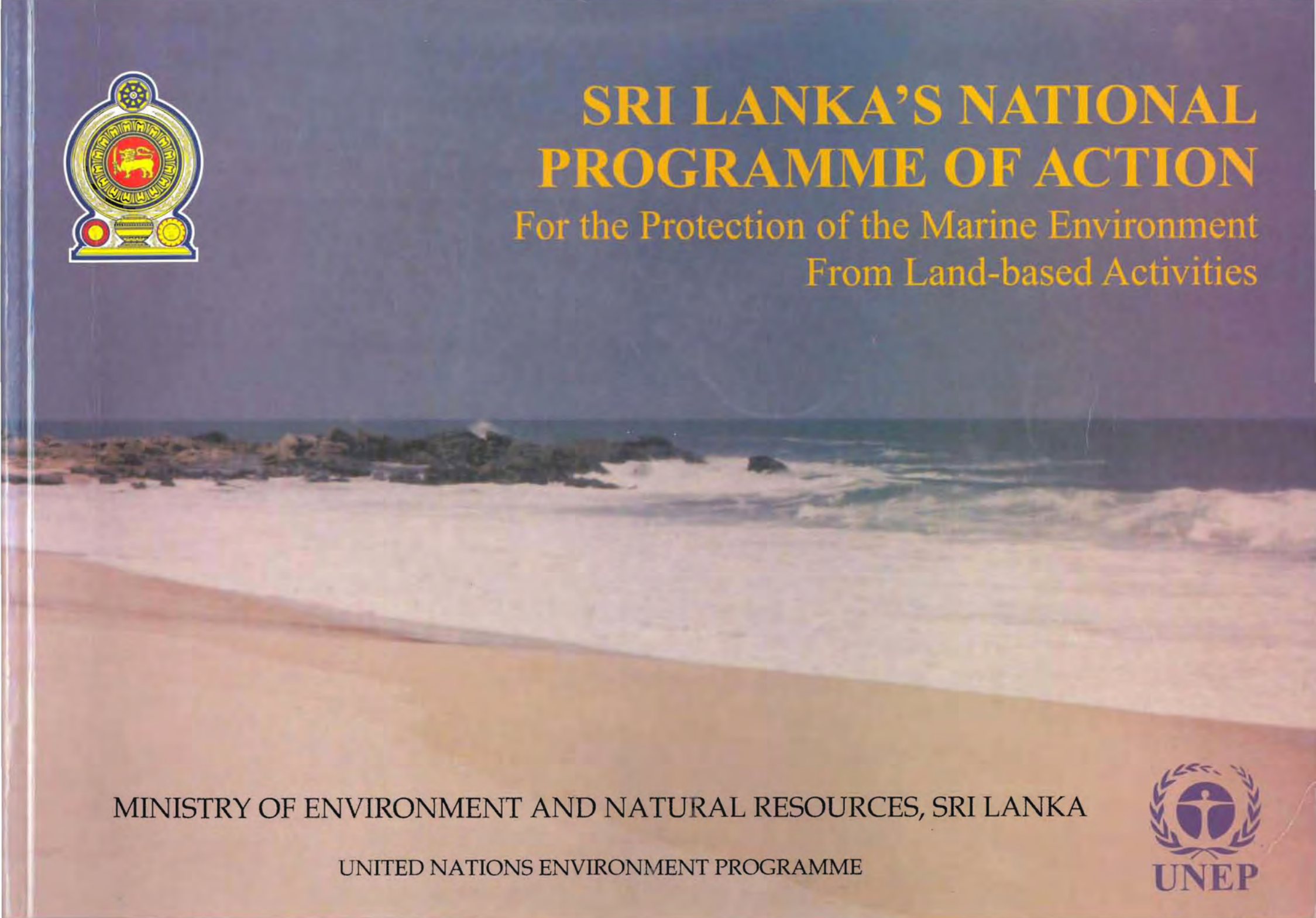


SRI LANKA'S NATIONAL PROGRAMME OF ACTION

For the Protection of the Marine Environment From Land-based Activities

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES, SRI LANKA

UNITED NATIONS ENVIRONMENT PROGRAMME

UNEP

SRI LANKA'S NATIONAL PROGRAMME OF ACTION

For the protection of the Marine Environment From Land-based Activities

Ministry of Environment and Natural Resources

2003 DECEMBER

පාරිසරික සහ ස්වභාවික සම්පත් අමාත්‍යාංශය
சுற்றாடல், இயற்கை வளங்கள் அமைச்சு
MINISTRY OF ENVIRONMENT & NATURAL RESOURCES

"සම්පත්පාය", අංක 82, රජමල්වත්ත පාර, බත්තරමුල්ල.
"சம்பத்பாய", இல. 82, ராஜமல்வத்த வீதி, பத்தரமுல்ல.
"Sampathpaya", No. 82, Rajamalwatta Road, Battaramulla.

මගේ අංකය / எனது இல. / My No. 03/01/1042

ඔබේ අංකය / உமது இல. / Your No.

දිනය / திகதி / Date 16/08/2004

South Asia Co-operative Environment Programme
No. L 265
+5 bks
16 AUG 2004
JT/DG/PA/NP.
RECEIVED
SACEP

Ms J Tissera
Accountant/Administrative Officer
SACEP/Colombo Office
10, Anderson Road
Colombo 05

Dear Ms Tissera

The Development of a Pilot National Program of Action (NPA) for the Protection of the Marine Environment from Land based activities in Sri Lanka

Please find attached a copy of the **National Programme of Action (NPA) for the Protection of the Marine Environment from Land based activities in Sri Lanka**, prepared in coordination with SACEP/Colombo Office with financial assistance from UNEP/GPA.

I take this opportunity thank you and your staff in coordinating this programme successfully and wish to associate with you in our future programmes also.

With best regards,

Anura Jayatilake,
National Project Coordinator and Deputy Director
For Secretary

අමාත්‍යතුමා / கௌரவ அமைச்சர் / Hon. Minister 866618
නියෝජ්‍ය අමාත්‍යතුමා / கௌரவ பிரதியமைச்சர் / Hon. Deputy Minister 868929
ලේකම් / செயலாளர் / Secretary 877290
කාර්යාලය / அலுவலகம் / Office 877291
ෆැක්ස් / பெக்ஸ் / Fax 875325

Sri Lanka's National Programme of Action
For the Protection of Marine Environment from Land-based Activities

ISBN : 955 - 9120 - 27 - 1

Published by : Pollution Control Division
Ministry of Environment and Natural Resources

Funded by : United Nations Environment Programme, Global Programme of Action (UNEP/GPA)

Printed by : Paramount Print Pack (Pvt) Ltd, Kelaniya.

ACKNOWLEDGEMENTS

The National Programme of Action for the Protection of the Marine Environment from Land-based Activities has been completed with the financial assistance of the United Nations Environment Programme/Global Programme of Action (UNEP/GPA). I take this opportunity to thank the UNEP/GPA and its staff for providing assistance for this important activity throughout the project period.

I express my sincere gratitude to Mr. Thosapala Hewage, Secretary of the Ministry of Environment and Natural Resources and to Mr. W.R.M.S. Wickramsinghe, Additional Secretary, for their invaluable guidance and advice.

My special thanks go to Prof. J. Jinadasa and Dr. (Mrs) Ajantha de Alwis who rendered valuable service as consultants for this project.

I also acknowledge the important contributions made by heads of the stakeholder organizations and their able representatives (listed herein), who acted as core team members and enabled the preparation of the National Program of Action possible through their vast experience and competence.

I also take this opportunity to thank the Director General, Deputy Director General and the staff of SACEP/Colombo office who coordinated all financial matters of the project.

The National Program of Action is a team effort of the Pollution Control Division of the Ministry of Environment and Natural Resources and I appreciate the assistance rendered by Mr. Anura Jayatilake, Deputy Director who coordinated the project as the National Project Coordinator, Ms. Chandani Panditharatne, Assistant Director who worked as the Task Manager of the project and other staff members, Ms. Ambika Tennakoon, Ms. Chamani Kumarasinghe, Ms. Nilmini Ranasinghe, Ms. Menaka Dilrukshi and the supporting staff. Also I would like to thank Mr. Lalith Perera, for his assistance rendered in various ways until the completion of the project.

I would also thank Mr. J. Alwis for the textual edition of this publication.

Padmini Batuwitage
Director (Environment)/Project Director
Ministry of Environment and Natural Resources
Sri Lanka

CONTENTS

List of Tables

List of Figures

List of Annexes

Abbreviations

DA	- Department of Agriculture
ARTI	- Agrarian Research and Training Institute
BOI	- Board of Investment of Sri Lanka
BII	- Bureau of Infrastructure Development
Dept. Building	- Department of Building
CARP	- Sri Lanka Council for Agriculture Research Policy
CBO	- Community Based Organisation
CCD	- Department of Coast Conservation
CEA	- Central Environmental Authority
CECB	- Central Engineering Consultancy Bureau
Chamber/Cons. Ind.	- Chamber of Construction Industry
CEPOM	- Committee on Environmental Policy and Management
CTB	- Ceylon Tourist Board
CZMP	- Coastal Zone Management Plan
DNP	- Department of National Planning
DOF	- Department of Fisheries and Aquatic Resources
DS	- Divisional Secretariats
DWLC	- Department of Wildlife Conservation
DF	- Department of Forest
GOSL	- Government of Sri Lanka
GSMB	- Geological Surveys and Mines Bureau
Hot. Ass.	- Hoteliers Association
LA	- Local Authority
LD	- Department of Land Commissioner
LUPPD	- Land Use and Policy Planning Division
M/E&NR	- Ministry of Environment and Natural Resources
MEDIP&IP	- Ministry of Enterprise Development, Industrial Policy and Investment Promotion
M/Finance	- Ministry of Finance
M/H& PI	- Ministry of Housing and Plantation Infrastructure
M/HAPCLG	- Ministry of Home Affairs Provincial Councils and Local Government
M/Indust.	- Ministry of Industries
M/I&WM	- Ministry of Irrigation and Water Management
MOL	- Ministry of Lands
M/ A & LSD	- Ministry of Agriculture and Live Stock Development
M/Tourism	- Ministry of Tourism
MPPA	- Marine Pollution Prevention Authority
NARA	- National Aquatic Resources Research and Development Agency
NAQDA	- National Aquaculture Development Authority
NBRO	- National Building Research Organisation
NCPC	- National Cleaner Production Centre
NGO	- Non-governmental Organisation
NLDB	- National Livestock Development Board
NPPD	- National Physical Planning Department
NWPEA	- North-western Provincial Environmental Authority
NWS &DB	- National Water Supply and Drainage Board
PC	- Provincial Councils
Railway Dept	- Railway Department
RDA	- Road Development Authority
REDC	- Regional Economic Development Cooperation
Regional Dev. Mins.	- Regional Development Ministries
RISC	- Regional Industrial Services Committee
SD	- Survey Department
UDA	- Urban Development Authority
Univ. Moratuwa	- University of Moratuwa
WRS	- Water Resources Secretariat

CONTRIBUTORS

CORE TEAM

Chairman	Mr. Thosapala Hewage	- Secretary, Ministry of Environment and Natural Resources
Co-chairman	Mr. W.R.M.S. Wickramasinghe	- Additional Secretary, Ministry of Environment and Natural Resources
Project director	Ms. L.P Batuwitage	- Director/Environment, Ministry of Environment and Natural Resources
Project coordinator	Mr. Anura Jayatilake	- Deputy Director, Ministry of Environment and Natural Resources
Task manager	Ms. Chandani Panditharatne	- Asst. Director, Ministry of Environment and Natural Resources
Consultants	Prof. J. Jinadasa	- University of Sri Jayewardenepura
	Dr. Ajantha de Alwis	- University of Sri Jayewardenepura
Members	Mr. C.M.M. Chandrasekara	- Director, Department of National Planning
	Mr. Indra Ranasinghe	- Manager, Coast Conservation Department
	Mr. Lakshman Perera	- Director /Planning, Ministry of Housing and Plantation Infrastructure
	Mr. A. K. Senaviratne	- Director, Ministry of Enterprise Development Industrial Policy and Investment Promotion
	Dr. B.M.S. Batagoda	- Director/EE&GA, Ministry of Environment and Natural Resources
	Mr. I.H.K. Mahanama	- Director/NRM, Ministry of Environment and Natural Resources
	Mr. Ajith De. Silva	- Deputy Director, Ministry of Environment and Natural Resources
	Mr. P.N.D. Abeygunawardene	- Deputy Director, South Asia Cooperative Environment Programme
	Ms. Nishanthi Perera	- Programme Officer, South Asia Cooperative Environment Programme
	Dr. P.P.G.S.N. Siriwardene	- Director, National Aquatic Resources Research and Development Agency
	Mr. N. Sureshkumar	- Head/ ESD, National Aquatic Resources Research and Development Agency
	Ms. Priyani Wijemanne	- General Manager, Marine Pollution Prevention Authority
	Mr. Premasiri Hettiarachchi	- SAS, Ministry of Home Affairs, Provincial Councils and Local Government
	Mr. Saman Senanayake	- Director, North Western Provincial Environment Authority
	Ms. A.L.S. Nazeema	- Assistant Director, Ministry of Environment and Natural Resources
	Mr. G.A. Weerasundara	- Assistant Director, Central Environment Authority
	Mr. Ajith Rodrigo	- IRMP, Central Environment Authority
	Mr. H.S.G. Fernando	- Director /Oceanic Resources, Ministry of Fisheries and Oceanic Resources
	Mr. B.A. Jayananda	- Director Ministry of Lands
	Ms. W.A.D.R. Suvinitha	- Senior Assistant Secretary, Ministry of Lands
	Mr. L.K. Hathurusinghe	- Actg. Director/Projects, Ministry of Agriculture and Livestock Development
	Mr. V.R. Sena Peiris	- Director, National Cleaner Production Centre
Textual Editor	Mr. J. Alwis	

Editorial Review Panel

Mr. W.R.M.S. Wickramasinghe
Ms. L.P Batuwitage
Dr. Ajantha de Alwis
Mr. C.M.M. Chandrasekara
Mr. Indra Ranasinghe
Mr. Lakshman Perera
Mr. A. K. Senaviratne
Mr. P.N.D. Abeygunawardene
Mr. Anura Jayatilake
Ms. Chandani Panditharatne

Other Contributors

Mr. Gamini Gamage, Mr. M.M.S.S.B. Yalegama, Mr. Munamale, Mr. Nimalsiri Abeyawickrama, Mr. M. Marcus, Dr. Nihal Atapattu, Mr. M.A.R. Kularatne, Mr. Hemantha Withanage, Ms. K.N. Elliyadda, Mr. R.A.D.B. Samaranayake, Mr. K. H. Mutukuda Arachchi, Mr. Bandarathilake, Mr. D.R. Senanayake, Mr. Sujana Herath, Ms. M.A. Kumaradasa, Mr. Shanthilal Rathnayake, Mr. L.P. Titus, Mr. Jagath Gunasekara, Mr. R.R.M.K.P. Ranatunga,

Special Assistance

Mr. Lalith Perera, Ms. Ambika Thennakoon, Ms. Chamani Kumarasinghe, Ms. Nilmini Ranasinghe, Mr. Amarabandu Wanninayake, Ms. Menaka Dilrukshi, Ms. Sigiri Piyasena.

Photo Credits

Mr. Roshan Menikpura

Type setting and Formatting

Mr. Lalith Perera

EXECUTIVE SUMMARY

The coastal and marine environment in the world including the South Asian region is degrading rapidly due to various anthropogenic activities. This has become an issue of international concern and a Global Programme of Action (GPA) was adopted by representatives of 108 governments and the European Commission at an intergovernmental conference held in Washington D.C., USA from 25th Oct – 03rd Nov 1995 to protect the marine environment from land based activities. The objective of this Global Programme of Action is to facilitate member states to preserve and protect the marine environment from land based activities. In order to facilitate implementation of the GPA, United Nations Environment Programme (UNEP) as Secretariat to the GPA as organised a series of regional workshops for experts from representative governments and relevant international representatives to strengthen national and regional capabilities in this field.

At the regional workshop for the implementation of GPA in South Asia held in 1997, it was decided that National Programmes of Action should be developed by all South Asian nations to implement the GPA, indicating the assessment of the problems, priorities and management strategies to be adopted in their respective countries.

Sri Lanka's NPA was formulated by the Ministry of Environment and Natural Resources in response to the above decision with the financial support from UNEP's Global Programme of Action (GPA).The programme thus aims at identifying the land based activities that have adverse effects on the marine environment in Sri Lanka.

At present, pollution of marine environment through certain land based activities is identified as a major threat to the marine environment worldwide and Sri Lanka is no exception. The pace of development in the coastal region of Sri Lanka has been rapid in recent years. While the numerous activities in the coastal region contribute to meet the ever growing demand for goods and services of the country, they also have had significant implications for the sustainable existence of the marine environment. Most of these land based activities are unplanned and haphazard and therefore such activities have been identified as one of the most crucial issues of the country which leads to the rapid deterioration and degradation of marine ecosystem and its biodiversity. Furthermore, unplanned and haphazard agricultural and other development activities in the hinterland adjacent and beyond the coastal

region, generate large quantities of pollutants of different nature, that are carried by the 103 river basins to the marine environment. Adverse impacts of these pollutants not only harm the marine environment and its resources, but also affect the socio-economic benefits and public health of the communities.

