major rivers canals and streams

Aset-back or structure free reservation will be applied for development activities in the riparian land of rivers located within the coastal zone in conformity with the Government Land Regulation (1) No.9912 of 1948.10.15 and guidelines/standards practiced/stipulated by the Department of Irrigation. The river side reference point is from the edge of the river bank or the FSL(Full Supply Level). The river categories are as follows**;**

River Category	Width
➢ Major River	(width more than 15 m)
➢ Medium size River	(width of 5m - 15 m)
➢ Small River and other canals	(width less than 5 m)

Reservations used by Department of Irrigation will be appled for development activities in the riperian land of rivers and canals .

However, if there is no reservation stipulated for riperian land of rivers and canals by the Irrigation Department or any other law , CC & CRM Department will be decided the reservation for the riperian land of rivers and canals within the coastal zone.

6.5.3. Set-back for Riparian Land of the Lagoons

A minimum of 10 meter set-back is required for the development activities in the riparian land of the lagoons within the coastal zone . However,in view of the complex nature and bio-physical variations of the riparian land lying within the coastal zone of the lagoons, a set-back exceeding 10 meters could be delineated by the Director General Coast Conservation and Coastal Resources Management as appropriate.

6.5.4 Reference points with respect to the riparian land of the water bodies:

Lagoon side Reference point: Full Supply Level (FSL) or the Mean High Tide line of the lagoon waters.

River side Reference Point: Edge of the river bank or the Full Supply Level (FSL) of the river.

Canals and other water ways: Edge of the canal or stream bank or edge of the bank protection structure.

6.5.5 Guidelines for issuing permits for reclamation within the Riperian Land of the water Bodies

- No reclamation activities will be permitted in the extended coastal zone except for conservation and stabilization of river banks, edge of the lagoon and the other water bodies.
- Reclamation of riparian land of the water bodies will be considered for the purpose of national security and urban beautification programmes.
- No solid waste or e-waste dumping sites will be located in the riparian land of the water bodies
- Reclamation of riparian land of the water bodies will not be permitted landward area of 20 m from the bank of thewater bodies .

6.6 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND INITIAL ENVIRONMENTAL EXAMINATION (IEE)

The legal provisions made for the requirement of Environmental Impact Assessment (EIA) stated under the section 16 of the Coast Conservation and Coastal Resource Management Act has been amended by the Coast Conservation (Amendment) Act, No. 49 of 2011as follows;

"Upon receipt of an application for a permit to engage in a development activity within the coastal zone as required by subsection (3) of section 14, the Director General may require the applicant to furnish an Initial Environmental Examination (IEE) report or an Environmental Impact Assessment (EIA) report relating to the development activity as the case may be or both such reports. It shall be the duty of the applicant to comply with such requirement".

In compliance with the above legal provision, when an application is received for a permit to engage in a development activity within the Coastal Zone, the Director General Coast Conservation and Coastal Resources Management will determine whether such activity requires an EIA or IEE. Although the Director General has discretionary powers, indetermining the requirements of an EIA or IEE, the CC&CRMD will consult the CEA where necessary and due consideration will be given to the list of prescribed projects under the NEA. It shall be the duty of the applicant to comply with the relevant requirements.

6.6.1 Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) has been defined in the Coast Conservation Act as follows:

"A written analysis of the predicted environmental consequences of a proposed development activity, and unavoidable adverse environmental effects of the proposed development activity, a description of alternatives to the activity which might be less harmful to the environment of the Coastal Zone, together with reasons why such alternatives were rejected, and a description of any irreversible or irretrievable commitments of resources required by the proposed development activity."

An Environmental Impact Assessment (EIA) report will be required in case of a Project that is considered by the Director General to have significant impactson the coastal environment or determined based on the adequacy of an Initial Environmental Examination(IEE) report. The terms of reference (TOR) for the EIA will be prepared by the CC&CRMD inconsultation with the related agencies on the basis of a consolidated review process and will be provided to the proponent of the project. It is the responsibility of the applicant to prepare the EIA in conformity with the given TOR and the general guidelines for the preparation of an EIA that are given above. The developers are advised to consult with CC&CRMD during the design and preparation of the EIA. This will enable the CC&CRMD to assist the developer to prepare a concise, cost effective EIA that focuses on the most relevant issues.

On receipt of an EIA from the developer, the Director shall submit a copy of the EIA to the Coast Conservation and Coastal Resource Management Advisory Council (CC&CRMAC) for comments. The Director shall also publish a notice in the Gazette and in one newspaper each in Sinhala, Tamil and English, indicating the place and time; the EIA can be inspected by the public and invite the public to submit their comments within30 days.The CC& CRM AC will submit its comments to the Director General within 60 days. The Director shall consider all comments received and within 60 days of receipt of comments make a decision whethera permit can be issued and the conditions thereof **(Figure 6.3).**

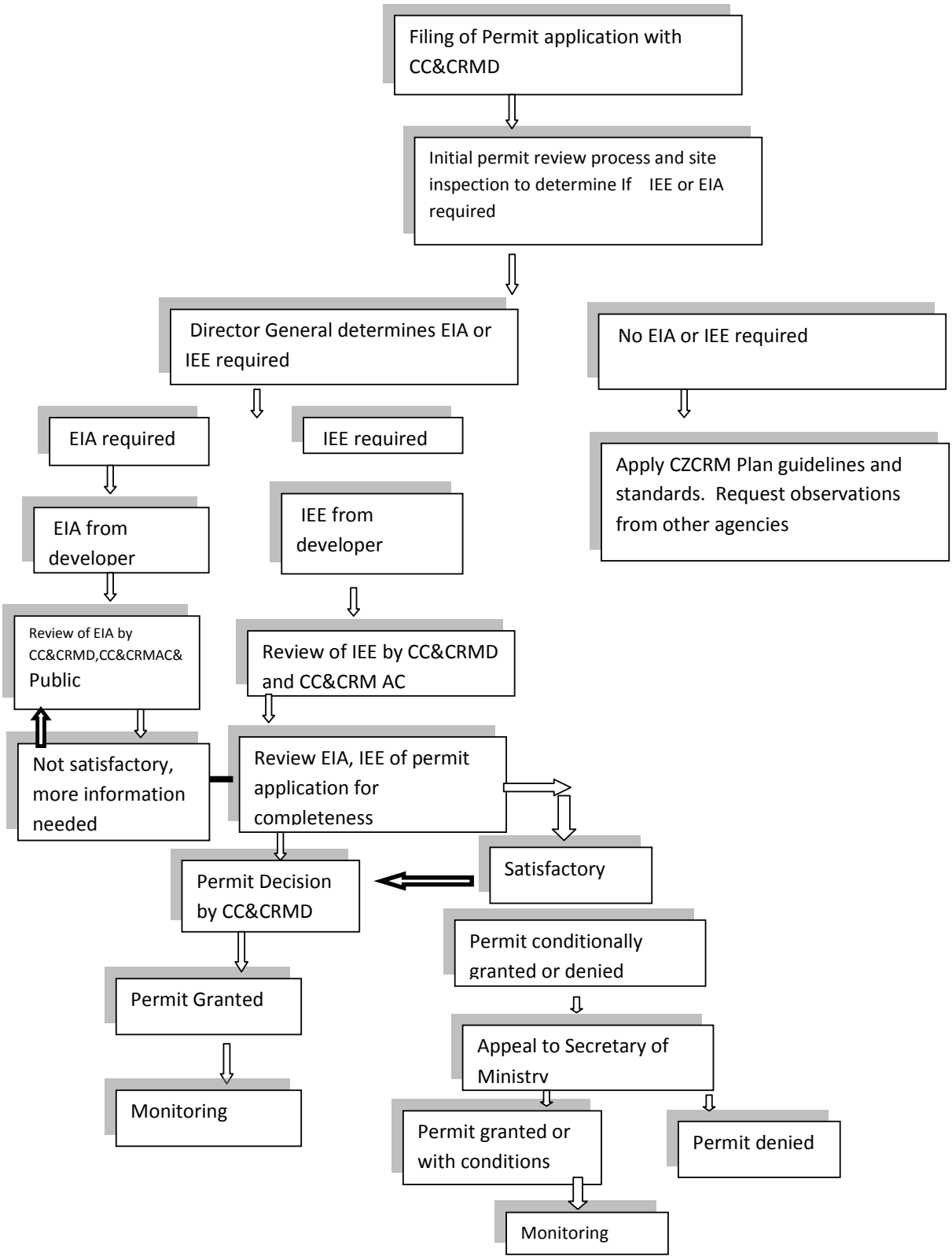

FIGURE 6.3: PROCEDURE FOR REVIEWING AND ISSUING DEVELOPMENT PERMITS

6.6.2 Initial Environmental Examination (IEE)

In issuing a permit, the Director is required to ensure that the development activity will not have an adverse effect on the environmental quality of the Coastal Zone and sustainability of the coastal resources. To ensure this, the Director may request the developer to submit an Initial Environmental Examination report in accordance with the legal provisions of the Section 16 (1) of the Coast Conservation and Coastal Resource Management Act amended by Coast Conservation Act No. 49 of 2011.The Initial Environmental Examination Report (IEE) is defined in the Amendment Act as follows:

"*Initial Environmental Report means a written report wherein possible impacts of the development activity on the environment shall be assessed with a view to determining whether such impacts are significant, and therefore requires the preparation of an environmental impact assessment report and such report shall contain all details and , descriptions, data, maps, designs and other information which is relevant to the development activity*".

Apart from the prescribed development activities for which an IEE report would not be necessary, an Initial Environmental Report will be required in the case of development activities that is considered to have significant impacts on the coastal environment and the resources as described in ***"Guidance for Implementingthe Environmental Impact Assessment Process".*** It is the responsibility of the applicant to prepare the IEE. The general guidelines for the preparation of an IEE are given below. A check list and terms of reference for an IEE will be prepared by CC&CRMD in consultation with the relevant agencies and will be conveyed to the developer.

On receipt of an IEE, the Coast Conservation and Coastal Resource Management Department will review the report and if the report is sufficient to make a decision to issue or not issue the permit, a copy of such report should be submitted to the Coast Conservation and Coastal Resources Advisory Council for its comments. The council shall furnish its comments to the Director General within thirty days. If the IEE report is insufficient to make a decision, the Director General shall request an EIA from the project proponent.

6.6.3 General guidelines for preparation of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA)

(*a*) Description of proposed activity

(i) Description of the nature aims and scope of proposed activity;

(ii) Description of the methodology to be adopted during construction operation and maintenance;

(iii) Description of proposed project's socio-economic and ecological benefits/costs; and,

(iv) Description of the long-term monitoring program for the proposed activity.

(*b*) Site description

(i) A description of the area within which the activity, development or operation is proposed to besited and its environs should include:

- Location of proposed activity marked on a 1 inch to 1 mile map or 1:50,000 metric sheet;
- A copy of map produced through Google Earth to show details of the site
- A site map at a scale suitable to show the proposed activity;

- Delineation of coastal habitats as defined in Chapter 3 and their ecological state;
- Proximity to water bodies;
- Existing land use and other human activities;
- Any high priority archaeological historic and cultural sites within the Coastal Zone as listed in table 6.4 and any high priority recreational sites
- Other relevant information

(*c*) Description of potential impacts

(i) The description of potential impacts should include the foreseeable direct and indirect, long-term and short-term effects of the activity on the Coastal Zone and its resources. In this context short-term and long term do not necessarily refer to any fixed time periods, but should be viewed in terms of the environmentally significant consequences of the proposed action. Any irreversible or irretrievable commitments of resources should be identified. The description should include the potential impacts on the following:

- Coastal habitats described in Chapter 3;
- Quality and quantity of coastal waters;
- Past and present land use patterns;
- The abundance and diversity of plant and animal life;
- Erosion and depositional processes along the shore;
- Water circulation, flushing, turbidity and sedimentation;
- Freshwater runoff patterns and/or saltwater intrusion;
- Areas of archaeological, historic, cultural, and scenic significance; and,
- Public access to and along the shore and to coastal waters.
- Consequences on national security aspects

(*d*) Proposed mitigation measures

A statement setting out proposed measures to minimise impacts and a statement on the effectiveness of the proposed measure should be provided. If alternative measures are considered,these should be stated and reasons for selection of the proposed mitigation measures given.

(*e*) Additional requirements

The Director General / Scoping Committee may, on a case-by-case basis, specify other particulars to be included in the IEE or EIA.The procedures for obtaining a CC&CRMD permit are summarized in Figure 6.3. In the case of development activities that do not require an EIA, a decision on the application will usually be made within three weeks of receiving all the required information. Consultation with the CC&CRMD and reading this plan and appropriate references early in the project planning stage are advised to facilitate the permit process.

.6.7 MONITORING PROCEDURES

As per the amendments made to the principle Act of the Coast Conservation, the geographic extent of the coastal zone has been extended inclusion of riparian land of the water bodies. Thus, the controlling of development activities also increases accordingly. In this context, monitoring of compliance is critical requirement for the management of the Coastal Zone and its resources. In considering the above requirement, improved guidelines have been provided in this Coastal Zone and Coastal Resources Management Plan in order to facilitate compliance monitoring.The main objectives of compliance monitoring carried out by the CC&CRMD is to:

- Determine whether approved permits meet the standards and guidelines stipulated in the Coastal Zone & Coastal Resource Management Plan;
- Determine the adequacy of CZM guidelines and standards in achieving CZM goals;
- Detect potential or existing inconsistencies between permit decisions and the goals of the CZ&CRM Plan, and
- Evaluate the performance of the regional and local level officials of the CCCRMD and the sufficiency of resources at the local level;
- Determine the effectiveness, adequacy and support of the other agencies in CZM policy implementation.

The CC&CRMD will apply one or more of the following monitoring tools to ensure degree of compliance with permit conditions:

- Periodic inspection by CC&CRMD officials during key stages of the implementation of the activity using astandard checklist,
- An information network based on formal and informal complaints for detecting violations in order to initiate enforcement action against violators,
- Conduct of permit monitoring compliance surveys on an annual basis including conditions imposed through EIA and IEE procedures,
- Cumulative Impact Assessment Monitoring emphasizing the collective and incremental impacts of numerous individual permit decisions spread over time and space in each coastal segment,
- Verification of required developer reports, surveys, tests stipulated by CEA or any other agencies, relevant to the development activity; and
- Verification of Certificates of Conformity required from local authority or other designated agency that the permit conditions have been adhered to.

SETBACKS FOR DEVELOPMENT ACTIVITIES IN THE COASTAL ZONE

Table 6.1 Setback standards for development activities in the coastal zone by segment and vulnerability