The need to protect the marine environment was long felt by the Government of Sri Lanka which has acted towards maintaining its good health and improving productivity through several legislative enactments, policies, programmes and projects. For instance the legislative enactment focusing primarily on "Environmental Protection and Management" which was enacted in Sri Lanka in the form of the National Environmental Act No 47 of 1980 with its subsequent amendments have provisions which serve directly and indirectly for the protection of the marine environment. Other legislative enactments including, Forest Ordinance No. 10 L (1885) as amended in 1966, 1979 and 1982 Fauna and Flora Protection Ordinance No. 2 of 1937, Tourist Development Act No. 14 of 1968, Urban Development Authority Act No. 41 of 1978, Marine Pollution Prevention Act No. 59 of 1981 and National Heritage Wilderness Areas Act No. 3 of 1988 also have legal provisions for the protection of marine environment.

The enactment of Coast Conservation Act, No. 57 of 1981 which identifies the Coast Conservation Department as the principal agency for coastal issues is a major breakthrough towards exclusive protection of coast and its resources. The main provisions of this Act are designed to protect and preserve the coast from erosion or *encroachment by the sea* and include control over the planning and management of development activities within the designated coastal zone (Fig.1.0.2).

Many policy decisions taken by the Government of Sri Lanka including The National Environmental Policy(2002), The National Physical Planning Policy (2002), The Industrial Pollution Management Policy, The National Mineral Policy (1999), The Coastal Resources Management Policy, The National Water Resource Policy(2000),The National Wildlife Policy (2000), The National Forest Policy (1999), The National Land Use Policy and The National Strategy for Solid Waste Management (2000) and the Proposed National Wetland Policy, among others, also provide for the protection of marine environment. There are over 20 programmes and projects that have been and are being implemented targeting the well being of the marine environment (Annex 1).

In the preparation of this NPA, following principles and steps were adopted.

- Adoption of framework methodology offered by the Global Programme of Action for the Protection of the Marine Environment from Land -based Activities (GPA)
- Incorporation of activities in ocean waters and coastal surface waters (including inshore areas, estuaries and lagoons, rivers and streams within the coastal region) in the classification of marine environment as land based activities which have adverse impacts on all these aquatic systems.
- Consideration of all adverse activities occurring in the coastal region, adjacent areas and upstream areas.
- Inclusion of certain activities which occur in the coastal waters that can affect the marine environment.
- Identification and assessment of activities that have adverse impacts on the marine environment through literature review, field surveys and stakeholder workshops
- Formulation of an action plan to address the issues identified through core-group participation comprising of senior members from relevant ministries/institutes/ organizations/agencies
- Formulation of pilot projects to develop the conceptual basis that can be extended subsequently to other areas.

Four prioritised areas identified to address through the NPA are as follows;

1. Coastal and Marine water pollution
2. Coastal erosion
3. Degradation of marine habitats and their biodiversity
4. Deterioration of environmental quality in sites of special significance

The priority issues pertaining to each area which call for immediate actions include:

- **Marine water pollution -** Sewage pollution, industrial pollution , pollution by uncontrolled dumping of solid waste, pollution by unplanned aquaculture, pollution by unauthorized underserved settlements and structures and pollution by agriculture/livestock practices in upstream areas ,

- **Coastal erosion** - Sand mining, sea coral mining and destruction of vegetation,

- **Degradation of marine habitats and their biodiversity -** Destruction/over exploitation of the resources within marine habitats, conversion of marine habitats, marine habitat alteration due to upstream activities and

- **Deterioration of environmental quality of sites of special significance-** Haphazard disposal of solid wastes, lack of proper infrastructure facilities, disposal of waste oil and other chemicals by boats shipwrecks etc.

The policies and strategies spelt out in this document require the implementation of a series of actions that are logical and well organised. This calls for an innovative approach in the implementation procedure where a greater emphasis is placed on the active participation of all stakeholders of the relevant priority areas including the civil society. Thus, the remedial actions that have been proposed are based on introducing appropriate market based instruments to ensure sustainability, securing partnerships of local authorities, securing community participation, promoting private sector participation, creating public awareness, strengthening the enforcement of existing laws and regulations , establishing effective monitoring and evaluation mechanisms and strengthening institutional coordination and cooperation.

The major task in the implementation procedure is to develop a coordinated management mechanism to obtain the cooperation and collaboration of relevant agencies. Certain actions recommended in the NPA require the involvement by a multiplicity of agencies and institutions with their own legal framework thus the need for an effective inter agency co-ordination mechanism has been emphasised

The Government of Sri Lanka has established an institutional framework to co-ordinate action and monitor progress for the implementation of the National Environmental Action Plan (Caring for Environment) covering the subject areas of

- Forestry and Wildlife Conservation,
- Agriculture, Plantations, Land Development and Mining,
- Fisheries and Coastal and Marine Area Management,
- Industry and Tourism,
- Energy and Transport,
- Health, Sanitation and Urban Development.

Six committees have been established to cover the above areas. These committees are designated as Committees on Environmental Policy and Management (CEPOMs). Each of these Committees are chaired by the Secretaries of the line Ministries and the Secretary of the Ministry incharge of the subject of Environment act as co-chair. The membership of the CEPOMs consist of (a) key officials of the concerned institutions (Ministries, departments, statutory bodies), (b) recognized experts in the subject areas concerned, (c) NGOs, (d) the private sector , and (e) the provincial administration. Each CEPOM will focus its attention on those actions within its areas of authority that affect the whole or any part of the environment.

Progress review meetings of CEPOMS will be held bi-monthly. It is expected that these CEPOMs will also be responsible for the implementation and monitoring of the actions proposed in the National Programme of Action (NPA).

CEPOMs will be reporting on all matters pertaining to the NPA to the National Operations Secretariat established to monitor the progress of all projects that are part of the Development Strategy of the Government of Sri Lanka.

Whilst it is desirable to achieved the full implementation of the NPA, it may not be possible to do so in the short term due to constraints such as financial and implementation capacity. Thus the implementation of actions that are most urgent under each area specified in the NPA within the currently available resources is necessary. Formulation and implementation of pilot projects that are most urgent to develop the conceptual basis of programmes with the possibility of extending its applications subsequently to other areas with similar adverse impacts will be considered as an important step in implementing the programme of action.

Six areas have been selected for pilot projects and project proposals have been prepared. The selected areas are:

1. *Pilot Project on Solid Waste Management for Wattala Pradeshiya Sabha in Gampaha District, of Western Province, Sri Lanka.*

2. *Pilot Project on the Selection and Design of an Appropriate Sewerage System for New and Improved Settlements under the Lunawa Environment Improvement and Community Development Project, Western Province, Sri Lanka*

3. *The Study of the Economic Significance of the Coastal Region of Sri Lanka in the Context of Social, Political and Environmental Changes that occurred during the last decade.*

4. *Pilot Scale Environmentally Sound Zoning Plan for Aquaculture Development in the Hambantota District in the Southern Province to overcome Unplanned Aquaculture Development in the Future.*

5. *Pilot Project to Control River Sand Mining in the Deduru Oya River Basin to Mitigate Marine and Coastal Environmental Degradation in the North Western Province, Sri Lanka.*

6. *The study on assessment of squatter settlements and their linkages to coastal pollution along the coastline from Negombo to Kalutara.*

BACKGROUND

Degradation of marine environment resulting from land based activities is a current global concern. In order to address this global concern and also reaffirming the Rio Declaration on Environment and Development, the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA) was adopted by the representatives of 108 Governments and the European Commission at an Intergovernmental Conference held in Washington, DC, USA from 23rd October to 03rd November 1995. The goal of the Global Programme of Action (GPA) is the realization of the duty of States to preserve and protect the marine environment. The aim of the Global Programme of Action therefore, is to facilitate states to preserve and protect the marine environment from land based activities. The GPA is designed to assist states in taking actions individually or jointly within their respective policies, priorities and resources, which will lead to the prevention, reduction, control and or elimination of the degradation of the marine environment as well as its recovery from the impacts of land-based activities.

The Washington Conference designated the United Nations Environmental Programme(UNEP) as the Secretariat of the GPA, which will promote and facilitate implementation of the Programme of Action at national and regional/sub-regional levels and play a catalytic role in the implementation at the international level with other organizations. The revitalization of the Regional Seas Programme is of particular concern for the GPA.

UNEP as the Secretariat of the Programme of Action has organized a series of regional workshops for experts representing their respective governments and relevant international representatives to strengthen national and regional capacities. At a similar workshop on the implementation of GPA in the South Asian region comprising of India, Bangladesh, Maldives, Pakistan, and Sri Lanka held in 1997, it was decided that National Action Plans (NPA) should be developed by all South Asian Nations to implement the GPA. These plans should assess the current land based activities that are detrimental to the marine environment and management strategies to be adopted. The Governments, therefore, are required to develop appropriate national programmes of action, in accordance with their policies, priorities and resources, and take necessary steps to implement these programmes.

The Global Programme of Action has identified pollutant sources other land based activities that degrade the marine environment and proposed methods and recommendations to alleviate and reduce the level of degradation. These pollutant sources include Sewage, Persistent Organic Pollutants (POPs), Radioactive Substances, Heavy Metals, Nutrients, Sediments and Litter. These also threaten human health and living resources and are transported long distances by watercourses, ocean currents and atmospheric processes. The other land based activities that degrade the marine environment include physical alteration and destruction of habitats.

This National Programme of Action is prepared in response to the above decision and is aimed at identifying the land based activities that have adverse effects on the marine environment, identifying the priorities and formulating a strategic plan to address the problems. This National document is formulated by the Ministry of Environment and Natural Resources with financial support from UNEP's Global Programme of Action (GPA) for the Protection of the Marine Environment from the Land Based Activities.

PART 1

PRESENT STATUS OF THE COASTAL REGION AND THE

CRITICAL LAND BASED ACTIVITIES THAT AFFECT THE MARINE ENVIRONMENT OF SRI LANKA

PRESENT STATUS OF THE COASTAL REGION AND THE CRITICAL LAND BASED ACTIVITIES THAT AFFECT THE MARINE ENVIRONMENT OF SRI LANKA

Sri Lanka – Major cities and road network

The NPA deals exclusively with land based activities that have adverse impacts on the marine environment and these activities are mainly concentrated in the coastal region of the country. Therefore it is important to understand the present status of coastal region and the critical land based activities that have adverse impacts on the marine environment which encompasses ocean waters and coastal waters (which include inshore areas, lagoons, estuaries, rivers and estuaries within the coastal region. Part 1 of the NPA gives a brief description of the present status of coastal region and the critical land based activities that have adverse impacts on the marine environment.

Arugam bay- Sandy beach at East Coast

1.0 THE BIOPHYSICAL FEATURES

Sri Lanka's coastal region and marine environment is greatly influenced by the island's location in the northern part of the Indian Ocean (Cooray,1984) between 5° 54' and 9° 52 N and 79° 39' and 81° 53'E (**Fig. 1.0.1**). The coastal region is located in the lowest of the three peneplains forming the island, and generally consists of a flat coastal plain averaging an elevation of less than 30 m (Cooray, 1984). This coastal plain extend outward from the island and under the sea as the continental shelf for a width between 8 km (along the southeastern and eastern coasts) and 40 km (in the north, northeastern and northwestern coasts) - about 20km in most parts. The depth within the shelf area ranges from 0 to 200 m with an average depth of about 65 m below sea level. The continental shelf is narrow around the southern and eastern part of the island, but widens considerably towards the north, northeastern and northwestern part where it merges with the shelf around India (Cooray, 1984). The country claimed a 200 nautical mile Exclusive Economic Zone (EEZ) in 1976, adding to its territorial waters a total of 233,000km^2. Sri Lanka's maritime boundaries are shown in **Fig. 1.0.1**.

Sri Lanka has a coastline of approximately 1,620 km (including the shoreline of bays and inlets, but excluding lagoons) (CZM, 2003). For management and conservation purposes of the coastal environment, the coastline is defined as the 'Coastal Zone' which is described in the Coast Conservation Act of 1981 as the area lying within a limit of 300m landward of the Mean High Water Line (MHWL) and a limit of 2km seaward of the Mean Low Water Line (MLWL); in the case of rivers, streams lagoons or any other body of water connected to the sea either permanently or periodically, the landward boundary extends to a limit of 2km measured perpendicular to the straight base line drawn between the natural entrance points thereof and includes the waters of such rivers, streams and lagoons or any other body of water so connected to the sea (**Fig. 1.0.2**).

For administrative purposes the coastline is included in the coastal region, which is generally viewed as the area of 74 Divisional Secretariat Divisions with maritime boundaries which are in close proximity to the coast (**Fig.1.0.3**).

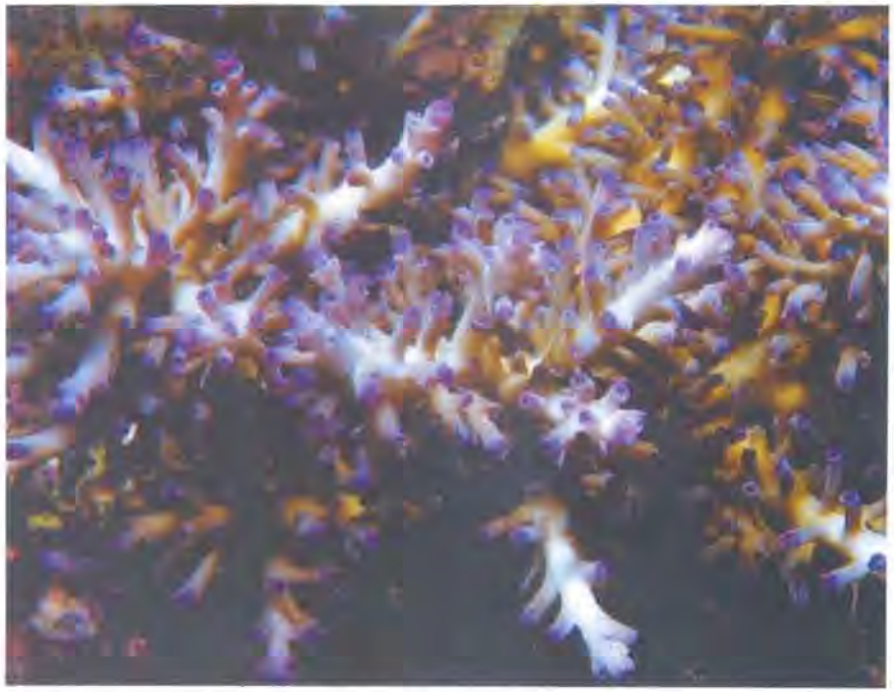
Part of the Northeast coastline- a picturesque sandy bays protected by rocky head lands -Nilaveli

The transverse type coastline in the southwest and northeast is characterized by a series of picturesque sandy bays protected on either side by rocky headlands (Cooray,1984). The bay of Trincomalee on the North-eastern coast described as "the most perfect natural harbour of the Indian seas" is of particular significance (Beny, 1970). The North-western and South-eastern coastlines exhibit sand bars, dunes and spits that sometimes extend over many kilometres. Recent estimates show that the coastline of the country contains around 5620ha of sandy beaches, barrier beaches and sand spits and around 15,930ha of dunes (CZMP,2003). Lagoons and estuaries are the other important coastal habitats that contribute considerably to the fishing industry. Lagoons are more abundant along the southern, South-eastern 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. There are around 89 lagoons in the country with a total extent of about 36,300ha. There are 45 estuaries with a total extent of about 90,960ha. Among other important coastal terrestrial habitats are the mangrove stands(around 4,640ha) which can be seen as fringing vegetation of lagoons/ estuaries and river mouths, salt marshes (around 26,250ha) and coastal marshy wetlands (around 880ha), all with scattered distribution (CZMP,2003).

Kelani River – one of the major rivers in Sri Lanka

The shallow water areas in the continental shelf around the island with high primary productivity have induced the formation of coral reefs. The most extensive coral reefs in Sri Lanka are the patchy coral reefs in the North-western coastal and offshore waters. 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 South-western, eastern and northern coasts also contain fringing coral reefs adjacent to the shore, growing from the sea floor usually on a nucleus of rock (Rajasuriya and Premaratne, 2000). It has been estimated that about 2% of the coastline contains fringing coral reefs (Swan, 1983). 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 can be seen in some places in the North-eastern coastal waters (Rajasuriya and White,1995). Corals also can be seen in association with sandstone reefs in varying degree which are widespread along the coast. Many of these are located along the bathymetric contours of the continental shelf. Rocky reefs which are also covered by corals in varying degree occur from the west coast to the northeast (Rajasuriya and White, 1995).

Large deposits of coral are also found inland in the coastal region, particularly between Ambalangoda and Matara on the south west coast, deposits at Akurala being one of the largest. However this deposit is depleted now due to over-exploitation. There is another large deposit in Habaraduwa which is being extracted for the lime industry.



Coral reefs at Hikkaduwa - Down South of the Island

In addition to the rich coral areas, Sri Lanka's marine waters have extensive sea grass beds, often occurring in association with coral reef ecosystems or in estuaries and lagoons. They are particularly apparent in some basin estuaries and lagoons of the country (Samarakoon and Pinto, 1988). Very extensive seagrass beds also have been reported in shallow coastal waters from North-western to the northern and across the Palk Bay to Rameswaram Island on the Indian coast (Samarakoon and Pinto, 1988). Seagrass

beds in Sri Lanka have particularly evoked interest because they are believed to be the main habitat of the endangered dugong (*Dugong dugong).* They also provide an important part of the diet of turtles and serve a vital function as nursery grounds for many commercially important food and ornamental fish species and shrimps.