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
1	Vellai, Palliyamulla,Baththalangunduwa and Other Islands (Islands Around Kalpitiya Peninsula)	Puttalam	8°32'26.82"N	79°46'56.70"E	High(+)	60		60
			8°24'19.50"N	79°48'44.76"E				
2	Uchchamunai to	Puttalam	8°23'01.20"N	79°47'14.90"E	High(+)	25	35	60
	Mohoththuwaram (Mohoththuwaram Split Northern Boundary)		8°15'00.60"N	79°44'20.20"E				
3	Mohoththuwaram (Mohoththuwaram Split Northern Boundary) to	Puttalam	8°15'00.60"N	79°44'20.20"E		No Build Zone		No Build Zone
	Mohoththuwaram / Kudawa Split Southern Boundary (Conservation /No Build Zone)		8°13'41.50"N	79°43'52.10"E				
4	Mohoththuwaram/Kudawa Split Southern Boundary (Kudawa Start Point) to	Puttalam	8°13'41.50"N	79°43'52.10"E	High(+)	25	35	60
	Udappuwa South (Cemetery)		7°44'17.50"N	79°47'29.70"E				
5	Udappuwa South (Cemetery) to	Puttalam	7°44'17.50"N	79°47'29.70"E	High (-)	20	35	55
	Daduru Oya Mouth Northern Boundary		7°37' 06.70"N	79°47'56.50"E				
6	Daduru Oya Mouth Northern Boundary to	Puttalam	7°37'06.70"N	79°47'56.50"E		No Build Zone		No Build Zone
	Chilaw Cemetery End Point (Conservation Zone / No Build Zone)		7°35'48.90" N	79°47'11.60"E				
7	Chilaw Cemetery End Point to	Puttalam	7° 35'48.90" N	79°47'11.60"E	Medium(-)	15	30	45
	Clilaw Beach Park Northern Boundary		7° 34'53.50"N	79°47'14.30"E				
8	Clilaw Beach Park Northern Boundary to	Puttalam	7°34' 53.50"N	79°47'14.30"E	Medium (+)	20	30	50
	North Thoduwawa River Mouth		7°29' 31.60"N	79°47'49.90"E				
9	North Thoduwawa River Mouth to	Puttalam	7°29' 31.60"N	79°47'49.90"E	High (-)	20	35	55
	Modarawella Marawila Gembarandiya Lagoon Mouth (Club Palm Bay Hotel)		7°25'58.20"N	79°48'39.10"E				
10	Modarawella Marawila Gembarandiya Lagoon Mouth (Club Palm Bay Hotel) to	Puttalam	7°25'58.20"N	79°48'39.10"E	Medium (+)	20	30	50
	Nainamadama Wellamankaraya Gin Oya River Mouth		7°18'12.05"N	79°50'14.16"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restructed	Total Setback
11	NainamadamaWellamankaraya Gin Oya River Mouth to Negombo Luice Place Bolanji Road	Puttalam / Gampaha	7°18'12.05"N 7°13'18.70"N	79°50'14.16"E 79°50'19.50"E	Medium(-)	15	30	45
12	Negombo Luice Place Bolanji Road to Duwa Pitipanaweediya Mora Wala	Gampaha	7°13'18.70"N 7°12'13.00"N	79°50'19.50"E 79°49'02.50"E	Low (+)	15	25	40
13	Duwa Pitipanaweediya Mora Wala to Dikovita Harbour North Boundary	Gampaha/ Colombo	7°12'13.00"N 7°00'34.80"N	79°49'02.50"E 79°51'55.50"E	Medium(-)	15	30	45
14	Dikovita Harbour North Boundary to Galleface Hotel Kollupitiya	Colombo	7°00'34.80"N 6°55'14.40"N	79°51'55.50"E 79°50'43.60"E	Medium (+)	20	30	50
15	Galleface Hotel Kollupitiya to Wellawatta Railway Bridge	Colombo	6°55'14.40"N 6°52'44.40"N	79°50'43.60"E 79°51'24.10"E	Low (-)	10	25	35
16	Wellawatta Railway Bridge to Mount Lavinia Hotel	Colombo	6°52'44.40"N 6°50'06.00"N	79°51'24.10"E 79°51'46.10"E	Medium(-)	15	30	45
17	Mount Lavinia Hotel to Panadura River Mouth (Moratuwa Fishery Habour)	Colombo	6°50'06.00"N 6°43'05.70"N	79°51'46.10"E 79°54'05.60"E	Low (+)	15	25	40
18	Panadura River Mouth (Moratuwa Fishery Habour) to Pinwatta Thalpitiya Outlet	Kalutara	6°43'05.70"N 6°40'56.76"N	79°54'05.60"E 79°55'02.46"E	Medium(-)	15	30	45
19	Pinwatta Thalpitiya Outlet to Kalutara Kalido Beach Strip Northern Boundary	Kalutara	6°40'56.76"N 6°35'15.60"N	79°55'02.46"E 79°57'17.30"E	Low (+)	15	25	40
20	Kalutara Kalido Beach Strip Northern Boundary to Avani Hotel Katukurunda (Southward Boundary of Kalutara Estuary) (Proposed to Kalido Strip as a Conservation Zone)	Kalutara	6°35'15.60"N 6°34'14.60"N	79°57'17.30"E 79°57'33.90"E		No Build Zone		No Build Zone
21	Avani Hotel Katukurunda (Southward Boundary of Kalutara Estuary) to Payagala South Railway Crossing	Kalutara	6°34'14.60"N 6°31'14.80"N	79°57'33.90"E 79°58'42.80"E	Medium (+)	20	30	50
22	Payagala South Railway Crossing to Beruwala Kechchimale Mosque	Kalutara	6°31'14.80"N 6°28'13.40"N	79°58'42.80"E 79°58'24.47"E	Low (+)	15	25	40

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restructed	Total Setback
23	Beruwala Kechchimale Mosque to	Kalutara/ Galle	6°28'13.40"N	79°58'24.47"E	Medium (+)	20	30	50
	Induruwa Headland (Saman Villa Hotel)		6°23'41.70"N	80°00'13.34"E				
24	Induruwa Headland (Saman Villa Hotel) to	Galle	6°23'41.70"N	80°00'13.34"E	Medium(-)	15	30	45
	Madu Ganga River Mouth		6°16'26.40"N	80°02'06.60"E				
25	Madu Ganga River Mouth to	Galle	6°16'26.40"N	80°02'06.60"E	Low (+)	15	25	40
	Hikkaduwa Fishery Habour		6°08'27.29"N	80°05'56.44"E				
26	Hikkaduwa Fishery Habour to	Galle	6°08'27.29"N	80°05'56.44"E	Low (-)	10	25	35
	Gintota River Mouth		6°03'49.10"N	80°10'26.00"E				
27	Gintota River Mouth to	Galle	6°03'49.10"N	80°10'26.00"E	Low (+)	15	25	40
	Dadalla Light House Hotel		6°02'28.71"N	80°11'40.82"E				
28	Dadalla Light House Hotel to	Galle	6°02'28.71"N	80°11'40.82"E	Low (-)	10	25	35
	Galle Cement Factory Bridge		6°01'39.20"N	80°14'37.40"E				
29	Galle Cement Factory Bridge to	Galle	6°01'39.20"N	80°14'37.40"E	Low (+)	15	25	40
	UnawatunaWelledewalaya		6°00'23.30"N	80°14'37.70"E				
30	Unawatuna Welledewalaya to	Galle	6°00'23.30"N	80°14'37.70"E	Low (-)	10	25	35
	Unawatuna Dalawella Mitton Hotel		6°00'18.40"N	80°15'20.10"E				
31	Unawatuna Dalawella Mitton Hotel to	Galle	6°00'18.40"N	80°15'20.10"E	Medium(-)	15	30	45
	Goviyapana Bridge		5°57'56.40"N	80°22'53.20"E				
32	Goviyapana Bridge to	Matara	5°57'56.40"N	80°22'53.20"E	Low (-)	10	25	35
	Madiha East		5°56'12.1"N	80°30'46.7" E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
33	Madiha East to	Matara	5°56'12.1"N	80°30'46.7" E	Low (-)	10	25	35
	Matara Rest House		5°56'35.8"N	80°32'51.2" E				
34	Matara Rest House to	Matara	5°56'35.8"N	80°32'51.2" E	Low (+)	15	25	40
	Devinuwara Light House		5°55'12.8"N	80°35'35.0" E				
35	Devinuwara Light House to	Matara	5°55'12.8"N	80°35'35.0" E	Low (-)	10	25	35
	Goyambokka Peace Heaven Hotel Headland (Julgahawella Fishing Landing Site)	Hambantota	6°00'44.92"N	80°47'13.50"E				
36	Goyambokka Peace Heaven Hotel Headland (Julgahawella Fishing Landing Site) to	Hambantota	6°00'44.92"N	80°47'13.50"E	Low (+)	15	25	40
	Rakawa West		6°02'34.19"N	80°51'38.27"E				
37	Rakawa West to	Hambantota	6°02'34.19"N	80°51'38.27"E	Medium (+)	20	30	50
	Kalamatiya Henagahapugala		6°04'34.40"N	80°56'07.90"E				
38	Kalamatiya Henagahapugala to	Hambantota	6°04'34.40"N	80°56'07.90"E	High(+)	25	35	60
	Ussangoda Wild Life National Park Southern Boundary (Lunama Side) **(Kalamatiya Wild Life Sanctuary Area)**		6°05'13.20"N	80°58'36.40"E				
39	Ussangoda Wild Life National Park Southern Boundary (Lunama Side) to	Hambantota	6°05'13.20"N	80°58'36.40"E		300		300
	Ussangoda Wild Life National Park Northern Boundary (Close to Ussangoda Fishery Harbor) **Ussangoda Wild Life National Park**		6° 05'43.00"N	80°59'23.90"E				
40	Ussangoda Wild Life National Park Northern Boundary (Close to Ussangoda Fishery Harbor) to	Hambantota	6° 05'43.00"N	80°59'23.90"E	Low (+)	15	25	40
	Godawaya Walawe River Mouth (Close to CC&CRMD Office)		6°06'28.00"N	81°03'02.50"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
41	Godawaya Walawe River Mouth (Close to CC &CRMD Office) to	Hambantota	6°06'28.00"N	81°03'02.50"E	Medium (+)	20	30	50
	Hambantota Sea Port Southern Boundary (Mirijjawila)		6° 06'53.16"N	81° 5'43.98"E				
42	Hambantota Sea Port Northern Boundary(Target Road Hambantota) to	Hambantota	6°07'23.10"N	81°07'36.40"E	High(+)	25	35	60
	Bundala National Park Southern Boundary Hambantota		6° 08'01.51"N	81°07'59.32"E				
43	Sub Zone - Hambantota Fishery Habour to	Hambantota	6°07'27.00"N	81°07'34.80"E	Low (-)	15	25	40
	Hambantota Bombu Canal Outlet		6°07'50.60"N	81°07'43.20"E				
44	Bundala National Park Southern Boundary Hambantota to	Hambantota	6° 08'01.51"N	81°07'59.32"E		300		300
	Kirindi Oya River Mouth (**Bundala National Park**)		6°11'46.70"N	81°17'44.90"E				
45	Kirindi Oya River Mouth to	Hambantota	6°11'46.70"N	81°17'44.90"E	High(+)	45	80	125
	Kirinda Andagala Healand Start Point (Close to Andagala Modara)		6°12'09.30"N	81°19'27.50"E				
46	Kirinda Andagala Healand Start Point (Close to Andagala Modara) to	Hambantota	6°12'09.30"N	81°19'27.50"E	Low (+)	25	40	65
	Kirinda Temple Rock		6°11'55.91"N	81°19'27.12"E				
47	Kirinda Temple Rock to	Hambantota	6°11'55.91"N	81°19'27.12"E	High(+)	45	80	125
	Yala Palatupana Sltda Tourism Zone End Point (Gode(Kalapuwa)Lagoon Boundary)		6°16'26.67"N	81°25'11.56"E				
48	Yala Palatupana SLTDA Tourism Zone End Point (Gode(Kalapuwa) Lagoon Boundary) to	Hambantota	6°16'26.67"N	81°25'11.56"E		300		300
	Yala National Park Northern Boundary (Okanda)	Ampara	6°21'46.50"N	81°31'44.00"E				
49	Yala National Park Northern Boundary (Okanda) to	Ampara	6°21'46.50"N	81°31'44.00"E	High(+)	45	80	125
	Panama Lagoon Mouth Becon Lamp Rock		6° 46'02.61" N	81°49'32.37"E				
50	Panama Lagoon Mouth Becon Lamp Rock to	Ampara	6° 46'02.61" N	81°49'32.37"E	Medium (+)	35	60	95
	Kudakalli Crocadile Rock (Hada Oya River Mouth)		6° 48' 32.71"N	81°49'27.14"E				
51	Kudakalli Crocadile Rock (Hada Oya River Mouth) to	Ampara	6° 48' 32.71"N	81°49'27.14"E	High(+)	45	80	125
	Arugambay Ulla Surfing Point		6° 50' 21.70"N	81°50'08.90"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
52	Arugambay Ulla Surfing Point to	Ampara	6° 50' 21.70"N	81°50'08.90"E	Low (-)	20	30	50
	Arugambay Bridge		6° 51' 03.20"N	81°49'55.10"E				
53	Arugambay Bridge to	Ampara	6° 51' 03.20"N	81°49'55.10"E	High(+)	45	80	125
	Viski Point Sand Dune Start Point (Kanahar Gramam (326 Km Post)		6° 55' 05.60"N	81°50'52.10"E				
54	Viski Point Sand Dune Start Point (Kanahar Gramam (326 Km Post) to	Ampara	6° 55' 05.60"N	81°50'52.10"E	Medium (+)	35	60	95
	Sangamankanda Point		7° 01' 21.39"N	81°52'42.46"E				
55	Sangamankanda Point to	Ampara	7° 01' 21.39"N	81°52'42.46"E	Medium(-)	30	50	80
	Thambattai (Closed toThambattai Kovil and Gayatri Thapovanam 354 .5 Km Post)		7°08' 24.70"N	81°51'29.30"E				
56	Thambattai (Closed to Thambattai Kovil and Gayatri Thapovanam 354.5 Km post) to	Ampara	7°08' 24.70"N	81°51'29.30"E	High(+)	45	80	125
	Alayadiwembu (Narrow Strip)		7°12' 26.40"N	81°51'43.75"E				
57	Alayadiwembu to	Ampara	7°12' 26.40"N	81°51'43.75"E	Low (+)	25	40	65
	Oluvil Harbour Southern Boundary		7°16' 32.70"N	81°51'49.90"E				
58	Oluvil Harbour Northern Boundary (Close To Light House) to	Ampara	7°16' 55.20"N	81°51'59.30"E	Medium(-)	30	50	80
	Nindavur Wowal Lagoon Mouth (Theater Road)		7°20' 02.70"N	81°51'47.30"E				
59	Nindavur Wowal Lagoon Mouth (Theater Road) to	Ampara	7°20' 02.70"N	81°51'47.30"E	Low (+)	25	40	65
	Baticaloa - Ampara District Boundary		7°27' 15.40"N	81°49'09.72"E				
60	Baticaloa - Ampara District Boundary to	Baticaloa/ Ampara	7°27' 15.40"N	81°49'09.72"E	Medium(-)	30	50	80
	Kaththankudy Dean Road Al Tharika Mosque		7°41'40.38"N	81°44'05.40"E				
61	Kaththankudy Dean Road Al Tharika Mosque to	Baticaloa	7°41'40.38"N	81°44'05.40"E	Medium (+)	35	60	95
	Kallady Beach Park (Sarawanaady Road)		7°43'05.10"N	81°43'08.80"E				
62	Kallady Beach Park (Sarawanaady Road) to	Baticaloa	7°43'05.10"N	81°43'08.80"E	High(+)	45	80	125
	Baticaloa Light House (Paalmeenmadu)		7°45'18.50"N	81°41'07.50"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
63	Baticaloa Light House (Paalmeenmadu) to	Baticaloa	7°45'18.50"N	81°41'07.50"E	Medium(-)	30	50	80
	Punniyakudah Point		7°49'41.80"N	81°37'07.80"E				
64	Punniyakudah Point to	Baticaloa	7°49'41.80"N	81°37'07.80"E	High(+)	45	80	125
	Pasikudah Fishery Landing Site		7°55'59.50"N	81°33'36.30"E				
65	Pasikudah Fishery Landing Site to	Baticaloa	7°55'59.50"N	81°33'36.30"E	High (-)	40	70	110
	Nasivanthive Lagoon Mouth		7°56'46.50"N	81°32'42.80"E				
66	Nasivanthive Lagoon Mouth to	Baticaloa	7°56'46.50"N	81°32'42.80"E	Low (+)	25	40	65
	Challitivu Munai Point (Close to Challitivu Island)		8°06'36.20"N	81°27'34.70"E				
67	Challitivu Munai Point (Close to Challitivu Island) to	Baticaloa	8°06'36.20"N	81°27'34.70"E	Medium(-)	30	50	80
	Lankapatuna		8°21'24.60"N	81°23'19.00"E				
68	Lankapatuna to	Trincomalee	8°21'24.60"N	81°23'19.00"E	Medium (+)	35	60	95
	Foul Point (Thirukonamalai Light House)		8°31'31.57"N	81°19'07.40"E				
69	Foul Point (Thirukonamalai Light House) to	Trincomalee	8°31'31.57"N	81°19'07.40"E	Low (-)	20	30	50
	Muthur East River Mouth (Close to Police Station)		8°27'42.60"N	81°15'33.40"E				
70	Muthur East River Mouth (Close to Police Station) to	Trincomalee	8°27'42.60"N	81°15'33.40"E	Medium(-)	30	50	80
	Gangei Bridge		8°27'37.50"N	81°13'44.10"E				
71	Gangei Bridge to	Trincomalee	8°27'37.50"N	81°13'44.10"E	Low (-)	20	30	50
	Irrakkandy bridge (River Mouth)		8°43'55.40"N	81°10'24.60"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
72	Irrakkandy bridge (River Mouth) to	Trincomalee	8°43'55.40"N	81°10'24.60"E	Medium(-)	30	50	80
	Salpayaru Bridge		8°47'27.80"N	81°07'13.10"E				
73	Salpayaru Bridge to	Trincomalee	8°47'27.80"N	81°07'13.10"E	Low (-)	20	30	50
	Kuchchaveli Puduwakattu		8° 51' 33.40"N	81° 05'6.10"E				
74	Kuchchaveli Puduwakattu to	Trincomalee	8° 51' 33.40"N	8° 05' 06.10"E	Low (+)	25	40	65
	Kallarawa (Close to Thiriyaya Junction)		8 °53' 04.52"N	81°02'09.08"E				
75	Kallarawa (Close to Thiriyaya Junction) to	Trincomalee	8 °53' 04.52"N	81°02'09.08"E	Medium(-)	30	50	80
	Pulmude Arisimale Point		8 °56' 17.05"N	81°00'26.64"E				
76	Pulmude Arisimale Point to	Trincomalee	8 °56' 17.05"N	81°00'26.64"E	High(+)	45	80	125
	Kokilai Lagoon Southern Boundary		8° 59' 02.80"N	80°58'00.20"E				
77	Kokilai Lagoon Southern Boundary to	Mulative	8° 59' 02.80"N	80°58'00.20"E	High (-)	40	70	110
	Mulative Town		9° 16' 03.40"N	80°49'16.10"E				
78	Mulative Town to	Mulative	9° 16' 03.40"N	80°49'16.10"E	Medium(-)	30	50	80
	Mulative Mohotthuwaram/ Vattuvan Lagoon		9°16' 23.80"N	80°48'47.60"E				
79	Mulative Mohotthuwaram/ Vattuvan Lagoon to	Mulative	9°16' 23.80"N	80°48'47.60"E	High (-)	40	70	110
	Naliatannitoduvay (Chundikulam National Park Southern Boundary)	Kilinochchi	9°27'34.20"N	80°37'26.30"E				
80	Naliatannitoduvay (Chundikulam National Park Southern Boundary) to	Kilinochchi	9°27'34.20"N	80°37'26.30"E		300		300
	Chundikulam National Park Northern Boundary (Kaddaikadut)		9°33'43.70"N	80°29'24.30"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
81	Chundikulam Northern Boundary (Kaddaikadut) to	Jaffna	9°33'43.70"N	80°29'24.30"E	Medium(-)	30	50	80
	Mamunai Village		9° 39' 45.50"N	80°21'49.80"E				
82	Mamunai Village to	Jaffna	9°39'45.50'N	80°21'49.80"E	High(+)	45	80	125
	Thumpalai (Point Pedro)		9°49'05.00'N	80°15'16.60"E				
83	Thumpalai(Point Pedro) to	Jaffna	9°49'05.00'N	80°15'16.60"E	Low (-)	20	30	50
	Ariyalai		9°38'11.50'N	80°04'25.40"E				
84	Karaitivu Island	Jaffna	9°45'43.80'N	79°53'06.70"E	Medium(-)	30	50	80
			9°42'24.80'N	79°51'55.30"E				
85	Mandativu Island	Jaffna	9°35'58.20'N	79°58'43.20"E	Low (+)	25	40	65
			9°38'16.20'N	79°59'19.56"E				
86	Allapiddy to	Jaffna	9°36'53.10'N	79°57'42.00"E	Medium(-)	30	50	80
	Velanai Iyanar Kovil		9°37'52.40'N	79°54'52.80"E				
87	Kytes Island	Jaffna	9°38'48.60'N	79°52'02.60"E	Low (-)	20	30	50
			9°42'10.90'N	79°51'45.20"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
88	Punkudutivu Island	Jaffna	9°35'22.40"N	79°48'26.60"E	Low (+)	25	40	65
			9°35'17.50"N	79°48'07.50"E				
89	Nainathivu Island	Jaffna	9°37'08.30"N	79°46'30.70"E	Low (+)	25	40	65
			9°35'05.30"N	79°46'23.80"E				
90	Delft Island (Delf National Park)	Jaffna			High(+)	45	80	125
91	Analaitivu, Eluvaitivu, Iranative and other Islands	Other Island Jaffna/ Kilinochchi			Medium(-)	30	50	80
92	Pooneryn Kalmunai Point to	Kilinochchi	9°35'56.70"N	80°03'08.30"E	Low (-)	20	30	50
	Pallikuda		9°29'11.10"N	80°11'08.60"E				
93	Pallikuda to	Kilinochchi	9°29'11.10"N	80°11'08.60"E	Low (+)	25	40	65
	Devil Point		9°23'19.50"N	80°03'11.10"E				
94	Devil Point to	Kilinochchi	9°23'19.50"N	80°03'11.10"E	Medium(-)	30	50	80
	Nachchikuda (Nawanthurai Point)		9°16'06.10"N	80°06'46.80"E				
95	Nachchikuda (Nawanthurai Point) to	Mannar	9°16'06.10"N	80°06'46.80"E	Medium (+)	35	60	95
	PalliAru North Ward Point		9°09'34.50"N	80°05'54.10"E				
96	PalliAru North Ward Point to	Mannar	9°09'34.50"N	80°05'54.10"E	High(+)	45	80	125
	Wankalai Point		8°56'15.30"N	79°54'11.30"E				
97	Mannar South Bar to	Mannar Island	8°57'53.40"N	79°53'08.60"E	Low (-)	20	30	50
	Erukkalampiddi Causeway Point		9°01'54.80"N	79°52'16.50"E				