Sri Lanka has 103 river basins, and most of the rivers radiate from the hill country and flow down to the sea forming estuaries/lagoons. These rivers, transport large amounts of sand, silt and clay essential for beach nourishment.

Sandy beaches –Aarugam bay, Potuvil, East coast

River basins of Sri Lanka

Sea beach environment in the down south of the island - Tangalle

A noteworthy physical feature of the coastline of the country is its retreating and accreting nature. 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 protective coral reefs (CZMP, 2003). In contrast, some areas of the North-western (e.g. Kalpitiya) and southeastern (e.g. Kalawanchikudi) coastlines are advancing due to accretion of sand, silt and clay (Cooray, 1984).

1.1 CLIMATIC FEATURES

Almost all major climatic zones of the country are represented in the coastal and marine environments. The western and southwestern coasts are within the Wet Zone which is characterized by an annual rainfall of 2,500 mm to over 5,000 mm, and a temperature of around 27°C. There are two strips of coast in the western and southern part of the island which falls within the intermediate climatic zone with an annual rainfall between 1900 –2500 mm. Most other areas of the Coast fall within the Dry Zone which averages an annual rainfall between 1,250-1,900 mm and a temperature of around 30°C. The two extra dry coastal strips in the northwest and southeast form the Arid Zone, which receives less than 1,250 mm of rain annually (CZMP 2003) **(Fig. 1.0.4).**

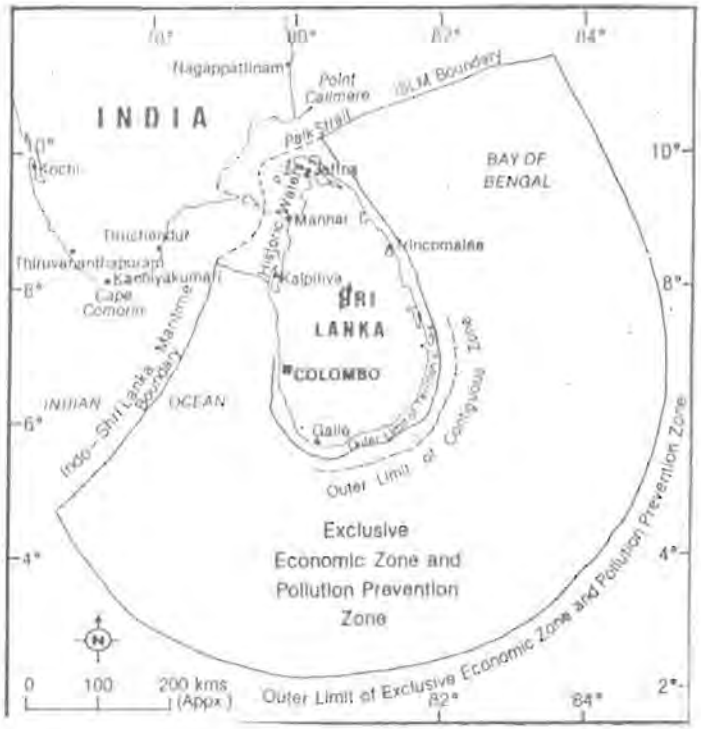


Fig. 1.0.1 Territory of Sri Lanka (including maritime zone)
(Source-Survey Department of Sri Lanka)

- **The territorial sea**, extending to distance of twelve nautical miles from the coast of the main island.
- **The contiguous zone**, which extends a further twelve nautical miles from the outer limits of the territorial sea.
- **The exclusive economic zone (EEZ)**, which extends 200 nautical miles from the coasts (and includes the territorial and the contiguous zones).
- **The internal waters**, for which a demarcation is necessary in the Gulf of Mannar and Palk Strait, where the above zones overlap with India's nautical zones.

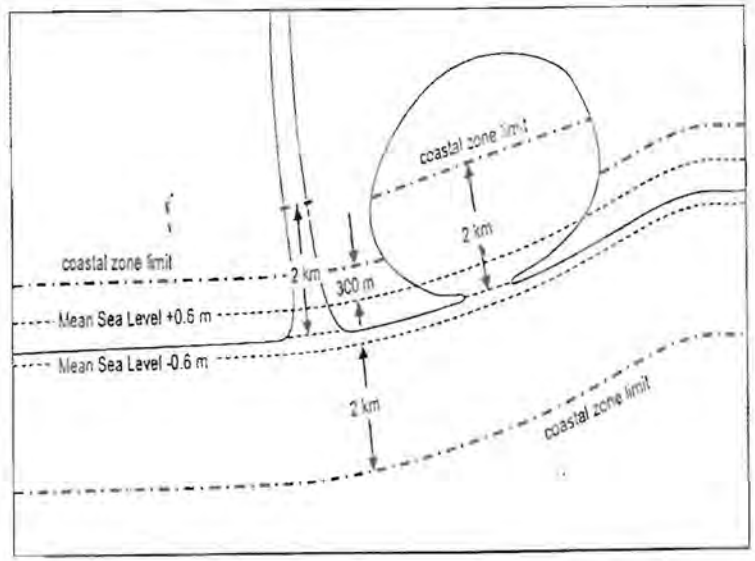


Fig.1.0.2 Legal boundary of the coastal zone
(Source: CZMP, 2003)

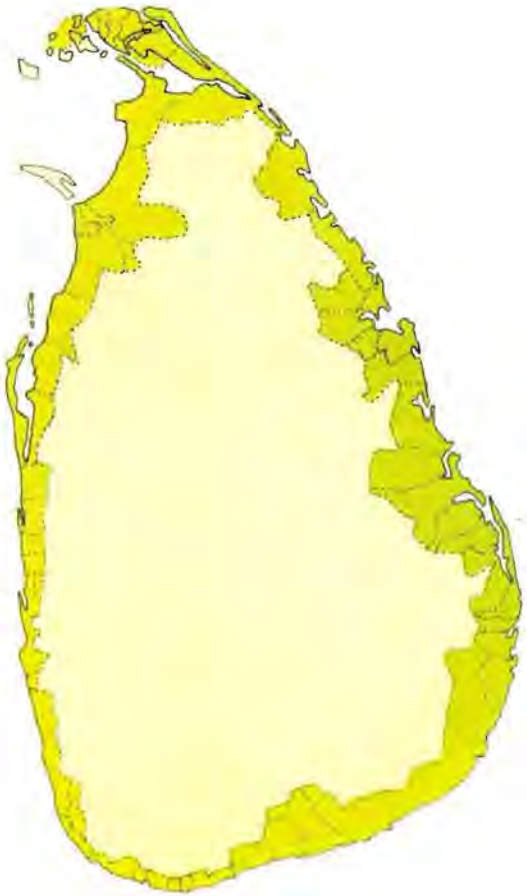


Fig.1.0.3 Administrative boundary of the coastal region
(Source: Coastal 2000, 1992)

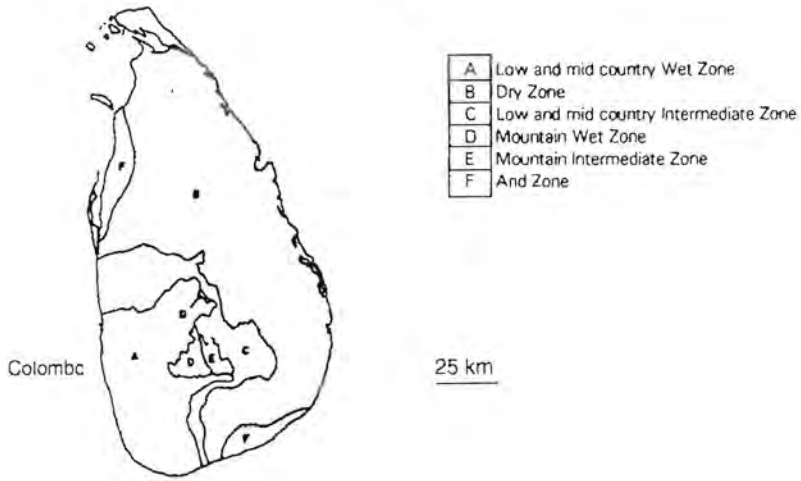


Fig. 1.0.4 Bioclimatic zones of Sri Lanka
(Source: Wijesinghe, et al., 1993)

The wave pattern around the island is seasonal with moderate wave heights. The tide is microtidal, mixed to semi-diurnal, with generally weak tidal currents. The wind pattern is influenced by the shifting monsoons with light to moderate wind speeds. During May to September, the coastal areas of the south-western part of the island experience heavy rains from the southwest monsoon. The east coast receives its highest rainfall from December to February from the northeast monsoon which also provides rain to the rest of the island.

Changes in the tidal movements – Arugam bay, Potuvil, East coast

The coastal areas also receive inter-monsoonal rains from April-May and October- November through tropical cyclonic activity. Cyclones are not frequent phenomena in Sri Lanka although the country is located at the fringe of the northern Indian Ocean cyclone belt. Most cyclones have traversed the northern part of the island moving from southeast to northwest, with the northeast coast experiencing the highest impact. The mean annual occurrence of storms affecting the northern areas of the island is 0.2, indicating a return frequency of a storm in every five years. This situation can vary, however, in the future with climate change, particularly as cyclone patterns in the equatorial zone have shown increasing frequency and intensity during the past two decades. (CZMP, 2003)

1. 2 SOCIO- ECONOMIC FEATURES

At present Sri Lanka has been divided into 25 Administrative Districts comprising 324 Divisional Secretariat (DS) Divisions. Of these Districts, 14 have maritime boundaries representing 74 DS Divisions (CZMP, 2003). The last population census (2001) has estimated a 18.73 million population in the country. It should however be noted that it did not cover the five (5) Districts in the North and East Provinces. The estimated population in the coastal Districts is 10.79 million, which is about 58% of the total population (Department of Census and Statistics, 2002)

(1) traditional fishing-Ahangama *(2) fish market – Negombo*
(3) Agricultural farms- Kalpitiya peninsula *(4) sand mining in rivers – Kelani river*

Conventionally poverty is viewed as the lack of access to adequate quantities of goods and services to satisfy an individual's material and social needs. Poverty is a common phenomenon in developing countries and Sri Lanka is no an exception. According to a recent study carried out by the Asian Development Bank (ADB), except the Colombo District, five Districts in the coastal region showed a high incidence of poverty ranging from 25%-30% which is above the national average of 23%. The number of Samurdhi (a social welfare programme) recipients is also a good indicator of the existence of poverty in the coastal region. The number of Samurdhi households in 14 maritime districts were 0.669 million and 34 percent of the total Samurdhi households of the island (Department of Poor Relief, 2001).

As regards other basic needs, such as clean water (pipe borne) supply, only 16.5 percent of the population in the maritime districts had access to this facility which is slightly lower than the national average of 17 percent. However, except for Colombo, Mannar and Jaffna all the other Districts had less than 10 percent of pipe borne water (IUCN, 2003)

It has been shown that the coastal region comprise 65% of urbanized areas of the country. For instance, of 14 Municipal Councils of the country, six large Municipal Councils including Colombo, the commercial capital and 19 Urban Councils out of 39 are located in the coastal region. The expansion of urban areas in the coastal region and migration of rural people particularly to Colombo has also been noticed in the recent past (IUCN, 2003).

Sri Lanka's coastal and marine areas has had considerable socio-economic significance since time immemorial and the use of coastal and ocean resources is linked to public health, food security and economic benefits including traditional livelihoods, and social benefits including cultural values of the people.

(1) Old Dutch port – Galle, down south (2) Kalutara temple- West coast
(3) Church in Negombo (4) Koneswaram Kovil – Trincomalee, East coast

The economic significance of the coastal region is generally shown in its contribution to the national economy. Gross Domestic Product (GDP) and Gross National Product (GNP) are the important measures on national accounts. The GDP measures the value of economic activities in the nation as a whole or in a particular region usually over a period of one year. In 1983, the coastal GDP contributed 35 percent to the national GDP while this percentage increased to 40 percent by the year 1989 showing its importance to the economy (Saundranayagam et. al. 1994). Wholesale and retail trade were the major element of this contribution while industries, transport and communication were the other important sectors.

(1) Agriculture- Kalpitiya Peninsula *(2) Fishing craft- Negombo*
(3) Tourist beach hotel - Tangalle *(4) Railway transport in the coast line*

Agriculture, forestry and fishing were ranked as the fourth contributor representing 15% in 1989. The coastal agriculture consists of mainly coconut, paddy and other food crops and was relatively less important. Fishing activities in the coastal economy play an important role. The fishery sector had contributed about 2.6% of the GNP at Current Factor Cost Prices in 2000 (NARA, 2001) and continues to be an important source of foreign exchange. Estimates show that the marine fishery provided approximately 88% of the total fish production in 2000 with the coastal fishery (primarily by day boats over the continental shelf) contributing 68% of this share. (NARA, 2001), while the value of export earnings from fish and aquatic products was over Rs. 6 billion. Fish also constitutes the top source of animal protein for Sri Lankans (DCS, 2000). The coastal region is also the hub of industrial production and contains around 62% of all industrial units (Anon. 2002a). Coastal region's contribution to Tourism which is the fifth income earner of the country (US $ 211 million in foreign exchange in 2001) (CZMP, 2003) is also tremendous as 70% of all hotels registered with the Tourist Board are located within the coastal region. Location of around 260 high priority sites of archaeological, historical, religious and another 119 or so scenic and recreational high priority sites in the coastal zone enhance the economic value of the coastal zone through tourism related activities. Country's economy is also enhanced by the commercial ports, fishery harbours, anchorages (Thotupolas), fish landing sites and salterns located in this area.

Economic development and the economic growth in the coastal economy have created pressure and stress on the coastal resources. Economic growth is achieved through utilization of coastal/marine resources which are subjected to degradation and depletion as a result of unplanned development and irrational management. The future productivity of coastal resources shows a declining trend.

1.3 DEGRADATION AND DETERIORATION OF THE MARINE ENVIRONMENT

The high population density, the growing demand for food, goods and services to satisfy human needs and the concentration of a large share of development activity within the coastal region is taking a heavy toll on the natural resources of the coastal region while these cause many adverse impacts on the marine environment. Marine water pollution through land based activities, coastal erosion, degradation of marine habitats and their biodiversity and deterioration of environmental quality of sites of special significance can be considered as areas that have felt adverse effects from land based activities.

1.3.1 MARINE WATER POLLUTION THROUGH LAND BASED ACTIVITIES

The problem of marine water pollution through land based activities has been rapidly growing over last few decades. Ocean waters and coastal surface waters(including inshore areas, estuaries and lagoons, rivers and streams within the coastal region) which are integral components of the marine environment receive high pollution loads from development activities and human settlements located in and outside the coastal region. These pollutants degrade the quality of marine waters on which the economic activities such as fishery and tourism and subsistence of local communities associated with these activities depend. Adverse effects of water quality deterioration due to pollution on economic activities such as tourist industry is well evident in some coastal tourist destinations of the country. For instance, Hikkaduwa, a world famous tourist area in the southwestern coast of Sri Lanka has lost its aesthetic and recreational value due to decreases in the biodiversity of marine fauna and flora of the area which resulted from different land based activities leading to pollution.

(i) Pollution due to fishing craft- Negombo (ii), (iii)) Municipal waste dumping in the coast –Negombo/Wattala, West coast

Main sources of pollution of the marine environment include raw sewage; release of untreated or partially treated wastewater and toxic substances from industries, tourist resorts and aquaculture ponds; the dumping of solid waste in coastal areas; and contamination with waste oil from fishing boats, ships, coastal service stations and accidental oil spills. These waters also receive excessive residues of agrochemical run off from agricultural activities, and waste from squatter settlements and other domestic sources. The pollutants that reach coastal waters vary, ranging from faecal matter, visual pollutants that float or are in suspension, nutrients rich in nitrogen and/or phosphorus, toxic organic substances and heavy metals, waste oil and warm water (**Table 1.3.1.1**). These pollutants 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 also may originate from non-point sources (run-off) such as agricultural lands, sewage from built-up areas and mines which are more difficult to control, (CZMP, 2003).

Sewage pollution: Sewage pollution is a major problem in marine waters where untreated or partly treated municipal sewage is discharged into waterways that end up in the marine environment whereby the BOD levels of the marine waters are affected leading to the destruction of their biological systems. The total BOD from sewage generated by the total population of the country is 1.8 million kg BOD per day while the total BOD load generated from sewage that has potential impacts on the marine system has been estimated to be about 0.6 million kg BOD per day (Batagoda et al.,2000). Sewage contamination of surface waters is compounded by the growing urban population in coastal areas with inadequate housing and sewage disposal facilities. For instance, Moratuwa /Ratmalana area which is located south of Colombo with a population of approximately 368,000 residents, discharge 771.26 m^3 of domestic sewerage water per day (UNEP,2000).

Pollution of inland rivers due to waste disposal (lower part of the Kelani river closer to the sea mouth)

Unauthorized construction in the river bank is a major environmental problem (lower part of the Kelani river closer to the sea mouth)

Even though some of the few cities have installed sewerage system, the capacity of these sewerage systems are inadequate to cater for the entire city. For instance the Colombo Municipal Council Area had a population of 642,163 in 2001 (Department of Census and Statistics, 2001). In 1992 roughly about 19% of the Greater Colombo Population was served by sewers, 59% had on-site facilities, but about 22% of this population had none, or grossly inadequate, sewage disposal systems. The latter category - primarily from low income squatter settlements that are underserved - releases about 138 tons of sewage/day into the city's waterways (Mubarak 2000) .