Segment No.	Segments	Source Map	Latitute	Longitute	Level of Vulnerability	Proposed Setback (M)		
						Reservation	Restricted	Total Setback
98	Erukkalampiddi Causeway Point Via Ushimukkanmunai Point to	Mannar Island	9°01'54.80"N	79°52'16.50"E	Medium(-)	30	50	80
	PesalaiVankalaipadu		9°04'48.50"N	79°50'48.60"E				
99	PesalaiVankalaipadu to	Mannar Island	9°04'48.50"N	79°50'48.60"E	Low (-)	20	30	50
	Thalaimannar Light House/Pier		9°06'26.90"N	79°43'51.40"E				
100	Thalaimannar Light House/Pier to	Mannar Island	9°06'26.90"N	79°43'51.40"E	Medium(-)	30	50	80
	Mannar Island South Bar		8°57'53.40"N	79°53'08.60"E				
101	Mannar Island South Bar to	Mannar Island	8°57'53.40"N	79°53'08.60"E		No. Build Zone		No. Build Zone
	VankalaiPoint (Proposed Conservation /No. Build Zone.)		8°56'15.30"N	79°54'11.30"E				
102	Vankalai Point to	Mannar	8°56'15.30"N	79°54'11.30"E	High(+)	45	80	125
	Vankalai Sanctuary Southern Boundary		8°53'26.30"N	79°55'44.70"E				
103	Vankalai Sanctuary Southern Boundary to	Mannar	8°53'26.30"N	79°55'44.70"E	Medium(-)	30	50	80
	Arippu East		8°47'43.10"N	79°55'28.60"E				
104	Arippu East to	Mannar	8°47'43.10"N	79°55'28.60"E	Low (+)	25	40	65
	Pukkulam Modaragam Aru		8°33'48.70"N	79°55'12.80"E				
105	Pukkulam Modaragam Aru to	Puttalam	8°33'48.70"N	79°55'12.80"E		300		300
	Kala Oya River Mouth (Wilpattu National Park)		8°17'53.60"N	79°49'55.00"E				

Table 6.2 : Classification of Coastal Segments by Level of Vulnerability and Setback Distances (in meters)

	Level of Vulnerability	Coastal Segments Nos. 1- 44			Coastal Segment Nos. 45-105		
		Reservation Area	Restricted Area	Total Setback	Reservation Area	Restricted Area	Total Setback
	Low (-)	10	25	35	20	30	50
	Low (+)	15	25	40	25	40	65
	Medium (-)	15	30	45	30	50	80
	Medium (+)	20	30	50	35	60	95
	High (-)	20	35	55	40	70	110
	High (+)	25	35	60	45	80	125
	Protected Areas	Protected Areas			Protected Areas		
	Conservation Zones	Conservation Zones			Conservation Zones		