Industrial Pollution: Near-shore waters, lagoons and estuaries frequently receive industrial effluents that have undergone little or no treatment, either by purposely discharging them or through run-off, leakage and seepage. Most of the industries located in the coastal area belong to either the medium or low polluting category. **Table 1.3.1.2** shows the number of industries located in coastal areas with their respective wastewater loads, inclusive of those set up under the Board of Investment (BOI). According to this, Sri Lanka has 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. This is further exemplified in **Table 1.3.1.3** which gives current estimates of process wastewater loading in an industrial area (not an exclusive industrial area) with 225 industries intermixed with residential and commercial establishments. Small Industries that deal with coconut fibre retting also have highly localised impacts on marine water pollution.

Most industries are not yet equipped with the basic infrastructure for wastewater treatment, while others are constrained in the use of available waste treatment facilities due to the high costs involved in doing so. Only a few, such as the Export Processing Zones at Katunayake (KEPZ) and Biyagama (BEPZ) have facilities for central treatment of wastewater prior to discharge (MEDIPIP, 2002).

Cement factory located near the coastal lagoon - Galle

Timber saw mills dump their waste into rivers – lower part of the Kelani River

Table 1.3.1.1: Type of pollution, sources and main adverse impacts on marine environment (Adopted from CZMP, 2003)

Type of pollution	Key sources	Adverse impacts
Faecal pollution	○ Domestic Sewage ○ Industries ○ Tourist sector ○ Aquaculture ○ Squatter settlements ○ Livestock	○ Causes diseases in fauna ○ Affects the growth of marine Flora and fauna ○ Foul odours, impairs visual aspects ○ May lead to anoxic environments
Visual pollution	○ Industries ○ Tourist sector ○ Agriculture and aquaculture ○ Squatter settlements ○ Municipal solid waste	○ Impairs visual aspects ○ Affects habitats and breeding Grounds of fauna ○ Affects growth of marine vegetation such as sea grass by reducing light penetration
Enrichment with nutrients such as nitrogen and phosphorus	○ Domestic sewage ○ Industries ○ Tourist sector ○ Agriculture and aquaculture	○ eutrophication ○ Causes decline or loss of biodiversity ○ Deteriorates water quality

Type of pollution	Key sources	Adverse impacts
	○ Squatter settlements ○ Municipal solid waste	
Organic (non-toxic and toxic) and heavy metal pollution	○ Industries ○ Tourist sector ○ Agriculture and aquaculture ○ Squatter settlements ○ Municipal solid waste	○ Bio-accumulation of substances that causes health hazards and lethal impacts ○ Decline or loss of biodiversity ○ Persistence in the marine environment for long periods ○ Affects growth and reproduction of marine fauna
Oil pollution	○ Industries ○ Boats, ships, oil spills and service stations	○ Impairs visual aspects ○ Decline or loss of marine fauna and flora ○ Affects benthic fauna with the formation of oil slicks and tar balls ○ Affects migration patterns of fauna
Thermal pollution	○ Power sector ○ Industries	○ Affects the growth of coastal and marine flora and fauna ○ Causes changes in ecosystems ○ Stimulates algal growth

Table1.3.1.2: Number of industries located in coastal areas with high or medium pollution potential and their waste loads (Source: ERM 1994 cited in Mubarak, 2000; M/EDIPIP, 2002, unpublished)

Type of industry or process	No. of units	Total wastewater load (m^3/day)	Estimated pollution load (kg/day)		
			BOD_5	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*

- Not measured * based on assumed average concentration of 100 mg/l

Table 1.3.1.3 Current estimate of process wastewater loading in Moratuwa/ Ratmalana industrial area (Source: National Water Supply and Drainage Board, 1996)

Constituent	Textile manufacturing	Metal fabricating	Food and beverages	Chemical and pharmaceuticals	Printing	Plastic and other industries	Total
Flow (m^3/day)	2,652	1.55	283	112	25	45	3,272
BOD	1,522	3.72	125	22.3	7.50	0.675	1,681
COD	3,368	206	188	62.9	16.8	3.6	3,846
Total suspended soils	316	6.20	28.3	11.20	1.88	1.8	368
Total nitrogen	385	1.55	9.91	1.68	0.375	0.540	399
Total phosphorus	9.28	0.078	1.02	0.235	0.375	0.023	11
Oils and greases	61.0	1.55	2.83	0.224	0.375	0.180	66

All units are expressed as kilograms/day unless indicated otherwise.

The adverse impacts of uncontrolled tourist industry are now becoming apparent in many coastal resorts due to the establishment of clusters of restaurants, guesthouses and other major tourist centres. The near-shore waters receive untreated sewage; sullage in the form of kitchen and laundry wastewater; and solid waste including plastics. This has caused pollution problems in most major tourist centres along the south and southwest coast. The problem of sullage is particularly perceived as a problem associated with the larger hotels [Interim Report- CRMP, 2002].

Coastal tourism is a major foreign exchange source in Sri Lanka -Nilaveli
Inset: *a beach tourist hotel-Hikkaduwa.*

Aquaculture ponds in the North-western province

The development of squatter settlements connected with tourism development is another activity of concern, as it contributes to faecal pollution which is a severe threat to recreational activities such as contact sports in marine waters. Marine pollution due to discharge of high amounts of effluents from unplanned shrimp aquaculture sites is prevalent in the North-western province of the island. This has already caused considerable pollution of the surrounding coastal areas.

High levels of nitrates and phosphates released from shrimp farms into the coastal waters have caused eutrophication of nearby watercourses in the region and also the pollution of ground water.

Negombo (Western province) is considered a major fishing area

Expansion of fishery industry contributes to the pollution of coastal waters due to improper disposal of used oil, cleaning out of fuel tanks and repair and maintenance work by mechanised fishing boats and accidental release of oil from fishing boats anchored in harbours and fish landing sites. This problem can be further aggravated to some extent by waste oil from oil tankers and discharge of oil in bilge and ballast waters around ports as shown in Table **1.3.1.4** which depicts the waste oil collected by the operators over the past five years at the Colombo Port. There have also been four moderate spills of crude oil reported in Sri Lankan marine waters (MPPA, 2002) and intrusions of tar balls on to the beaches. They pose a risk to coastal habitats and species. Waste oil from many vehicle service stations (where the vehicles are washed/cleaned etc. using various types of oil) also end up in coastal waters. There is a recognised need for these service stations to intercept the oil with separators, but most lack these devices or often defective.

'Lellama'in Negombo beach – Wholesale and retail fish market at Negombo beach

The improper handling of fish and the resultant fish waste in fishery harbours/landing sites and their subsequent decaying in the water is a matter of concern as the decaying matter can release various gases which may affect the fauna and flora living in adjacent waters. While they may

not cause serious impacts, the fish offal can result in visual pollution leading to depreciation of aesthetic quality for recreation.

Table 1.3.1.4: Amounts of waste oil collected or removed by collectors in the Colombo Port (Source: MPPA, 2002)

1997 (tons)	1998 (tons)	1999 (tons)	2000 (tons)	2001 (tons)
1403.6	1403.6	1667.5	2078.0	1878.0

Plans that are underway to establish thermal power plants in the coastal region to meet the increasing power demand may be another area of concern as such plants may result in thermal pollution of coastal waters unless adequate preventive measures have not been taken.

Pollution due to solid waste:

Environmental hazards related to solid waste have been growing in Sri Lanka during the last few decades, and continues to be a problem. The rate of waste collection by the Local Authorities island wide is estimated to be about 2,694 t/day (MOFE, 1999). but the problem is essentially urban and 54 percent of the waste is generated in the Western Province. (MOFE, 1999). A crucial problem faced by many Local Authorities is inadequate facilities for safe disposal of solid waste due to the lack of disposal sites. Waste disposal is thus mainly at open dumps, sometimes in low-lying marshy lands within the Coastal region. There are also instances 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 quality of marine waters and reduces aesthetic value.

Dumping of waste in the western beaches is a major problem -Negombo

Pollution due to agricultural /live stocks activities:

At present there is a heavy use of agro chemicals in agriculture and live stock industry, some of which are persistent. For instance, chemical fertilizer use in Sri Lanka has increased from 20,000 tons of N, P, K during 1950-51, and 195,000 tons in 1974-1975 to 525,651 tons in 1995. This

trend has continued and use had increased; by 9 per cent from 1998 to reach 612,000 ton in 1999. It is also significant that the annual average level of chemical fertilizer use in Sri Lanka is estimated to be 77kg/ha, which is relatively a higher figure (M/E&NR, 2002; Central Bank, 2000). Although there is no literature pertaining to the adverse impacts of agriculture runoff on marine waters, their heavy use in coastal agriculture as well as in agriculture practices of upstream areas and resultant runoff through 103 river basins discharging into the sea around the island is a matter of great concern as the agrochemical residues contained in the runoffs may affect the existence of marine fauna and flora through bioaccumulation. Livestock management in coastal areas as well as in upstream areas may also contribute to faecal pollution of the coastal and marine waters through direct release and resultant runoff from inland areas. Some studies done on effects of chemical fertilizers on groundwater shows alarming results and similar effects can be expected for marine waters as well. For instance, the Kalpitiya peninsula is characterised by highly permeable soils and a shallow water table and 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. Reason for this is the excessive use of chemical fertilisers which degrades the soil which absorbs contaminants in the leachate leading to pollution of ground water. In contrast, domestic wells located outside these areas have nitrate levels less than 2 mg/1 and chloride concentrations less than 100 mg/1 (Mubarak, 2000)

Pollution of marine water due to overuse of pesticides and fertiliser in the coastal areas is a major issue for concern - Kalpitiya Peninsula

1. 3. 2 COASTAL EROSION

Marine environment of the country loses or degrades its valuable resources due to coastal erosion which is a long standing problem. Erosion occurs due to both natural and human interventions. The natural processes contributing to coastal erosion include factors such as the increase in gradient of sediment transport rate, loss of sand inland due to breaching, offshore loss due to extreme wave and storm surge conditions, deposition of sand in sand spits, natural variation in the sand supply to the coast from rivers etc. (CZMP, 2003). However, the vulnerability to erosion due

to natural causes along the coast differs considerably as the underlying factors vary from place to place. In addition to the natural erosion, certain anthropogenic activities have accelerated the erosion rates along many areas of the country. These activities include both within, and inland of the coast. They include extractive (where resource are removed) and non extractive (where resources are not removed but the environment is used for an activity) actions, most of which are development oriented. Examples of extractive actions are sand mining on beaches and in rivers, sea coral mining, and removal of coastal vegetation. Among non-extractive actions are the location of buildings in close proximity to the shoreline and the construction of dams and irrigation schemes inland and construction of coastal structures (e.g. groynes, detached breakwaters, seawalls and revetments, ports and inlet jetties) (CZMP,2003).

Table 1.3.2.1 summarizes the anthropogenic activities and their impacts which contribute to coastal erosion.

Coast protection measures to protect coastal erosion - Hendala Wattala- West Coast

Effect of coastal erosion – Eththukala – North Western Coast

Effects of coastal erosion: - the shrine was earlier a part of the mainland down south

Sand mining in the rivers:

River sand mining which decreases the supply of sediment that stabilizes the shoreline has been widely acknowledged as the main cause for coastal erosion in Sri Lanka. Sand mining in rivers is most severe in the North Western, Western and Southern provinces of the country where much of the construction activity and the major coastal erosion problems are concentrated. The drastic increase in river sand mining over the last two decades is of great concern. For instance, sand mining has increased in six rivers from 1.2 million cubic metres in 1984 to 5.5 million cubic metres in 2001 (Byrne and Nanayakkara, 2002; Mangor, 2002) Overall sand mining in rivers at current rates to meet the requirements of the construction industry is clearly unsustainable, and could lead to rapid riverbed degradation and a further decrease in the supply of sand to beach nourishment as shown by the sand mining, sediment supply and deficit rates in Table 1.3.2.2 a and b (CZMP,2003)

Sand mining closer to the river sea mouth – Kelani River

Table 1.3.2.1: Anthropogenic activities with an impact on the stability of coast in Sri Lanka (Source: CZMP, 2003)

Activity		Effect on Coast	Examples of sites affected
Beach sand mining	Reduction of beach sand volume available for littoral processes	Induces beach and coast erosion	Panadura, Lunawa, Angulana and Palliyawatte
River sand mining	Reduction of river sand supply to the beach	Induces erosion of beaches and of river banks	Nilwala Ganga, Gin Ganga, Kalu Ganga, Kelani Ganga, Maha Oya and Deduru Oya
Inland coral mining	Conversion of productive land into waterlogged areas	Creates inland waste dumps and abandoned pits: reduces long-term coastal stability by creation of low-lying areas	Akurala, Kahawa, Ahangama and Midigama
Collecting coral from beaches and shoreface	Reduction in volume of beach material	Induces beach and coastal erosion	Ambalangoda to Hikkaduwa, Midigama, Ahangama and Polhena
Reef breaking or dynamiting for coral mining or fishing	Damage to the reef, reduction of reef size, creation of gaps in reef	Increases wave energy on beaches and reduces supply of coral debris to beaches resulting in erosion	Ambalangoda to Hikkaduwa, Koggala, Midigama, Polhena, Rekawa, Passikudah, Kuchchaveli and Nilaveli
Constructing buildings and infrastructure installations, etc. in close proximity to the coastline	Reduction of coastal stability	Causes loss of buildings, etc. and necessitates the performance of coast protection which may interfere with coastal processes	Hikkaduwa, Bentota, Berewala, Negambo
Maintenance dredging in access channels and port entrances	Removal of sand from the littoral budget (unless the sand is pumped back to the downstream beach)	Causes erosion in adjacent coastal stretches	Colombo Port
Sea level rise due to global warming	Generation of offshore movement of sand	Expected to cause erosion along all coastlines and to increase the frequency of flooding of low lying areas	Erosion to be expected along all sedimentary shores
Loss of coastal vegetation (e.g. due to cutting of firewood, aquaculture, grazing, and unauthorized vehicular use).	Creation of exposed areas subject to more rapid rates of wind erosion	Induces dune and coastal erosion	Palliyawatta, Koggala, Polhena, Negombo, Yala , Puttalam, Kalpitiya, Chilaw, Pothuwil,

Table 1.3.2.2:

a. Sand mining, sediment supply and deficit for the year 2001 and the period 1976 – 2001 for the rivers Maha Oya, Kelani Ganga and Kalu Ganga (Source: CZMP,2003)

(Value in million cubic meters)

River	Sand Mining		Catchment supply		Deficit.	
	2001 (1 year).	1976 – 2001	2001	1976 - 2001	2001	1976 - 2001
Maha Oya	1.8	23	0.2	5.0	1.6	18.0
Kelani Ganga	1.0	32	0.3	7.5	0.7	24.5
Kalu Ganga	1.2	12	0.4	10.0	0.8	2.0
Total	4.0	67	0.9	22.5	3.1	44.5

b. Characteristics of sand deficit and past and present supply from the rivers Maha Oya, Kelani Ganga and Kalu Ganga (value in million cubic meters)

River	Deficit relative to catchment supply		Supply to coast			
	2001 (1 year)	1976 - 2001	1976	1984	1991	2001
Maha Oya	8.0 times	3.6 times	0.2	0.15	0.1	<0.05
Kelani Ganga	2.3 times	3.3 times	0.3	0.25	0.2	<0.1
Kalu Ganga	2.0 times	0.2 times	0.4	0.4	0.35	0.3

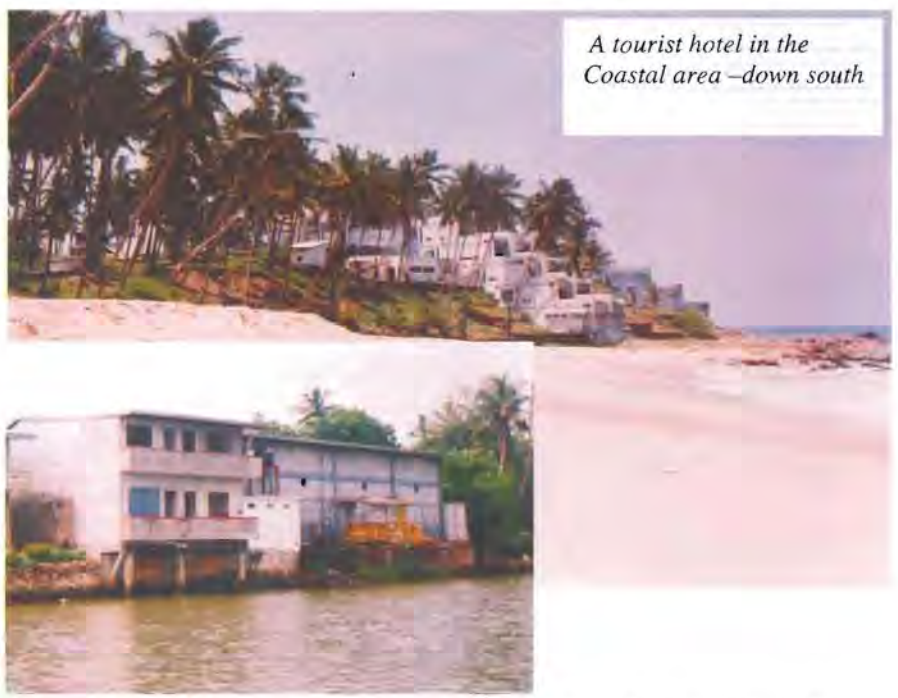
Coral mining:

Coral is the major source of quicklime for island's construction industry, supplying approximately 90% of the lime in use. Part of this is supplied by sea coral mining. Most records of sea coral mining are from the west and south coastal areas. Overall coral extraction (inclusive of inland coral mining) has increased in this region from about 18,000 tons in 1984 to 19,820 and 30,500 tons in 1994 and 1998. Even so sea coral removal has declined in the southern coastal stretch from 7,660 in 1984 to 4,020 and 2,200 tons respectively in 1994 and 1998 (CZMP,2003). This decline is attributed to the successful enforcement of the ban on sea coral mining since 1983 (Katupotha and Wickramasinghe, 1999). Despite this, sea coral mining continues to be of concern in the southwest coast, and an estimated number of 211 persons were directly engaged in mining, collecting and transporting sea corals in 1998 (Katupotha and Wickramasinghe, 1999)

Coral mining is still going on, **Inset:** *a coral lime kiln* - Sinigama, Down South

Coastal structures:

Coastal structures that interfere with the littoral transport aggravate coastal erosion. These structures induce downstream lee-side erosion relative to the direction of the net littoral transport. The fact that protection structures such as groynes, seawalls and revetments restrict natural coastal processes and may lead to further degradation of coast and the marine resources is an important aspect in erosion management.



A tourist hotel in the Coastal area –down south

A construction abating the coastal waters (Kelani river closer to sea mouth)

Constructions in close proximity to the shoreline:

Some constructions, including inadequately planned tourism and under-served human settlements have resulted in induced erosion rates while they also have contributed to pollution of the marine environment.

Left: Illegal constructions in the shore line – Panadura West coast

Right: Coast protection measures - Ahangama Down south

Inland Constructions:

There are many ways in which development landward of the coastal area contributes to degradation of marine resources. They are mostly activities having an impact on river discharge – including establishment of irrigation schemes and reservoirs - which thereby reduce the supply of sand to the coast and also change water quality of the marine environment.

1.3.3 DEGRADATION OF MARINE HABITATS AND DECLINE OF THEIR BIODIVERSITY

Most of Sri Lanka's marine habitats have been in various stages of degradation during the past five decades, resulting 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 the many dynamic processes occurring on land and in the sea, due to both natural and human-induced causes. The perceptible increase in human populations in Sri Lanka's Coastal Zone during the past two decades has caused a tremendous increase in human-induced disruption of coastal processes.

Damage and destruction of coral reefs

Famed for their spectacular beauty, coral reefs were among Sri Lanka's most valuable shallow water marine habitats. These reefs are now degraded at many sites, due to both natural causes and human impacts. Especially affected are the near-shore coral reefs in the west and south coastal areas. The major cause for coral reef destruction is the mining of corals for the lime industry

The use of destructive fishing methods such as dynamite fishing, use of 'moxy nets' to catch ornamental fish, and the use of bottom set nets on coral reefs to catch lobsters are other factors that cause damage to these habitats. Unregulated fishing effort have also reduced valuable and rare fish species inhabiting the reefs. Coral destruction in most shallow areas was evident in 1998 due to bleaching caused by high water temperature associated with 'El Nino" Southern Oscillation (ENSO) effect [CZMP, 2003].

Illegal Coral mining – Sinigama, down South

Illegal Coral mining – Sinigama, down South

Other natural events such as the proliferation of the crown of thorns starfish (*Acanthaster planci*) and other invasive species have compounded the damage to Sri Lanka's coral reefs. Table 1.3.3.1 summarizes the major threats to this valuable habitat.

Table: 1.3.3.1 Major threats to coral reefs (CZMP, 2003)

Human related causes		Natural causes
Non-site specific damage	**Site specific damage**	
▪ Sedimentation ▪ Destructive fishing practices (e.g. blast fishing using explosives, bottom-set nets, moxy nets) ▪ Uncontrolled harvesting of reef resources including food fish and ornamental fish, lobsters and other invertebrates ▪ Pollution ▪ Change of water quality	▪ Coral mining from the sea ▪ Coral damage by ramming glass bottom boats and fishing boats against reefs and anchoring boats on reefs ▪ Destructive collecting techniques for ornamental fish and lobsters such as bottom-set nets and moxy nets ▪ Urban pollution ▪ Coastal and harbour development ▪ High visitor pressure (leading to damage by trampling and removing coral) ▪ Increased levels of sedimentation due to coastal erosion ▪ Increased freshwater flow due to upstream irrigation schemes	▪ Coral bleaching ▪ Crown of thorns starfish (Acanthaster planci). ▪ Other invasive organisms such as tunicates, corallimorphs (coral anemones/ false corals) and algae (Halimeda, Caulerpa and filamentous algae) ▪ Sedimentation due to natural erosion ▪ Cyclones and monsoons

Damage to seagrass beds

The valuable seagrass beds in lagoons and coral reefs are damaged due to destructive fish harvesting techniques. There is large scale commercial trawling and drift netting over the seagrass beds that occur between Puttalam and Jaffna, while beach seining done in certain sections of this area of the coastline also affects seagrass beds. Other adverse impacts are from siltation resulting from land-based activities such as changes in catchment hydrology through irrigation schemes. In certain areas commercial polychaete harvesting to obtain broodstock feed for shrimp hatcheries also causes severe damage to seagrasss beds. Sandbar formation, either through natural causes or induced by human activity - such as siltation – may also cause degradation of seagrass beds (CZMP,2003). Table 1.3.3.2 summarises the major threats to seagrassbeds.

Sea grass beds are damaged due to fishing boats- Negombo lagoon

Fishing is major industry in the coastal areas – Bolgoda Lake, Moratuwa west coast

Table 1.3.3.2 Major threats to seagrass beds (Adopted from CZMP, 2003)

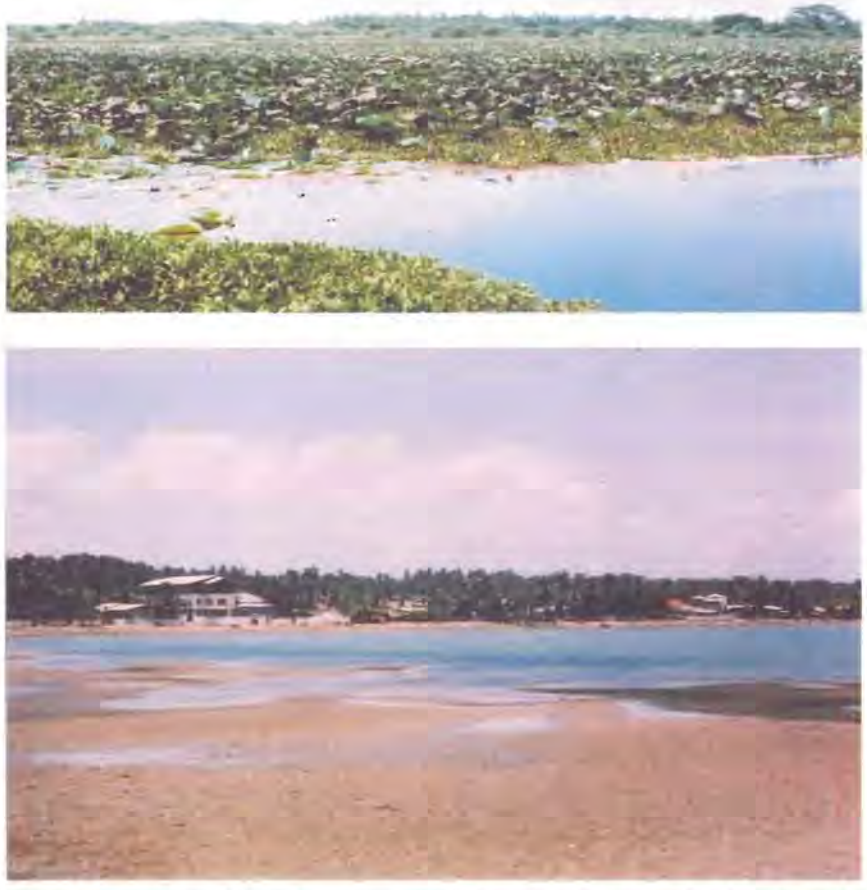
Human related causes		Natural causes
Non-site specific damage	**Site specific damage**	
▪ Sedimentation and pollution due to land based activities ▪ Destructive fishing practices (e.g. blast fishing using explosives, bottom-set nets, moxy nets in coral associated areas, push nets in estuaries/lagoons) ▪ Introduction of excessive nutrients/ agro chemicals	▪ Destructive collecting techniques (digging) for polychaete worms ▪ Urban pollution ▪ Coastal and harbour development ▪ Eutrophication - excessive algal blooms occurring as a result of high levels of nutrient inputs from upstream activities (e.g. agricultural discharges and aquaculture discharges change the seagrass beds.	Other invasive organisms such as algae (e.g. *Chaetomorpha* in the Negombo estuary) Sedimentation due to natural erosion.

Degradation of lagoon and estuarine habitats

The biodiversity of the Lagoon and estuarine ecosystems are increasingly affected by pollution due to the impact of sewage, untreated industrial effluents, urban wastes and waste oil. In the Northwestern coastal belt, lagoons and estuaries are heavily polluted due to chemical compounds from shrimp farms. Some lagoons/estuaries are degraded by coconut husk retting (e.g. Madu Ganga estuary, Bolgoda estuary, and Negombo estuary), sand mining and use for anchorage of boats. Other adverse impacts felt are increased siltation due to inland development activities in the upstream areas such as construction of dams, irrigation schemes, unplanned agriculture, infrastructure development deforestation and mining. These ecosystems are also affected by indiscriminate

harvesting of commercially important species. 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 *Salvinia molesta* (CZMP, 2003).

Other issues connected with these systems are the loss of functional lagoon/estuarine area due to unauthorised encroachment and land reclamation (e.g. the Bolgoda and Negombo estuaries, and the Mawella and Lunawa lagoons).There has also been loss of ecological and aesthetic value in some (e.g. Bentota, Negombo and 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 a matter for concern as for instance, 30,000 part-time and full-time fishermen are engaged in the lagoon/estuarine fishery in Sri Lanka (CZMP, 2003). **Table 1.3.3.3** provides specific details about the threats faced by these systems currently.



Lagoons and coastal waters are covered with salvinia and other invasive plants, Above – Chilaw North Western Province, Below- Trincomalee bay- North Eastern Province.

Table 1.3.3.3 Major threats to lagoon and estuarine habitats (adopted from CZMP, 2003)

Human related causes		Natural causes
Non-site specific damage	**Site specific damage**	
• Sedimentation • Pollution from land based activities • Fishing methods that deplete fish/ shrimp stocks • Destruction of submerged and fringing vegetation • Unauthorized reclamation and construction	• **Pollution** **Chemical** (e.g. Walawe and Valaichchenai estuaries receive major chemical and other contaminants from the two paper factories) **Oil** (e.g. The Negombo estuary: oil from fishing crafts anchored in it and boat repair and fuel supply stations along the banks) **Coir retting** (pollution of some lagoons in the southern sector. e.g. Madu Ganga estuary) **Sewage:** (e.g. illegal disposal sites for sewage in the Kelani and Negombo estuaries and the Lunawa Lagoon) **Industrial effluents** (e.g. Negombo, Kelani and Valaichchenai estuaries, Lunawa Lagoon). **Solid wastes** (Bentota, Kirama Oya and Negombo estuaries. Lunawa lagoon) • **Sand mining** - lowering the riverbed below mean sea level leads to saltwater intrusion (e.g. Kelani estuary). • **Introduction of excessive nutrients or agrochemicals** - rainwater runoffs, effluents from shrimp farms • **Over harvesting** - over extracting food fish, ornamental fish and other species • **Sand bar formation** – caused by several recent river basin development/diversion schemes which restrict and alter water flow patterns, leading to changes in water quality (e.g. Maud Gaga estuary). • **Decrease in functional size** – (e.g. Negombo, Lunawa and Kalametiya estuaries) • **Upstream irrigation schemes** - Change of water quality and quantity in estuaries/lagoons • **Poorly controlled salterrn and aquaculture development** (e.g. Puttalam estuary) • **Improper irrigation structures**	• Sand bar formation • Invasive plants • Shifting of the lagoon mouth

Damage and destruction of mangrove areas

Extensive damage to the naturally fragmented mangrove swamps has been caused by the conversion of large mangrove areas to other uses - such as shrimp culture, lowland agriculture and housing construction. Overall, there has been about a 39% reduction of the mangrove cover between 1986 and 2002, with over 2,750 ha of mangrove area being lost in the Puttalam district due to various activities during this period. The increase of b Sea grass beds have been damaged due to the destructive fish harvesting techniques currently in practice and during harvesting of polychaete worms for commercial purposes. rackish water shrimp culture and expansion of salterns during the past decades particularly underlie much of the encroachments into mangrove areas. There is also over-use of resources from mangrove areas). For example the extraction of poles and fuel-wood for domestic use and twigs for brushpile fishery is beyond sustainable levels. Mangrove ecosystems are also degraded by water pollution and siltation (CZMP, 2003). **Table 1.3.3.4** provides specific details about the threats encountered in these areas currently.

Table 1.3.3.4 Major threats to mangroves (Source: CZMP, 2003)

Human related causes	
Non-site specific damage	**Site specific damage**
• Clearing and filling for housing development	• Clearing for urban and industrial development (e.g. Negombo, Muthurjawela) • Clearing for shrimp culture (in the North Western province) • Erosion of banks (due to operation of high speed boats) of estuaries/lagoons destroy mangroves adjoining the water edges (e.g. Madu ganga, Kaluwamodara) • Change of water regimes (e.g. in Kalametiya, the mangroves are dying as a result of salinity reductions

1. 3. 4 DEGRADATION OF ENVIRONMENTAL QUALITY OF SITES OF SPECIAL SIGNIFICANCE

The degradation of environmental quality of historic, cultural and religious as well as scenic and recreational sites have a direct impact where physical damage is caused to the sites within the marine environment together with the adverse impacts to the water quality of the marine environment which in turn affects many designated uses of the coastal and marine waters. All these adversely affect the economic development of the country.

Old Dutch Fort in Galle is an archaeological monument in the island

Physical damage is caused to the sites by coastal erosion, accelerated both due to natural causes as well as human induced activities and this is quite evident in some sites such as Godawaya, Muhudu mahavihara and Arippu and similarly, encroachment and resultant vandalism is evident at places such as the Dutch Church at Kalpitiya, King Sri Wikrama Rajasinghe's rest at Mutwal [CZMP, 2003].

Kirinda in Down South is a place of Historical significance.

The unplanned and unauthorised development activities and settlements associated with high priority archaeological, historic, religious and cultural sites, not only degrade the quality of sites, but they also degrade the

water quality of adjacent marine waters as many pollutants including sewage, solid wastes etc. from these activities and settlements finally end up in the marine waters.

Hummanaya, in Kudawella, Tangalle is a place of special significance, down South.

1.4 MANAGEMENT OF THE MARINE ENVIRONMENT

Degradation of environment due to human induced activities had been recognized as far back as British colonial administration and since then the legislation pertaining to conservation of the environment has been introduced and implemented. Many statutes that had provisions relating to the environment, land use, water, fauna and flora, and waste disposal which also covered the marine environment came into operation over the last several decades (M/E&NR,2002).

The firm commitment of the state for environment conservation is shown in the 1978 (current) Constitution of the Democratic Socialist Republic of Sri Lanka, through Article 27(14), which decrees "The state shall protect, preserve and improve the environment for the benefit of the community". Article 28f also states "The exercise and engagement of rights and freedom is inseparable from the performance of duties and obligations, and accordingly, it is the duty of every person in Sri Lanka to protect nature and conserve its riches" (MOENR, 2002).

While the National Environment Act (NEA) No. 47 of 1980 constitutes the first comprehensive legislation on environmental management, the Central Environment Authority (CEA) which was established under the NEA was mandated regulating environmental management and to control environmental pollution and to mitigate the adverse impacts of development activities.

A landmark in environmental management in Sri Lanka was the creation of a separate Cabinet Ministry for environmental affairs in 1990. Currently it constitutes the Ministry of Environment and Natural Resources. The Ministry is mandated for facilitating sustainable development by the

promotion of sound environmental management, and formulating all policies at the national level.

Management of coast and its resources needed a special attention in view of the magnitude of coastal erosion and other natural resource related problems. First systematic efforts to manage the coastal resources in Sri Lanka commenced in the 1978 with the setting up of Coast Conservation Department (CCD) and the enactment of the Coast Conservation Act of 1981.