Table 6.3 Protected Areas Bordering the Coastal Zone of Sri Lanka

Name	Location/Geographical Coordinate** Latitude(N) Longitude (E)	Coastal Length (k.m)	Extent (ha)	Year of Establish-ment
1.Bar Reef Sanctuary	8°16'00 - 8°32'00" 79°40'75 - 79°49'70"	75	30,670	1992.04.03
2.Honduwa Island Sanctuary	6°27'17 - 6°23'55" 79°58'31 - 80°00'16"		9	1973.11.19
3.Telwatta Sanctuary*	6°16'00 - 6°08'55" 80°01'53 - 80°03'52"		1,425	1938.02.25
4.Ambalangoda – Hikkaduwa Rocky Islets Sanctuary	6°09'00 - 6°08'00" 80°08'00 - 80°05'00"	638m	1	1940.10.25
5.Hikkaduwa National Park		04.8	102	2002.10.08
6.Parappaduwa Nuns Island and Polgasduwa Sanctuary*	Entire Island and lagoon 22		1,988	1988.08.17
7.Kalametiya lagoon Sanctuary*	6°05'00 - 6°06'00" 80°56'00 - 80°59'00"	4.72	2,525	1984.06.28
8.Bundala National Park	6°07'00 - 6°14'00" 80°07'00 - 81°17'00"	21.33	6,216	2004.07.28
9.Nimalawa Sanctuary	6°08'20 - 6°46'05 81°08'46 - 81°49'25"	03.25	1,066	1993.02.18
10.Ruhuna(Yala) – National Park*	6°16'00 - 6°42'00 81°15'00 - 81°41'30"	45.4	97,881	1938.02.25
11.Yala Strict Natural Reserve*	6°16'00 - 6°42'00 81°15'00 - 81°41'30"		28,906	1938.03.01
12.Kumana National Park*	6°16'00 - 6°42'00 81°04'00 - 81°45'00"	15.4	35,665	2006.09.05
13.Kudumbigala Sanctuary *	6°46'05 - 6°57'23 81°49'25 - 81°51'30"	12.35	6,534	2006.02.20
14.Seruwila – Allei Sanctuary *	8°20'00 - 8°25'00 81°20'00 - 81°23'00"	15.8	15,540	1970.10.09
15.Greater Sober Island	Entire Island	03.91	65	1963.06.21
16.Little Sober Island Sanctuary*	Entire Island	898m	7	1963.06.21
17.Pigeon Island National Park	Entire Island	08.34	471	2003.06.04
18.Kokilai Lagoon Sanctuary*	8°56'00 - 9°03'00 80°52'00 - 80°58'00"	01.15	1,995	1951.05.18
19.Chundikulam National Park*	9°26'00 - 9°32'00 80°24'00 - 80°37'00"	32.56	19,565	2015.06.22
20.Paritivu Islands Sanctuary*	Entire Island	02.38	970	1973.05.18
21. Wilpattu National Park*		36.8	131,667	1938,1941,1973
22. Madampawila Sanctuary		01.2	1,217	2007.09.21
23.Rekawa Sanctuary		3.58	271	2006.05.25
24.Godawaya Sanctuary		4.15	232	2006.05.25
25. Ussangoda National Park		04.0	349	2010.05.06
26. Rumassala Sanctuary		5.0	171	2003.01.03
27. Vankalai Sanctuary		14.8	4,839	2008.09.08
28.Adams bridge National Park		57	18,990	2015.06.22
29. Delft National Park			1,846.28	2015.06.22
30. Veduthalathivu Natural reserve		32.8	29,180	2016.03.01

Source: 1. IUCN Directory of South Asian Protected Areas 1989
2. Department of Wildlife Conservation (2016), Marine Protected Areas & associated Marine Protected Areas

6.8 MANAGING SITES OF SPECIAL SIGNIFICANCE AND PUBLIC ACCESS

The previous CZMP's of 1990 and 1997 addressed the issue of loss and degradation of sites of special significance within the coastal zone that include archaeological, historical, religious, cultural sites and scenic areas as a separate Chapter. In addition enhancement and protection of both lateral and vertical access to and along the coast was also emphasized. However, to maintain consistency and produce user friendly Coastal Zone and Coastal Resource Management Plan, these aspects have been incorporated into this Chapter instead of addressing as a separate issue. The sites of special significance located within the coastal zone are of considerable importance for the preservation of the cultural heritage of the country. These sites are prone to be despoiled than the monuments in the hinterland due to natural causes such as coastal erosion, tsunami as well as rapid development activities. Thus it is important to take necessary management interventions to preserve these sites through adequate management interventions.

6.8.1 Ensuring Public Access

Coastal access can be defined as the right of approach and using an approach (access) to or along a coastal margin by the public, in a physical and visual sense. With the rapid development of the coastal zone in the recent past, public access to and along the coast emerged as a critical issue. The public right to access to the beach for purposes of residential, recreational and economic activities has been traditionally recognized in the past. However in recent times, the rapid development of fishing activities, shrimp aquaculture, tourism, harbour development, coast protection, human settlements and natural security requirements have produced access restrictions to, and along the beach in numerous ways. In the context of economic development activities thriving in the coastal zone after eradication of the terrorism in the northern and the eastern coastal region, public access plays an important role specifically since the ownership of the foreshore, beach, coastal waters and the bottom of the sea are vested with the state; it is therefore incumbent upon the state to ensure public has free access to those resources to carry out their legitimate activities.

In considering the importance of ensuring public access to and along the beaches, new legal provisions have been introduced through Coast Conservation (Amendment) Act, No. 49 of 2011 to formulate "Coastal Access Plan" under Part 111D Section 22 of the amendments. Thus in compliance with the legal provision, action will be initiated by the CC&CRMD to formulate and implement a "National Coastal Access Plan".

6.8.2 Archaeological, historical, religious and cultural sites

The high priority archaeological, historical, religious and cultural sites have been identified through a field survey conducted in 1989 and updated in 2002. The list of high priority sites are given in Table 6.4. As per the field survey, the following management problems have been identified;

- Absence of proper management guidelines has led to degrading the quality of the high priority sites within the coastal zone due to unplanned and unauthorized development activities.
- Lack of awareness on the importance of the sites among the public and the sectoral agencies have led to degradation due to encroachments and development.
- Lack of financial commitment from the respective agencies for implementing conservation plans resulted in loss and degradation of the sites.
- Some of the high priority sites in the north and the eastern coastal segments have been damaged due to the civil conflict that prevailed during the last three decades.
- Lack of proper consideration of the value and significance of the sites have contributed to degradation and attention of the authorities.

In considering the above management problems, necessary policy guidelines, management strategies and actions have been introduced by the CC&CRMD through the 1990, 1997 and 2004 CZMP's respectively. Although the effectiveness of previous management strategies and actions could not be

presented in a quantifiable manner, the development activities in the vicinity of such sites have been effectively controlled through the development permit system, EIA and IEE while enhancing the public awareness.

In view of the above specific attention will be given to protect these valuable monuments (see Table 6.4) through the development permit system and application of new legal provision in the Coast Conservation and Coastal Resources Management Act, No.57 of 1981.

Table 6.4
High priority archaeological, historical, religious and cultural sites within the Coastal Zone (Updated in 2002)

	Place	Type	GN Division	GND No.
Puttalam District				
1	Kudiramalai pre-historic site	A/H/C	Pukulam	634
2	Kollan Kanatta pre-historic site	A/H/C	Pukulam	634
3	Dutch Church*	H/C	Sinnakudirippu	631
4	Dutch Fort*	H/C	Sinnakudirippu	631
5	Dutch House	A/H	Sinnakudirippu	631
6	St. Anne's Church	H/R/C	Mudalaipali	625/626
7	Sri Mariamman Kovil	H/R/C	Udappuwa	594
8	Kali Amman Kovil	H/R/C	Udappuwa	594
9	Mohideen Jumma Mosque	H/R/C	Udappuwa	594
10	Sri Pathasrdhi Draupadi Kovil	H/R/C	Udappuwa	594
11	Ayyanar Kovil	H/R/C	Karukkaponai	582
12	Wanawasa St.Anthony's Church	H/R/C	Karukkaponai	582
13	St. Anthony's Church, Thoduwawa S.	H/R/C	Thoduwawa S.	531
14	St. Anthony's Chruch	H/C/R	Ulhitiyawa North	294
Gampaha District				
15	Kudapaduwa Church	H/C/R	Ettukala	73
16	St. Sebastian Church	H/C/R	Wellaweediya	158
17	Main Street Church	H/C/R	Munnakkare	156
18	District Court Building	A/H	Munnakkare	156
19	Negombo Fort	A/H	Munnakkare	156
20	Church of Our Lady of Sindrathri	H/C/R	Duwa	162A
21	Shipwreck	A(M)	Duwa	162A
22	St. Anne's Church	H/C/R	Pitipana	162
23	St. Mary Magdalena Church	H/C/R	Talahena	163
24	St. Babara's Church	H/C/R	Talahena	163
25	St. Anthony's Church	H/C/R	Kepungoda	163A
26	St. Joseph's Church	H/C/R	Pamunugama	164
27	Shipwrecks	A(M)	Uswetakeyyawa	167
28	Church of Our Lady of Mount Carmel	H/C/R	Palliyawatta	168