While these key institutions play a major role in the protection of environment, there are a multitude of state mechanisms comprising departments, commissions and agencies that deal with various aspects of coastal and marine environmental management at national level. Notable among these are the Forest Department, the Department of Wildlife Conservation (DWLC), the National Aquatic Resources Research and Development Agency (NARA), the Department of Fisheries and Aquatic Resources, National Aquaculture Development Authority (NAQDA), Geological Surveys and Mining Bureau (GSMB), National Water Supply and Drainage Board (NWS&DB), Marine Pollution Prevention Authority (MPPA), Department of Agriculture etc. There are national and sectoral policies adopted by different institutions in environmental management that have positive impacts on the protection of coastal and marine environment. Notable among these are;

- NATIONAL ENVIRONMENTAL POLCY
- INDUSTRIAL POLLUTION MANAGEMENT POLICY
- NATIONAL LAND USE POLICY
- NATIONAL CLEANER PRODUCTION POLICY
- COASTAL RESOURCES MANAGEMENT POLICY
- PROPOSED WATER RESOURCE POLICY
- NATIONAL STRATEGY FOR SOLID WASTE MANAGEMENT
- URBAN POLICY FRAMEWORK
- NATIONAL FOREST POLICY
- CLEAN DEVELOPMENT MECHANISM (CDM) POLICY (DRAFT)
- ORGANIC AGRICULTURE POLICY
- FISHERIES POLICY
- NATIONAL AGRICULTURE FOOD AND NUTRITION POLICY
- PROPOSED WATER POLICY
- NATIONAL POLICY ON AIR QUALITY MANAGEMENT
- TOURISM POLICY
- NATIONAL WILDLIFE POLICY

1.4.1 ENVIRONMENTAL LEGISLATION TO PROTECT THE MARINE ENVIRONMENT

As at present, Sri Lanka has over 80 laws that are directly concerned with conservation of the environment and pollution abatement and control, and many others that are concerned with management of land, soil, water, etc. or impinge on the environment due to agriculture, transport and tourism development, urban expansion, etc[(MOENR,2002)]. Most of these have legal provisions to cover the marine environment and its resources, some of which such as the coastal resources management policy acts directly.

Administration and/or implementation of these laws are vested with numerous government institutions and in most instances the responsibility of implementing and administering a legislation enacted is divided among different agencies, each having responsibility for a small area of the resource in question. This hinders the efficient enforcement of these laws which is identified as a crucial issue. One other setback that has been experienced with regard to environment-related laws is that certain laws have not been implemented since their enactment due to reasons such as lack of administrative (enforcement) mechanisms. Some laws pertaining to actions such as encroachment on public property (forests and reservations), illicit felling of timber, unauthorised mining of gems or coral, and indiscriminate use of steep slopes, river banks, stream reservations, etc. which are offences liable for severe punishment cannot be strictly implemented due to lack of political support. In addition, gaps exist in the laws that make enforcement difficult and some of the laws contradict each other.

Some of the most important environmental related laws that have direct or indirect provision for the protection of marine environment are explained briefly in Table 1.4.1.

Pollution due to waste oil from fishing boats is a serious environmental problem. Fishing harbour – Beruwala- West Coast

Table 1.4.1: The main legislation relating to environmental conservation and management in Sri Lanka (SOURCE: M/E&NR, 2002)

Legislation	Conservation measures
Soil Conservation Act, No.25 of 1951; amended in 1996	The Act empowers the Director of Agriculture to undertake surveys and investigations to be made for the purposes of ascertaining the nature and extent of land degradation due to various factors including floods, droughts, salinisation, desertification, siltation and soil erosion. It also empowers the Minister to declare and acquire 'erodible areas', to specify measures regulating the use of land in such areas and to acquire land for carrying out measures to prevent erosion. As this Act was inadequate to meet present day demands for a number of reasons, the deficiencies have been rectified in the Amended Act of 1996. Accordingly there has also been a shift of focus from the control of soil erosion to land resource management, while covering damage by floods, stream bank erosion, salinity, alkalinity and water logging. One of the major shortcomings in soil conservation legislation has been identified as the lack of provision to integrate the application of soil conservation measures on a watershed basis.
Land Development Ordinance No 19 of 1935; and its subsequent amendments	Under this Ordinance, the Minister responsible for land development may, by notification published in the Gazette, declare that any state land is constituted as a state reservation for anyone or more of stated public purposes, including for prevention of the erosion of the soil. This law provides for the systematic development and alienation of state land, for which a Land Commissioner is appointed, who apart from the duties and functions assigned to him under the Ordinance, is responsible for the general supervision of land officers in the administration of state land. Under this law there is no mechanism for monitoring the use of land at high elevations, regulating the alienation and unauthorised use of land on slopes and hilltops.
Land Grants Special Provisions Act No 2 of 1979	This Act provides for the transfer to the state land vested in the Land Reform Commission and the transfer of this vested land, free of charge, to landless persons. The transfers are subject to certain conditions, one of which is the stipulation tha1 transferee should carry out on his land, such soil conservation measures which District Secretary may require him to do from time to time.
Mahaweli Authority of Sri Lanka Act No.23 of 1979; and amendment No. 59 of 1993.	This Act has provision for the Mahaweli Authority to have the power to take measures as may be necessary for watershed management and control of soil etc. in the relevant lands under its purview.
Flood Protection Ordinance No 4 of 1924	This Ordinance deals with protecting areas subject to damage from floods; notably areas declared to be a flood area by the Director of Irrigation

Legislation	Conservation measures
Water Resources Board Act No29 of 1964	This Act decrees that 'It shall be the duty of the Board to advise the Minister on specific matters, and on any other matters that are referred to the Board for advice by the Minster. This Act also provides for the appointment of a Water Resources Board, which is responsible for advising the relevant Minister on the use of water resources, maintenance of irrigation schemes, drainage, flood control, hydropower, promotion of a forestation, control of soil erosion, prevention of pollution of rivers and other water courses, formulation of national policies on the use of water resources, preparation of plans for conservation and use of water resources. However, it does not empower the Board to act or intervene in any of these areas. The Board is responsible to advise the Government on means for prevention of the pollution of rivers, streams and other water sources; to formulate national policy and legislation relating to the disposal of sewage and industrial wastes; and to take adequate steps to enforce such laws.
National Aquatic Resources and Development Agency Act, No.54 of 1981	This Act was enacted to establish the National Aquatic Resources and Development Agency (under the Ministry of Fisheries in 1981) as the premier national institute to carry out and coordinate research, development and management activities on the subject of aquatic resources, including freshwater and oceanic resources available for economic use, including fisheries resources
National Water Supply and Drainage Board Act No.12 of 1974	This provides for the establishment of the NW&SDB which has to develop and operate an efficient water supply for public, domestic and industrial purposes; to operate and coordinate an efficient sewerage system; to distribute or sell water in bulk; and to take over and operate any existing water supply and sewerage system transferred to the Board. However, the implementation of the provisions of the law is far from effective.
Irrigation Ordinance No.32 of 1946; Irrigation Act No 1 of 1951 and its subsequent amendments	This Act covers all matters connected with irrigation and paddy cultivation within irrigation schemes. It deals with the legal provisions concerning the prevention of and misuse of water, and specifically prohibits water wastage.
Crown Lands Ordinance	The right to use, manage and control water in any public lake or stream has been vested in the State under Section 72 of the Ordinance. Thus the occupant of a land on the bank of any public lake or public stream has a right to the water in that lake or stream for domestic use, livestock or agricultural purposes provided that it is extracted by manual means. However, all beds of public streams and lakes belong to the state and their use is allowed only by a permit
Colombo District (low lying areas) Reclamation and Development Board Act of 1968 and the Amendment – Sri Lanka Land Reclamation and Development Cooperation Act No. 52 of 1982.	Under this Act the Sri Lanka Land Reclamation and Development Corporation is the authority responsible for the maintenance of canals in Colombo, but enforcement is poor. At present canal banks are extensively encroached by squatters and shanty dwellers while industries on the banks discharge industrial wastes directly into the canals. Powers to prevent encroachments and abuses are vested in the Local Authorities.

Legislation	Conservation measures
Mines and Minerals Act No. 33 of 1992	This Act was introduced to liberalise the minerals sector and to attract investments. It has also provided for the restructuring of the former Geological Survey Department and the establishment of the Geological Survey and Mines Bureau to administer the Act, and to regularise the mining industry by issuing licences in this sector.
Coast Conservation Act No. 57 of 1981 and the amendment No.64 of 1988	The Act requires the Coast Conservation Department to survey the Coastal Zone and inventorise the resources available therein, including coastal ecosystems and material regularly removed for commercial or industrial purposes from this area, and to draw up Coastal Zone Management Plans periodically. The Act vests the administration, custody and management of the coastal *zone* in the state, while the responsibility of administering and implementing the Act devolves on the Director of the Coast Conservation Department who has to issue permits for all development activities undertaken within the coastal zone.
Agrarian Services Act No.58 of 1979 and its subsequent amendments and the new Agriculture and Agrarian Services Act of 1999	This Act has provisions for the Commissioner of Agrarian Services to specify and ensure that the owner, cultivator or occupier of any agricultural land carries out, in addition to such other duties as the Commissioner may in his discretion specify, measures for proper maintenance of the land to ensure the maximum conservation of soil and water. This act has been updated to regularize land among farmers, and to empower grass-root level organizations involved in the agricultural sector through institution building
Plant Protection Act No.35 of1999 (replacing Plant Protection Ordinance No.10 of 1924).	This Act controls the introduction of noxious plants, pests and diseases of plants into Sri Lanka. The Director of Agriculture is the administering authority under this Act. However, this Act needs revision to ensure that it addresses alien invasive species, GMOs, and IMOs more comprehensively.
The Forest Ordinance No.16 of 1 907, and its subsequent amendments (a new Forest Conservation Act is in the draft stage)	The Forest Department is responsible for the implementation of this Ordinance which has been subject to many revisions to make provision for the protection of state forests from unlawful felling, clearing, encroachment, and removal of produce, etc; the declaration of forests as Reserve Forests; the control of felling and other forms of exploitation in forests and the transportation of timber. The recent amendments have created Conservation Forests. Despite this, enforcement of the Forest Ordinance has not been fully effective, as seen by the illicit felling and encroachment that continue to occur in the state forests.
The Fauna and Flora Protection Ordinance No.2 of 1937 and subsequent amendments including Act No. 49 of 1993 (currently under revision)	The Department of Wildlife Conservation is primarily responsible for the implementation of this Act. Under it, six categories of wildlife reserves are recognised. In addition, the Act besides protecting animal and plant life within the national reserves also has provision to protect certain categories of animals and plants wherever they are found. The act also states the penalties for violation of the law. However, enforcement of this Act too remains week.

Legislation	Conservation measures
Felling of trees control Act No. 9 of 1951	This Act makes provision for the prohibition, regulation or control of the felling of specified valuable tree species, including cultivated species such as jak.
The National Heritage Wilderness Area Act No.3 of 1988.	This Act has been enacted to enable the preservation of unique natural ecosystems under the jurisdiction of the Forest Department and the genetic resources found in them.
The Botanic Gardens Ordinance No.31 of 1928	This deals with *ex.situ* conservation of plants, and concerns the management. administration of botanic gardens
The Fisheries and Aquatic Resources Act No.2 of 1996 (a new revision is underway)	This Act replaces the Fisheries Ordinance No.24 of 1940, and promotes measures for the integrated management, regulation, conservation and development of fisheries and aquatic resources in Sri Lanka and addresses the protection of fish and aquatic resources, including permitting the state to set aside marine areas as fisheries reserves where necessary for replenishments of wild stocks. A new revision is underway.
Town and Country Planning Ordinance No.13 of 1946	This law governs the functions of the Town and Country Planning Department on land use planning and zoning, and deals with the planning and development of land in the country; the protection of natural amenities, and the preservation of buildings and objects of interest or beauty. Environmental considerations have been included in the law to ensure proper sanitary conditions and conveniences; and the preservation of buildings and places of architectural, historical or artistic interest and places of beauty, Both the human environment and the natural environment are covered by this Law,
Housing and Town Improvement Ordinance No.19 of 1950	This Ordinance regulates the construction of buildings and the demolition of ruined buildings. Standards have been specified for buildings, rooms and streets. This is the only law which specifies standards to be adopted in building activities. This Ordinance spells out different improvement schemes to be carried out for housing and improvement.
Urban Development Authority Law No 37 of 1978, as amended by subsequent Acts, the recent ones being Act No 44 of 1984 and Act No. 4 of 1992	This Law served to establish the Urban Development Authority (UDA) to promote the integrated planning and implementation of social, economic and physical development of areas declared as "Urban Development Areas". The Act provides for the development of environmental standards and schemes for environmental improvement in areas identified as UDA areas.

Legislation	Conservation measures
The National Environmental Act No.47 of 1980 and the amendment No.56 of 1988 (a new National Environmental Protection Act is being drafted),	The NEA served to create the Central Environmental Authority, while its amendment of 1988 empowers all project approving agencies to obtain an Environmental Impact Assessment (EIA) from any developer for prescribed developmental projects, The NEA has also provided for the establishment of District Environmental Agencies (DEAs) each administrative district for devolution of powers to the regions in relation to environmental management through the Provincial Councils and the DEAs, The Act updates the existing legislation while introducing new concepts in relation to pollution abatement.
Marine Pollution Prevention Act No.59 of 1981	This Act enabled the establishment of the Marine Pollution Prevention Authority (MPPA) and provides for the prevention, reduction and control of pollution in Sri Lankan Waters and for giving effect to international conventions that Sri Lanka is a signatory for prevention of pollution of the sea.
The Motor Traffic Act	On mobile sources, the Motor Traffic Act appears to be the only legislation in force. The statute does not mention air quality as such, but it authorizes the issuance of regulations that may prescribe "any condition or requirement not expressly provided for in this Act, as to the construction of equipment and use of all, or any, specified class or description of motor vehicles.
Tourist Development Act No. 14 of 1968	Allows the Ceylon Tourist Board (CTB) to regulate locations, constructions and operations of tourist activities through CTB guidelines.
North Western Provincial Environmental Authority Statute	Enacted under the provisions of the Provincial Councils 13th Amendment to the Constitution of Sri Lanka
Provincial Environmental Statutes	Deal with provincial environmental issues

1.4.2 Projects/ programmes for protection of the environment

There are several on-going/ completed site specific projects that had been implemented with a view to minimize environmental degradation while enhancing the economic development of the country. Details of the projects are given in Annex 1.

PART 2 - THE NATIONAL ACTION PLAN

2.0 PREAMBLE TO THE NATIONAL ACTION PLAN PREPARATION PROCESS

The Global Programme of Action for the Protection of the Marine Environment from Land -based Activities (GPA) offers a framework methodology for establishing national and regional programmes of action. Sri Lanka has followed this methodology in developing its National Programme of Action for the Protection of the Marine Environment from Land -based Activities (NPA). This methodology involves a six-step process.

1. Identification and assessment of problems
2. Establishment of priorities for action
3. Setting goals and management objectives
4. Identification, evaluation and selection of strategies and actions
5. Identification of criteria for evaluation of effectiveness
6. Development of programme support elements

The GPA recommends that the identification and assessment of land based activities include consideration of the severity of the problem in relation to:

- food security and poverty alleviation;
- public health;
- coastal and marine resources and ecosystem health including biodiversity and
- Economic and social benefits and uses, including cultural values

In addition, GPA also recommends to consider the sources of degradation (such as point or non- point) and the specific areas affected (such as critical areas).

The NPA of Sri Lanka has adopted three important concepts in its formulation.

a. In the classification of marine environment, the NPA has incorporate ocean waters and coastal surface waters (including inshore areas, estuaries and lagoons, rivers and streams within the coastal region) and the resources within them as land based activities have adverse impacts on all these systems.

b. The coastal region is the other important concept in the NPA as majority of activities are located and occur within the coastal region that have direct or indirect effects on the marine environment. There is no clearly stated definition for the coastal region of Sri Lanka. The coastal region is generally viewed as the area of Divisional Secretariat Divisions with maritime boundaries which are in close proximity to the coast. At present Sri Lanka has been divided into 25 administrative districts comprising 324 Divisional Secretariat (DS) divisions. Of the 25 districts, 14 have maritime boundaries representing 74 DS divisions. In addition to the activities in the coastal region, specific land based activities well beyond the coastal region that have considerable impacts (e.g. Upstream agriculture and livestock practices) on the marine environment were also given due consideration in the NPA.

c. The NPA distinguishes between activities affecting the marine environment that are land based and that are of marine origin. Land based activities are those taking place directly on land or that are connected to the land. In addition, there are a number of activities in nearshore waters/ marine origin (e.g. sea coral mining, sand mining) that can affect the marine environment. Therefore they have been included as land based activities.

In Identification and assessment of problems for the NPA, field surveys and a participatory approaches were adopted. Field surveys were carried out for preliminary identification and assessment of problems followed by national stakeholder workshops where identified problems were further analyzed and prioritized giving due consideration to GPA guidelines. These national stakeholder workshops which comprised of representatives from all relevant stakeholder groups associated with identified problems (a list of national stakeholder participatory group is given in Annex 1) also provided forum to identify, evaluate and select management objectives, policies and actions for the prioritized problems. The first draft of the NPA was prepared following these workshops and regular consultative meetings of a core-group which comprised of members from relevant ministries/ institutes/ organizations/ agencies enabled the scrutinisation and amendment of the NPA. A final national stakeholder workshop was held for the finalization of the NPA.

2. 1 IDENTIFICATION AND ASSESSMENT OF PROBLEMS

Marine water pollution, coastal erosion, degradation of marine habitats and their biodiversity and deterioration of the environmental quality of coastal and marine sites of special significance have already been major concerns of the Government of Sri Lanka and various steps have been already taken to mitigate these problems in different scales. Nevertheless they are still continued to be areas of priority, playing a major role in adversely affecting the marine environment of the country. Therefore, these four areas have been identified as principal areas in formulating a NPA for the protection of the marine environment from the land based activities

2.2 ESTABLISHMENT OF PRIORITIES FOR ACTION RELATED TO MAIN AREAS OF CONCERN

Priority issues connected with the four areas of concern, based mainly on the magnitude and the severity of their impacts are identified on a priority basis.

2.2.1 Marine water pollution

The need for a more effective marine water pollution control system is a primary concern. Actions are required to control/reduce/mitigate the impacts of pollution caused by different sources. The major sources for marine water pollution that need immediate attention are,

a) Sewage pollution
b) Industrial pollution
c) Pollution by uncontrolled dumping of solid waste
d) Pollution by unplanned aquaculture
e) Pollution by unauthorized, underserved settlements and structures
f) Pollution by undesirable agriculture/livestock practices in upstream areas

2. 2. 2 Coastal erosion

Considering the magnitude of damage caused by the activities that induce coastal erosion, which causes deterioration of marine habitats, immediate steps have to be taken to control/ reduce/mitigate the adverse impacts caused by them. The issues/activities to be dealt with are,

a) Sand mining
b) Sea coral mining
c) Destruction of vegetation

2.2.3 Degradation of marine habitats and their biodiversity

In this regard, the challenge faced is to manage the development and use of natural habitats in a manner that will provide sustainable yields. It requires immediate intervention in activities that cause degradation of habitats and depletion of marine resources that are identified as,

a) Destruction/overexploitation of the resources within marine habitats
b) Conversion of marine habitats to other purposes and
c) Marine habitat alteration caused by upstream activities

2.2.4 Deterioration of environmental quality of sites of Special significance

Problems associated with the deterioration of environmental quality of sites of special significance which have an impact on the marine environment that call for immediate action include

a) Haphazard disposal of solid wastes
b) Lack of proper infrastructure facilities and
c) Disposal of waste oil and other chemicals by boats shipwrecks etc.

2.2.5 Pilot projects

This action plan has prepared six pilot project proposals for immediate action the details of which are given in Part 3 of the NPA.

PROJECTS IDENTIFIED ARE:

1. *Pilot Project on Solid Waste Management Programme for Wattala Pradeshiya Sabha, Gampaha District, Western Province, Sri Lanka.*

2. *Pilot Project on the Selection and Design of an Appropriate Sewage System for New and Improved Settlements under the Lunawa Environment Improvement and Community Development Project, Western Province, Sri Lanka.*

3. *The Economic Significance of the Coastal Region of Sri Lanka in the Context of Social, Political and Environmental Changes Occurred during the Last Decade.*

4. *Pilot Scale Environmentally Sound Zoning Plan for Aquaculture Development in the Hambantota District in the Southern Province to overcome Unplanned Aquaculture Development in the Future.*

5. *Pilot Project to Control River Sand Mining in the Deduru Oya River Basin to Mitigate Marine & Coastal Environmental Degradation in the North Western Province, Sri Lanka.*

6. *The study on assessment of squatter settlements and their linkages to coastal from Negombo to Kalutara.*

2.3 SETTING UP GOALS, MANAGEMENT OBJECTIVES AND POLICIES FOR PRIORITY ISSUES RELATING TO CRITICAL AREAS OF CONCERN

On the basis of the identified priority issues, the management objectives for those identified priority issues and the policies adopted to achieve the objectives are as follows.

2.3.1 Management objectives and policies to control marine water pollution

2.3.1.1 OBJECTIVE

MAINTAIN THE QUALITY OF MARINE WATERS BY MINIMIZING THE ADVERSE EFFECTS OF POLLUTION, CAUSED BY LAND BASED ACTIVITIES.

2.3.1.2 POLICIES

a. SEWAGE POLLUTION

Reduce sewage pollution in critical marine waters through appropriate mechanisms.

b. INDUSTRIAL POLLUTION

i. Support high polluting industries that significantly degrade the quality of marine waters, to promote the use of pollution abatement/cleaner production technologies and assist to relocate high polluting industries that are situated outside industrial estates.

ii. Maintain relevant standards for effluent discharges from all existing development activities in industrial areas to ensure the maintenance of water quality standards for designated uses of marine waters.

c. POLLUTION BY UNCONTROLLED DUMPING OF SOLID WASTE

Promote solid waste management within critical areas of the coastal region and hinterland to minimise the degradation of quality of marine waters.

d. POLLUTION BY UNPLANNED AQUACULTURE

Minimize marine water pollution caused by unplanned aquaculture practices through regulations and good aquaculture practices.

e. POLLUTION BY UNAUTHORIZED, UNDERSERVED SETTLEMENTS AND STRUCTURES

Reduce marine water pollution caused by unauthorised, underserved settlements and structures in identified areas through regulatory mechanisms.

f. **POLLUTION BY UNDESIRABLE AGRICULTURE/ LIVESTOCK PRACTICES IN UPSTREAM AREAS**

Minimise adverse impacts caused by undesirable agriculture and livestock practices in upstream areas to marine waters, through integration of coastal management with watershed management in identified areas.

2.3.2 Management objectives and policies to control coastal erosion

2.3.2.1 OBJECTIVE

CONTROL OF COASTAL EROSION THROUGH ENHANCEMENT OF BEACH STABILITY BY CONTROLLING/ REDUCING/PREVENTING ANTHROPOGENIC ACTIVITIES THAT INDUCE COASTAL EROSION.

2.3.2.2 POLICIES

a. **SAND MINING**

i. Regulate river sand extraction with community collaboration and participation.

ii. Promote Introduction of alternative sources of sand and alternative employment opportunities to reduce/minimise river sand mining.

b. **SEA CORAL MINING**

Protect sea corals through participatory management systems.

c. **DESTRUCTION OF BEACH VEGETATION**

Restore coastal vegetation in critical sites to promote beach stability.

2.3.3 Management objectives and policies to control and mitigate the degradation of marine habitats and their biodiversity

2.3.3.1 OBJECTIVE

MAINTAIN THE QUALITY OF MARINE HABITATS AND PRESERVE THEIR BIODIVERSITY BY MINIMIZING DESTRUCTION /OVEREXPLOITATION OF RESOURCES AND CONVERSION OF THE HABITATS.

2.3.3.2 POLICIES

a. **DESTRUCTION/OVEREXPLOITATION OF THE RESOURCES WITHIN MARINE HABITATS**

Prevent or reduce destruction/overexploitation of resources in specifically identified marine habitats with community participation and collaborative action through appropriate participatory approaches, management strategies / market instruments.

b. **CONVERSION OF MARINE HABITATS**

Prevent or reduce conversion of marine habitats in identified areas through collaborative actions with local authorities and communities.

c. **MARINE HABITAT ALTERATION DUE TO UPSTREAM ACTIVITIES**

Reduce habitat alteration due to upstream activities in identified marine areas.

2.3.4 Management objectives and policies to control deterioration of environmental quality of sites of special significance

2.3.4.1 OBJECTIVE

MAINTAIN THE ENVIRONMENTAL QUALITY OF SITES OF SPECIAL SIGNIFICANCE BY ENHANCING FACILITIES FOUND WITHIN THE SITES AND THROUGH REGULATORY MEASURES.

2.3.4.2 POLICIES

a. HAPHAZARD DISPOSAL OF SOLID WASTES

Environmentally friendly solid waste disposal systems will be promoted with community participation.

b. LACK OF PROPER INFRASTRUCTURE FACILITIES

Enhance the environmental quality of selected sites with special significance through development/improvement of infrastructure facilities.

c. DISPOSAL OF WASTE OIL AND OTHER CHEMICALS

Minimise the disposal of waste oil and other chemicals that damage the environmental quality of sites of special significance through regulatory measure

Old Dutch port at Galle - down South

2.3 IDENTIFICATION, EVALUATION AND SELECTION OF STRATEGIES AND ACTIONS AND IDENTIFICATION OF CRITERIA FOR EVALUATION OF EFFECTIVENESS

On the basis of the identified priority areas, issues, management objectives and policies, strategies and measures/actions with performance indicators are outlined in this section.

2.4.1 PRIORITY AREA: MARINE WATER POLLUTION

OBJECTIVE

Maintain the quality of marine waters by minimizing the adverse effects of pollution caused by land based activities.

Issue: SEWAGE POLLUTION

POLICY

Reduce sewage pollution in critical marine waters through appropriate mechanisms.

STRATEGY

Reduce sewage pollution in critical marine waters in collaboration with respective authorities and communities through proper sewage treatment and disposal methods and by introducing appropriate market based instruments.

Proposed actions	Performance indicators
1) Assist the selected Local Authorities of Negombo, Marawila, Seeduwa, Wadduwa, Unawatuna, Waikkala, Beruwala, Moratuwa - Ratmalana, Wattala- Peliyagoda and Galle in reducing sewage contamination by improving sewage treatment and disposal methods with the assistance from the associated communities and private entrepreneurs. (N.B. sites are based on tourism sector master plan). Two Pilot projects to be implemented in two areas from the above list, based on the commitment of local authorities)	▪ 75% increase in the number of households connected to proper sewage disposal facilities within the next 5 years in the four identified municipal areas ▪ Reduction in cost of water treatment ▪ Improvement of water quality in selected locations, from water quality ▪ Reduction in the frequency of occurrence of vector borne diseases/epidemics ▪ 10% increase in the allocation of local authority budget towards proper sewage collection and treatment
2) Ensure sustainability of sewage pollution control by introducing appropriate market based instruments.	▪ Number of market based instruments developed and implemented
3) Secure partnerships of local authorities and private entrepreneurs in sewage pollution control.	▪ Number of projects implemented with local authority - private entrepreneur partnerships

ISSUE: INDUSTRIAL POLLUTION

POLICY 1

Support high polluting industries that significantly degrade the quality of marine waters, to promote the use of pollution abatement/ cleaner production technologies and assist to relocate high polluting industries that are situated outside industrial estates.

STRATEGY

Identify high polluting industries emitting effluents that degrade the quality of coastal and marine waters and assist such industries by providing with appropriate pollution abatement/ cleaner production technologies and/or financial incentives; encourage relevant authorities responsible for relocation of high polluting industries that are situated outside industrial estates.

Proposed actions	Performance indicators
1) Facilitate access to information on technology on pollution abatement and on cleaner production and formulate a programme of action including financial assistance to promote Cleaner Production and Environmentally Sound Practices to industries	▪ Number of industries adopting Cleaner Production (CP) Principles ▪ Number of industries adopting pollution abatement technologies ▪ Number of industries certified with ISO 14000 ▪ A mechanism for financial incentives established.
2) Assist and facilitate the Ministry dealing with industries, other relevant industrial development institutions and the Ministry of Finance to provide possible financial incentives to relocate high polluting industries that are situated outside industrial estates.	▪ Number of relocated industries ▪ A mechanism for financial incentives established. ▪ No of industries complying to EPL regulations
3) Carry out an assessment of the existing industries to identify inappropriate siting of industries in collaboration with CEA, BOI and Ministry of Industries.	▪ Inventory prepared

ISSUE: INDUSTRIAL POLLUTION

POLICY 2

Maintain relevant standards for effluent discharges from all existing development activities in industrial areas to ensure the maintenance of water quality standards for designated sites in the marine areas.

STRATEGY

Carry out regular monitoring of water quality in coastal waters of industrial areas.

Proposed actions	Performance indicators
1) Assess the existing industrial estates to identify non –compliance.	▪ Compilation of a data base on non -complying industries
2) Initiate water quality-monitoring programmes to capture high incidence of pollution o selected water ways.	▪ A monitoring programme established and operational
3) Design and implement a programme of action to ensure that development activities likely to pollute the marine waters adhere to CEA standards on disposal of effluents.	▪ A programme of action is formulated and implemented

ISSUE: POLLUTION BY UNCONTROLLED DUMPING OF SOLID WASTE

POLICY

Promote solid waste management within critical areas of the coastal region and hinterland to minimise the degradation of quality of marine waters.

STRATEGY

Prepare and implemented site specific plans for solid waste management for critical sites.

Proposed actions	Performance indicators
1) Identify five critical urban centres with industries/ coastal tourist centres/ fishing harbours along the coast for which solid waste plans are most urgently needed and formulate site specific plans for solid waste management.	• Five plans formulated for selected sites
2) Assist the relevant agencies to implement plans.	• Reduction of volume of waste in selected locations by 25% within the next five years
3) Update the database on solid waste collection.	• Updated solid waste collection data base
4) Assist Local Authorities to identify environmentally friendly disposal methodologies for final disposal of waste in environmentally less vulnerable locations.	• More environmentally friendly disposal methodologies are made available for fina disposal of waste • Number of local authorities refraining from open dumping • Number of public complaints on open dumps reduced
5) Encourage and assist relevant Local Authorities to implement waste minimisation, sorting at source and recycling (as an alternative to haphazard dumping of solid waste in the Coastal areas) through projects for composting, biogas generation, etc. with community participation.	• Number of new partnerships built up by local authorities on solid waste management • Number of projects engaged to reduce, reuse and recycle of waste

ISSUE: POLLUTION BY UNPLANNED AQUACULTURE

POLICY

Minimise marine water pollution caused by unplanned aquaculture practices through regulations and good aquaculture practices.

STRATEGY

Prepare and implement zonal plans for aquaculture development in selected coastal areas and promote good aquaculture management practices through education and awareness programmes.

Proposed actions	Performance indicators
1) Prepare and implement zonal planning with community participation for potential areas suitable for aquaculture development in the southern and eastern coasts.	▪ Zones established
2) Promote the formulation and legalisation of effluent standards for aquaculture development activities in collaboration with the relevant authorities.	▪ Effluent standards established ▪ Number of aquaculture projects abiding by effluent standards
3. Prepare technical manuals/guidelines on good management practices for prospective developers and conduct awareness programmes to ensure the pollution of coastal and marine areas by aquaculture development is minimised.	▪ Technical manuals and good practice manuals for prioritised sectors published ▪ Number of aquaculture projects adopting good management practices

ISSUE: POLLUTION BY UNAUTHORIZED UNDERSERVED SETTLEMENTS AND STRUCTURES

POLICY	STRATEGY
Reduce marine water policy caused by unauthorised and underserved settlements and structures in identified areas through regulatory mechanisms	Identify areas with unauthorised, under-served settlements and structures that contribute towards pollution and facilitate their relocation.

Proposed actions	Performance indicators
1) Identify suitable areas for resettlement through development of zonal plans.	▪ Number of zonal plans for resettlements formulated and declared
2) Coordinate with the relevant authorities and stakeholders for removal, relocation and upgrading of under-served settlements and structures in critical areas of the west coast.	▪ Number of resettlements carried out ▪ Number of improved settlements
3) Strictly enforce regulatory measures within the coastal region to prevent further unauthorized settlement.	▪ Number of complaints against unauthorized settlers reduced
4) Identify sites of special significance that need close monitoring to prevent unauthorised settlements and to mitigate adverse effects of settlements.	▪ Database formulated on sites of special significance

ISSUE: POLLUTION BY UNDESIRABLE AGRICULTURE AND LIVESTOCK PRACTICES IN UPSTREAM AREAS

POLICY

Minimise adverse impacts caused by undesirable agriculture and livestock practices ir upstream areas to marine waters, through integration of coastal management witl watershed management in identified areas.

STRATEGY

Identify sources of pollution caused by crops and livestock in surface waters entering the marine areas, formulate and implement an action plan for selected sites to enable improvement of water quality, in collaboration with relevant agencies.

Proposed actions	Performance indicators
1) Identify surface water bodies that are conveying excessive amounts of agricultural/livestock pollutants into marine waters and estimate the loads during wet and dry weather.	▪ Baseline database on surface water bodies and pollutant loads established
2) Formulate and implement site specific action plans for improvement of water quality for prioritised rivers.	▪ Pollution loads of the prioritised rivers reduced by 25% in five years
3) Assist the Registrar of Pesticides and other relevant authorities to take necessary steps to reduce excessive use of pesticides/fertilizer by providing necessary information to the farmers (through workshops, guiding manuals etc.).	▪ Number of farmers adopting environmentally sound practices in reducing excessive chemical/fertiliser use
4) Develop bio-indicators.	▪ Bio indicators developed

2.4.2 PRIORITY AREA: COASTAL EROSION

OBJECTIVE

Control coastal erosion through Enhancement of beach stability by controlling/reducing/preventing anthropogenic activities that induce coastal erosion.

ISSUE: SAND MINING

POLICY 1

Regulate river sand extraction with community collaboration and participation.

STRATEGY

Review and formulate guidelines (Quotas, time and area limits) to regulate river sand mining in selected areas and imposition of monitoring schemes as proposed in the National Action Plan for the prevention of adverse environmental impacts due to unsustainable sand mining.

Proposed actions	Performance indicators
1) Enact and enforce restrictions on sand mining 2km downstream and 1km upstream of selected NWS& DB intakes, namely Bambukuliya in Maha Oya, Ambatale in Kelani Ganga, Kalutara intake in Kalu Ganga, Amugoda in Gin Ganga and the Balakawela in the Nilwala Ganga.	▪ Complete termination of mining in selected areas
2) Formulate guidelines to control sand mining in upper reaches of rivers.	▪ Guidelines formulated for (site specific) upper reaches of rivers
3) Ensure adherence to guidelines by licensed mining operations at suitable sites during certain periods.	▪ Number of monitoring efforts undertaken
4) Facilitate periodic checking of sand mining to curtail unauthorized mining operations.	▪ Reduction in number of cases reported on unauthorized sand mining

ISSUE: SAND MINING

POLICY 2

Promote Introduction of alternative sources of sand and alternative employment opportunities in order to reduce/minimise river sand mining.

STRATEGY

Promote the use of offshore sand and other alternative technologies/sources and facilitate alternative employment opportunities for those who are engaged in sand mining.