	Place	Type	GN Division	GND No.
Colombo District				
29	Whist Bungalow	A/H/C	Modara	2
30	Siva Kovil	H/C/R	Modara	2
31	St. James' Church	H/C/R	Aluth Mawatha	4
32	Jumma Mosque	H/C/R	Aluth Mawatha	4
33	Sri Ponnambalameswar Kovil	H/C/R	Kochchikade	9
34	St. Thomas' Church	H/C/R	Kochchikade	9
35	St. Anthony's Church	H/C/R	Kochchikade	9
36	Colombo Fort	A/H/C	Fort	20
37	Colombo Harbour	A/H/C	Fort	20
38	Jami Ul-Alfar Mosque	H/C/R	Fort	20
39	Gordon Gardens	H/C	Fort	20
40	St. Peter's Church	H/C	Fort	20
41	Hotel Taprobane	H/C	Fort	20
42	Khan Clock Tower	H/C	Fort	20
43	Naval Headquarters	H/C	Fort	20
44	Galbokke Lighthouse	H/C	Fort	20
45	Cargills, Department Stores	H/C	Fort	20
46	President's House	H/C	Fort	20
47	Former General Post Office Building	H/C	Fort	20
48	Chatham Street Clock Tower	H/C	Fort	20
49	Dutch Hospital	H/C	Fort	20
50	Prison Cell of Sri Wickrama Rajasinghe	H/C	Fort	20
51	Old Parliament Building	H/C	Fort	20
52	Old Secretariat	H/C	Fort	20
53	Galle Face Green	H/C	Slave Island	21
54	Beira Lake	H/C	Slave Island	21
55	Taj Samudra Hotel	H/C	Slave Island	21
56	Galle Face Court	H/C	Kollupitiya	37
57	Galle Face Hotel	H/C	Kollupitiya	37
58	Temple Trees	H/C	Kollupitiya	37
59	St. Andrew's Scots Kirk	R/H/C	Kollupitiya	37
60	Sri Darmakirtiyaramaya	R/H/C	Kollupitiya	37
61	Dutch Reformed Church	R/H/C	Bambalapitiya	38
62	Borah Mosque	R/H/C	Wellawatta	38

	Place	Type	GN Division	GND No.
63	Ramakrishna Mission	R/H/C	Mount Lavinia	47
64	Dutch Church	R/H/C	Mount Lavinia	541
65	St. Thomas College	H/C	Mount Lavinia	541
66	Grand Hotel	H/C	Mount Lavinia	541
67	St. Francis Xavier's Church	H/C	Angulana	547
68	Duwe Dewale Church	H/C	Angulana	547
69	Lunawa Devale	R/H/C	Uyana	552
70	Methodist Church	R/H/C	Uyana	552
71	St. Joseph's Church	R/H/C	Uyana	552
72	Talarukkharamaya	R/H/C	Katukurunda	555
73	Bodhirajaramaya	R/H/C	Egoda Uyana	556

Kalutara District

74	Rankot Viharaya	R/H/C	Pattiya North	685
75	Sri Sudharmaramaya	R/H/C	Nalluruwa	692
76	Samudraramaya	R/H/C	Talpitiya	697
77	Parana Walawwa	H/C	Molligoda	704
78	Sri Sudharma Dharma Salawa	R/H/C	Mahawaskaduwa	714
79	Asokaramaya	R/H/C	Kalutara North	717
80	Pulinatalaramaya	R/H/C	Kalutara North	717
81	Kalutara Fort	R/H	Kalutara South	725
82	Kalutara Bodhiya (Gangatilaka Vihara)	R/H/C	Kalutara South	725
83	Church of the Infant Christ	R/H/C	Kalamulla	731
84	St. Joseph's Church	R/H/C	Kuda Paiyagala	734
85	Rajeswari Church	R/H/C	Kuda Paiyagala	734
86	St. Joseph's Church	R/H/C	Maha Paiyagala	735
87	Francis Xavier's Church	R/H/C	Maha Paiyagala	735
88	Purana Chetiyaramaya	R/H/C	Magalkanda	746
89	Kechchimale Mosque	R/H/C	Paranakade	753/757
90	Beruwala Lighthouse	H/C	Paranakade	753/757
91	Maradana Mosque	R/H/C	Maradana	754
92	Duwe Viharaya	R/H/C	Moragalla	760/761

	Place	Type	GN Division	GND No.
Galle District				
93	Bentota Rest House	H/C	Pahurumulla	1
94	Bentota Rajamahavihara	R/H/C	Pahurumulla	1
95	Village Council Building	H/C	Angagoda	2
96	Sri Gnanawimala Purana Vihara	R/H/C	Ahungalla	18
97	Samudraramaya	R/H/C	Ahungalla	18
98	Sumanaramaya	R/H/C	Ahungalla	89
99	Jumma Muslim Mosque	R/H/C	Balapitiya	89
100	Sri Subhadraramaya	R/H/C	Balapitiya	89
101	Ambalangoda Rest House and Dutch Church School	H/C	Balapitiya	82
102	Modara Devale	R/H/C	Maha Ambalangoda	82
103	Chetiyagiri Purana Viharaya	R/H/C	Maha Ambalangoda	80
104	Shipwreck	A(M)	Akurala	76
105	Sinigama Devalaya	R/H/C	Sinigama	64
106	Subhadraramaya	R/H/C	Totagamuwa	61
107	Sailabimbaramaya	R/H/C	Dodanduwa	51
108	Nashir Mohamed Mosque	R/H/C	Gintota	103
109	Miran Mosque	R/H/C	Gintota	103
110	Hussain Mosque	R/H/C	Gintota	103
111	Devol Devalaya	R/H/C	Gintota	103
112	Shipwreck	A(M)	Gintota	103
113	Veheragala	R/H/C	Gintota	103
114	Galle Fort	H/C	Galle Fort	96
115	Ahangama Maha Viharaya	R/H/C	Ahangama Central East	157,156
116	St. Mary's Church	R/H/C	Dangedara South,Kaluwella	97A, 98C
117	Sri Minachchi Sundanesvar Temple	R/H/C	Dangedara South,Kaluwella	97A, 98C
118	Sri Kadira Velayudha Swamy Kovil	R/H/C	Dangedara South,Kaluwella	97A,98C
119	The Closenberg	H/C	Magalla	99
120	Shipwreck	M.A	Magalla	99
121	Welle Devalaya	R/H/C	Unawatuna West	137
122	Ariyakara Viharaya	R/H/C	Talpe South	132
123	Sri Subhadraramaya	R/H/C	Koggala	144 A
124	Birth Place of Martin Wickramasinghe and Folk Museum	H/C	Koggala	144 A

	Place	Type	GN Division	GND No.
125	Devagiri Vihara (Hirugal Devale)	R/H/C	Koggala	144 A
126	Air Base	H	Koggala	144 A
127	Aluth Walawwa	H/C	Kataluwa West	162

Matara District

128	Rajakulawadana Raja Maha Viharaya	R/H/C	Mahawediya	382
129	Theruvila Kovil	R/H/C	Mahawediya	382
130	Veluvanaramaya	R/H/C	Mirissa South	406
131	Bodhi Tree and Devalaya	R/H/C	Mirissa South	406
132	Sri Subhadraramaya	R/H/C	Mirissa South	406
133	Samudragiri Viharaya	R/H/C	Mirissa South	406
134	Sri Subhadraramaya	R/H/C	Kamburugamuwa	408
135	Samudrateera Viharaya	R/H/C	Kamburugamuwa	408
136	Kompannawatta Kovil	R/H/C	Madihe	411
137	Pujita Nivasa	H/C	Madihe	411
138	Jaya Maha Viharaya	R/H/C	Polhena	412
139	Galagediyawa Viharaya	R/H/C	Polhena	412
140	Matara Fort	R/H/C	Kadaweediya	417B, C
141	Church of Our lady of Matara	R/H/C	Ganigasmulla	416
142	Wellamadama Ambalama	H/C	Medawatta	425
143	Kihireli Viharaya	R/H/C	Devinuwara West	433A
144	Vishnu Devalaya	R/H/C	Devinuwara West	433A
145	Muhandiram Walawwa	H/C	Devinuwara West	433A
146	Lighthouse	H/C	Devinuwara West	433A
147	Sinhasana Kovila	R/H/C	Devinuwara West	433A
148	Wanawasa Raja Maha Viharaya	R/H/C	Devinuwara West	433A
149	Talgashena Viharaya	A/R/H/C	Gandara E &.W.	473/473A
150	Siri Sumanarama	R/H/C	Kottegoda	440
151	Abhayadeera Walawwa	H/C	Kottegoda	440
152	Gurukanda Viharaya	R/H/C	Batigama	451
153	Maligatenna Raja Maha Viharaya	R/H/C	Dodampahala E.	453A
154	Veherahena Minikirule Raja Maha Viharaya	R/H/C	Dodampahala E.	453A

	Place	Type	GN Division	GND No.
Hambantota District				
155	Wdukaramaya	R/H/C	Kudawella W.&.E	464A, B
156	Tangalla Fort	H/C	Kotuwegoda	458
157	Tangalla Bodhiya	R/H/C	Kotuwegoda	458
158	Giribandu Viharaya	R/H/C	Kotuwegoda	458
159	Burial Ground	H/C	Kotuwegoda	458
160	Rest House (Old wing)	H/C	Kotuwegoda	458
161	Vehera Navaya	R/H/C	Bata Ata	562
162	Ussangoda	A	Lunama	555
163	Gothapabbata Viharaya	A/R/H/C	Walawa	586
164	Godavaya Port	A/H	Walawa	586
165	Martello Tower	H/C	Hambantota	584
166	New Mosque	R/H/C	Hambantota	584
167	Bundala Archaeological Reserve	A	Bundala	604
168	Telulla Buddhist Ruins	A/H	Bundala	604
169	Kirinda Viharaya	R/H/C	Kirinda	601
170	Palatupana Fort	H/C	Kirinda	601
171	Shipwreck Egypt (1922)	A(M)	Kirinda	601
172	Shipwreck (1961)	A(M)	Kirinda	601
173	Patanagala	A/H/C	Magama	602
174	Minihagalkanda	A/H	Magama	602
Ampara District				
175	Megalithic Site, Kumana	A	Kumana	1
176	Samuddra Viharaya	R/H/C	Kumana	1
177	Megalithic Site, Panama	A	Panama	2
178	Okandamalai	A/R/H/C	Panama	2
179	Velayudha Swami Kovil	R/H/C	Panama	2
180	Muhudu Maha Viharaya	R/H/C	Potuvil Dir.l	3
181	Arugam Bay Port	A/H	Potuvil Dir.l	3
182	Komari Lighthouse	H/C	Komari	9
183	Sangamankanda	A/H/C	Komari	9
184	Komari	A/H/C	Komari	9
185	Tirichchipulavai Sri Murugan Kovil	R/H/C	Komari	96

	Place	Type	GN Division	GND No.
186	Chitra Velayudha Kandaswamy Kovil	R/H/C	Thirukkovil	10
187	Kirulegama Monastic Site	A/R/H/C	Thirukkovil	10
188	Kannaki Amman Alayam	R/H/C	Thambavil Div.l	12
189	Palukamam Kovil	R/H/C	Padiruppu Div.l&2	66
190	Draupathi Amman Kovil	R/H/C	Padirippu Div.l &2	66
191	Kudikadakarai Mosque	R/H/C	Kalmunai Div.3	59

Batticaloa District

192	Dutch Fort	H/C	Koddaikallar Div-l&2	113
193	Amparavillippillaiyar Kovil	R/H/C	Koddaikallar Div-l&2	113
194	Kannaki Amman Kovil	R/H/C	Eruvil	115
195	Jami-ul Lafreen Mosque	R/H/C	Katthankudi Div.l	167
196	Batticaloa Fort	H/C	Puliyantivu	179
197	Shipwreck	A(M)	Puliyantivu	179
198	Church of the Holy Names of Jesus	R/H/C	Kalkudah	204
199	Sittandi	H/C	Valachchenai Tamil Div.	205
200	Periyakaduveikarai	H/C	Valachchenai Tamil Div	205
201	Shipwreck	A(M)	Kayanderni	211A
202	Panichchankerni	H/C	Mankerni	211

Trincomalee District

203	Illangaturai Port	A/H	Ichchilampattai	214
204	Monastic Site	A/H/C	Nawathkanikadu	215
205	Tampalakamam	A/H/C	Tampalakamam South	228A
206	Galmetiyana Tank	A/H	Tampalakamam South	228L
207	Thirnkoneswaram Kovil	R/H/C	Trincomalee Town	244B
208	Fort Fredrick	H/C	Triucomalee Town	244B
209	Gokanna Viharaya	R/H/C	Trincomalee Town	244B
210	Memorial Column, Swamy Rock	H/C	Trincomalee Town	244B
211	Trincomalee Harbour	A/H	Trincomalee Town	244B
212	Shipwreck, Trincomalee Harbour	A(M)	Trincomalee Town	244B
213	Fort Ostenberg	H/C.	Trincomalee Town	244B
214	Floating Dock Wreck	A(M)	Trincomalee Town	244B
215	Kuchchaveli Monastic Site	A/H/C	Kuchchaveli	239
216	Palvakki	H/C	Kuchchaveli	239

	Place	Type	GN Division	GND No.
Mullaitivu District				
217	Mulaitivu Fort	H/C	Mulaitivu Town	233
218	Monastic Site, Kurundanmalai	A/H/C	Mulaitivu Town	233
Jaffna District				
219	Pas Payl Port	A/H	Mullian	149
220	Nakar Koyil	R/H/C	Nakar Koyil	145
221	Vallipuram Burial	A/H	Thunnalai	131
222	Point Pedro Lighthouse	H/C	Tumpalai	140
223	Hartley College	H/C	Point Pedro	137
224	KKS Lighthouse	H/C	Kankasanthurai	67
225	KKS. Fort	H/C	Kankasanthurai	67
226	Sambalturai Port (Jambukolapattana)	A/H/C	Keeramalai	64A
227	Keeramalai Springs	H/C	Keeramalai	64A
228	Naguleswaram Sivam Kovil	R/H/C	Keeramalai	64A
229	Vishnu Kovil	A/H/C	Keeramalai	64A
230	Monastic Site, Keeramalai	A/H/C	Keeramalai	64A
231	Tiruvadi Nilai	A/H/C	Chulipuram	49
232	Megalithic Site, Annaikottai	A/H/C	Annaikottai	40
233	Jaffna Fort	H/C	Colomboturai	8
234	Karainagar Lighthouse	H/C	Karainagar North	9
235	Hammenheil Fort	H/C	Karainagar North	9
236	Megalithic Site	A/H	Karainagarweet North	9
237	Port of Kayts (Uratota)	A/H	Allaipiddy	19
238	Portuguese Fort, (Urindi Kottai)	H/C	Allaipiddy	19
239	Fort Eyrie	H/C	Allaipiddy	19
240	Allaippiddy	A/H/C	Allaipiddy	19
241	Nagadeepa Viharaya	R/H/C	Nainativu	04
242	Nagapooshani Amman Kovil	R/H/C	Nainativu	04
243	Pungudutivu	R/H/C	Pungudutivu	05
244	Dutch Fort	H/C	Delft Central	02
245	Nolan's Bungalow	H/C	Delft Central	02
246	Portuguse Fort	H/C	Delft West	01
247	Stable, Tarapitti	H/C	Delft West	01

	Place	Type	GN Division	GND No.
248	Monastic Site, Vadiresankottai	A/H/C	Delft West	01
249	Dutch Tower, Kuvindan	H/C	Delft East	03
250	Elephant Pass Fort	H/C	Mukavil	153

Mannar District

251	Mannar	H/C	Thoddaveli	194
252	Mannar Dutch Fort	H/C	Thoddaveli	194
253	Talaimannar Lighthouse (02)	H/C	Talaimannar	192
254	Vankalai Settlement	A/H/C	Vankalai	195
255	Tambapanni Port	A/H	Arippu	198
256	Dona Katherina's Rest (Alli Rani Kottai)	H/C	Arippu	198
257	Dutch Fort	H/C	Arippu	198
258	Uruvela	A/H/C	Kokkupadayan	202
259	Megalithic Site, Marichchukaddi	A	Marichchukaddi	203

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Protected Monument and Archaeological Reserve

Type A - Archaeological Value C - Cultural Value

H - Historical Value R - Religious Value

REFERENCES:

1. Government of Sri Lanka: 1981. Coast Conservation and Coastal Resources Management Act (No: 57).
2. Government of Sri Lanka: 1981. Coast Conservation (Amendment) Act (No: 64).
3. Government of Sri Lanka: 2011. Coast Conservation (Amendment) Act (No: 49).
4. Government of Sri Lanka: 1980. National Environment Act (No: 47).
5. CCD: "Coastal 2000: Recommendations for a Resource Management Strategy for Sri Lanka's Coastal Region".
6. CCD: Coastal Zone Management Plan 2004.
7. Government of Sri Lanka: 1940. Archealogical Ordinance and the subsequent revisions of 1956, 1998 and 2000.
8. Ministry of Public Administration: Circular No. 21/92 of 21st May, 1992.
9. Government of Sri Lanka: 1985. Gazette Notification No. 337/48 of Feb 21st.
10. IUCN. 1989. Directory of SA Protected Areas.

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