Proposed actions	Performance indicators
1) Identify new technologies that minimise the use of sand for construction.	▪ Number of technologies identified
2) Create awareness on the benefit of the use of offshore sand and alternative sources in the construction industry.	▪ Increase in the use of offshore sand and alternative sources in development works, initially with the state sector
3) Facilitate private sector involvement in off shore sand mining.	▪ Number of partnerships formulated with the private sector in off-shore sand mining operations
4) Identify other lands sand deposits that can be mined without adverse environmental effects, determine sustainable yields, formulate and implement a plan for sustainable extraction of sand	▪ Alternative sites identified ▪ Number of site specific plans formulated
5) Obtain inter-agency assistance to provide alternative employment for displaced river sand miners of the north western province.	▪ Number of individuals for whom alternative employment provided

ISSUE: SEA CORAL MINING

POLICY

Protect sea corals through participatory management systems.

STRATEGY

Enforce legislation and regulations with community participation to prevent destruction of coral reefs and initiate customised communication programmes and promote the use of alternative sources of lime and promote alternative livelihoods and/or facilities for those engaged in activities that damage or destroy coral reefs.

Proposed actions	Performance indicators
1) Formulate and implement a management mechanism in collaboration with the law enforcement authorities, communities and local authorities	▪ A collaborative mechanism to prevent sea coral mining formulated and implemented
2) Formulate a programme of action for the ban of the use of coral based lime in state construction works.	▪ Reduction of number of people involved in unauthorized sea coral mining
3) Provide appropriate publicity on alternatives for coral based lime.	▪ Reduction of complaints against illegal sea coral mining
4) Use market instruments to promote the use of alternatives to coral –based lime among different user groups and suppliers.	▪ Termination of the use of coral based lime in state construction works within 5 years
5) Initiate a programme to identify and provide alternative livelihoods to those who are involved in activities that damage/ destroy the coral reefs in selected sites of the western and eastern coasts with private sector participation.	▪ Decrease in the number of people involved in destructive activities
6) Carry out customised communication programmes (including awareness creation) for identified target groups on laws/regulations relevant to preventing damage to coral reefs.	▪ 20 programmes carried out in 3 years for target groups

ISSUE: UNPLANNED STRUCTURES

POLICY	STRATEGY
Mitigate adverse impacts of unplanned structures leading to coastal erosion in critical areas through regulations and community awareness	Regulate development activities within and outside the coastal region in accordance with setback standards and through awareness programme.

Proposed actions	Performance indicators
1) Formulate and implement a programme of action to ensure adherence to coastal setback standards stipulated by the Coast Conservation Department.	• A programme of action to ensure adherence to coastal setback standards stipulated by the Coast Conservation Department is formulated and implemented
2) Develop a mechanism to conduct regular permit compliance monitoring surveys.	• Mechanism to carry out surveys established
3) Develop a programme of action to ensure that new developments do not occur in areas prone to erosion and floods.	• Critical areas prone to erosion and floods are identified • 30% decrease of new development activities in identified areas prone to erosion and floods within 2 years.
4) Demarcate coastal segments and display sign boards indicating the amended setback distances.	• Display of sign boards indicating setback distances
5) Initiate a programme of action in collaboration with relevant state agencies to take legal action against non-compliance of stipulated setback standards.	• Number of incidences where legal action was taken by 2005
6) Train staff of Divisional Secretariats, GSMB and CCD to monitor compliance of setback standards.	• Number of trained officers in relevant institutions • Number of compliance monitoring programmes carried out
7) Formulate a programme of action to identify alternative sites and to relocate unplanned structures.	• Alternative sites identified • Programme of action for relocation formulated
8) Identify State owned reservations which need strict maintenance (e.g. RDA, SLRD owned) and develop a collaborative mechanism to maintain them.	• Priority reservations for strict maintenance identified • A collaborative mechanism to maintain them is developed

ISSUE: DESTRUCTION OF BEACH VEGETATION

POLICY

Restore coastal vegetation in critical sites to promote beach stability.

STRATEGY

Replant natural vegetation on selected coastal areas where natural vegetation is damaged.

Proposed actions	Performance indicators
1. Identify and establish suitable cluster/ community organisations to carry out replanting in critical areas where natural vegetation is damaged.	▪ Cluster/ community organisations established in critical areas.
2. Formulate management mechanisms and replant beaches with natural vegetation in collaboration with cluster/community organisations.	▪ Management mechanisms for replanting formulated. ▪ Beach vegetation restored in 40 critical sites along the coast of the country during a period of 5 years

2.4.3 PRIORITY AREA: DEGRADATION OF AND MARINE HABITATS AND THEIR BIODIVERSITY

OBJECTIVE

Maintain the quality of coastal and marine habitats and preserve their biodiversity by minimizing the adverse effects of pollution on them and by minimizing destruction and conversion of the habitats.

ISSUE: POLLUTION OF MARINE HABITATS

POLICY

Reduce pollution of identified marine habitats through regulatory and collaborative actions with Local Authorities and communities.

STRATEGY

Initiate and implement new mitigatory measures or support existing mitigatory programmes to minimize adverse impacts of pollution in critical areas in collaboration with Local Authorities and other relevant agencies.

Proposed actions	Performance indicators
1. Formulate and implement a monitoring and a mitigatory programme to ensure that all industries and other development activities within the Coastal region of the north western and southern coasts adhere to environmental guidelines and standards and setback standards.	▪ A programme for monitoring and mitigation formulated for north western and southern coasts ▪ Mechanism for implementation identified
2. Carry out periodic sampling of water quality in important and critical marine habitats in the north western and southern coasts to determine the impacts of pollution on them.	▪ A sampling programme designed ▪ Violators of regulations identified

ISSUE: DESTRUCTION/OVEREXPLOITATION OF THE RESOURCES WITHIN MARINE HABITATS

POLICY

Prevent or reduce destruction of resources in identified marine habitats with community participation and collaborative action through appropriate management strategies / market instruments.

STRATEGY

Formulate and implement appropriate management strategies in selected locations and declare suitable areas as eco- tourism areas.

Proposed actions	Performance indicators
1) Establish effective communication tools with stakeholders to conserve and enhance ecological, aesthetic and recreational value of marine habitats.	▪ Communication tools developed ▪ Reduction in destruction/overexploitation of resources in coastal and marine habitats
2) Formulate a programme of action to protect marine ecosystem through creation of a market for the non destructive uses of coastal resources which will increase the rural income	▪ Programme of action formulated to create and propagate a market for non- destructive uses ▪ Number of projects to enhance rural income through non-destructive use of coastal resources
3) Declare suitable areas as eco-tourism areas and promote participation of private entrepreneurs to establish eco-tourism projects in these areas with the required community participation.	▪ Number of eco-tourism projects initiated ▪ Number of partnerships established

ISSUE: CONVERSION OF HABITATS

POLICY

Prevent or reduce conversion of marine habitats in identified areas through collaborative actions with local authorities and communities.

STRATEGY

Communicate with Local Authorities and communities to establish protection societies and develop public awareness among them.

Proposed actions	Performance indicators
1) Coordinate with relevant agencies to formulate a mechanism and prepare guidelines to manage areas outside the jurisdiction of CCD.	▪ A mechanism formulated for the management of areas outside CCD jurisdiction ▪ Guidelines developed for prioritised areas
2) Collaborate with local authorities and formulate protection societies for effective communication and education to enhance interest and commitment for conservation of marine habitats.	▪ Number of protection societies established and made operational
3) Prepare and distribute printed materials on environmental significance of marine habitats.	▪ Printed material produced and distributed
4) Take collaborative action to prevent and mitigate problems of invasive plant and animal species.	▪ 20 programmes implemented to eliminate/control selected invasive species during a period of 3 years

ISSUE: HABITAT ALTERATION DUE TO UPSTREAM ACTIVITIES

POLICY

Reduce Habitat alteration due to upstream activities in identified areas

STRATEGY

Coordinate with relevant organisations and develop mechanisms to reduce habitat alteration caused by upstream development activities, through regulatory measures.

Proposed actions	Performance indicators
1) Develop a mechanism to integrate marine habitat management with other relevant management policies such as watershed management to minimise pollution/siltation/ salinity changes caused by upstream development activities including irrigation works.	▪ An integrated mechanism is developed ▪ New partnerships established ▪ A monitoring program in place ▪ Changes in the standards

2.4.4 PRIORITY AREA: DETERIORATION OF ENVIRONMENTAL QUALITY OF MARINE SITES OF SPECIAL SIGNIFICANCE

OBJECTIVE

Maintain the environmental quality of sites of special significance by enhancing facilities found within the sites and through regulatory measures.

ISSUE: CONTROL OF HAPHAZARD DISPOSAL OF SOLID WASTES

POLICY

Environmentally friendly solid waste disposal systems will be promoted with community participation.

STRATEGY

Minimize haphazard disposal of solid wastes in identified areas through suitable management and regulatory measures and through awareness.

Proposed actions	Performance indicators
1) Assist Local Authorities in Muthurajawela, Morawala in the Negombo beach, Madu Ganga, Seenigama, Hummanaya, Bundala National Park and Nilaweli beach to identify landfills in environmentally less vulnerable locations for relocation.	▪ Solid waste management programmes implemented by each Local Authority of identified sites ▪ Clean environment in sites with special significance
2) Encourage and assist relevant Local Authorities of identified sites to implement environmentally sound ways of waste minimisation through projects for composting, biogas generation, etc. with community participation.	▪ Number of projects developed and implemented for waste minimisation ▪ Number of partnerships established

ISSUE: LACK OF PROPER INFRASTRUCTURE FACILITIES

POLICY	STRATEGY
Enhance the environmental quality of selected sites with special significance through development/ improvement of infrastructure facilities.	Develop infrastructure facilities in the identified sites.

Proposed actions	Performance indicators
1) Develop a program of action in collaboration with national and Local Authorities to develop/upgrade infrastructure facilities in critical religious/ cultural/ scenic areas.	▪ Well planned developed locations with improved infrastructure facilities ▪ Increased number of visitors

ISSUE: DISPOSAL OF WASTE OIL AND OTHER CHEMICALS

POLICY

Minimise the disposal of waste oil and other chemicals that damage the environmental quality of sites of special significance through regulatory measures.

STRATEGY

Ensure that all industries that are likely to cause physical alteration through their emissions to site of significance are minimised through regulatory measures.

Proposed actions	Performance indicators
1) Develop a mechanism to ensure that the industries/ other activities within the significant sites adhere to guidelines pertaining to effluent discharge.	▪ A mechanism for monitoring sites of special significance established
2) Declare formulate and implement Special Area Management Plans for Muthurajawela, Morawala in the Negombo beach, Madu ganga, Seenigama, Hummanaya, Bundala National Park and Nilaweli beach.	▪ Special Area Management plans formulated for identified locations
3) Introduce and implement international rules and regulations for the disposal of waste oils and use of hazardous chemicals during ship breaking and maintenance.	▪ A waste oil collection mechanism established for ships ▪ Four awareness programmes carried out for ship-breakers and maintenance institutes on hazardous chemicals /oils within a period of three years

2.5 SOCIO-ECONOMIC ANALYSIS OF THE STRATEGIES AND ACTIONS IN THE NATIONAL PROGRAMME OF ACTION (NPA)

The plan has identified four priority areas in the National Programme of Action for the Protection of the Marine Environment from land based activities in Sri Lanka. These areas are as follows.

1. Marine water pollution through land based activities
2. Coastal erosion
3. Degradation of marine habitats and their biodiversity
4. Deterioration of environmental quality of sites of special significance

In each area, the objective, issue, policy and strategy are clearly stated. The strategy and the actions are at conceptual stage and some covers legal/institutional changes and others are new programmes. Following is a socio-economic analysis of selected actions in the management plan.

Inadequate municipal sewage disposal facilities have been identified as a key problem in controlling marine water pollution. Direct discharge of untreated municipal sewage into water bodies and lands is the present practice. Faecal contamination of surface and ground water sources is another outcome of this situation. As the urban population in the proposed areas of the NPA for sewage pollution control actions is also increasing at a rapid pace, proposed actions will benefit a large number of persons and

Other associated environmental issues. Moreover, the proposed market based instruments such as taxes, soft loans, or subsidies will generate additional source of income, which will facilitate economic sustainability in the future.

The environmental impacts of unplanned aquaculture can be grouped as the adverse impacts of aquaculture on water quality (e.g. pollution of coastal water bodies, salinization of ground water etc.), loss of access to the sea/estuaries/ lagoon, inundation during rainy periods and the changes in the land use patterns. The social and economic costs of unplanned aquaculture are very high. According to the experiences gained in the shrimp farming in the Northwestern province, unplanned aquaculture has had resulted in a great damage to the environment and to the socio-economics of the people. For instance, Firth (1997) has estimated that around 5950 households in 27 villages were affected due to loss of access to sea/lagoons due to this unplanned shrimp farms. The construction of unplanned shallow shrimp ponds had resulted in the inundation of Chilaw and Puttalam areas during the heavy monsoons in 1995. The value of economic loss of paddy and coconut lands due to shrimp farming in 1999 was estimated at Rs. 265 million (Siriwardena, 1999). Disputes among farmers, frequent occurrence of diseases, loss of biodiversity, environmental problems and socio-economic losses can be mitigated by introducing well-planned aquaculture in the southern and eastern provinces.

Unsanitary disposal of solid waste has been identified as one of the major environmental problems in Sri Lanka. The rate of waste collection by local authorities in the island was about 2700 tons per day [MOFE, 1999]. Of this 54 % of the waste is generated in the western province which has many coastal cities and areas. Inadequate facilities for collection and safe disposal and lands for safe disposal are the major problems faced by many local authorities. The proposed actions will facilitate to mitigate these issues to some extent. The proposed actions are socially acceptable and economically feasible.

The loss/degradation of valuable marine habitats (e.g. sandy beaches, mangroves, and coral reefs), damages to buildings, and lands are the major impacts of coastal erosion. Natural and anthropogenic activities are the causes for coastal erosion. During 1995 to 1999 Sri Lanka government has invested over Rs. 1520 million on coastal erosion management. The average annual allocation of the local funds is over Rs. 100 million which is inadequate [MOF, 2003]. Sand mining (beach and river sand mining) and coral mining are the key reasons which can impact the coastal stability. According to a study conducted by Byrne and Nanayakkara (2002), the average annual sand requirement in 2001 was 7.3 million cubic meters, mainly for the construction industry that demands a large quantity of sand to meet its requirement. Of this, the Western Province used 40% and was from the main rivers in the North and the South of Colombo. According to another study conducted by the Environmental Action1 project [MOENR, 2003], the volume of sand extracted in Deduru Oya, Maha Oya, Kelani Ganga, Gin Ganga, and Kalu Ganga was estimated at 3.8 million cubic meters per annum. A Number of negative outcomes such as lowering river banks, curtailment of sediment flows, health effects, salt water intrusion and coastal erosion occur due to unregulated upstream river sand mining.

Dune sands, sands from heavy metal industries, sand from rehabilitation sites of old canals and deepening lagoons, sand from off shore sources and quarry dust are the potential alternative sources that can be extracted to meet the current requirements . Of these, off shore sand is the only option that provides a large volume of sand as stated by and Byrne and Nanayakkara (2002).

However, the termination or scaling down of river sand will create an immediate impact to the people who are involved in river sand trade. River sand miners would be the major victims in this situation. At present, a large number of persons depend on river sand mining. The introduction of off shore sand and scaling down will disrupt their livelihood which can create social unrest. Therefore, it is desirable to introduce alternative employment opportunities to mitigate this problem. As suggested by Byrne and Nanayakkara (2002), a small levy imposed on the use of sand from offshore at some point in the supply chain could be used to provide technical training and encourage sand miners to find other forms of employment.

Therefore, the actions proposed in relation to sand mining are socially acceptable, environmentally sound and economically feasible with the suggested recommendations.

With regard to coral mining, mining and collecting coral from beach and the shore-face reduce the volume of beach materials and induce beach and coastal erosion. At present sea coral mining is banned. However, effective law enforcement is required to implement it. Therefore, the suggested actions in the plan are appropriate and socio-economically important.

The upstream activities such as sedimentation from land erosion, excessive use of chemical fertilizers, pesticides, animal manure and waste, and development of alkali soils resulting from inadequate drainage facilities in irrigation schemes also contribute to the pollution of marine water bodies. With regards to sedimentation, major contributing factors are the soil eroded from cultivated lands, construction of houses, other infrastructure development activities and logging operations. The excessive use of chemical fertilizer for agriculture and livestock activities pollutes water through enrichment of water with nutrients leading to eutrophication. The residuals of insecticides, fungicides and weedicides used in agriculture and livestock activities that are carried to marine waters through rivers, streams and rainwater run-off may have direct effects on the biodiversity of the marine environment. Thus the adverse environmental and socio-economic impact of marine environment is substantial and the stated strategies and actions to mitigate these adverse effects are socio- economically very important.

2.6 PROGRAMME SUPPORT ELEMENTS

Following section gives the details of the support elements for each identified activity under each critical area. Institute/organisation/ department that have main responsibility for coordination and action and the Institute/organisation/ department that should provide support service are identified. Existing legal and enforcement mechanisms and any other mechanisms that are needed are also given under each activity. Projected period for each activity, financial mechanism (to obtain funds) and the required financial component are indicated. Among other identified support elements are HRD/education, research and monitoring and public participation and awareness.

2.6.1. Marine Water Pollution

2.6.2. Coastal Erosion

2.6.3. Degradation of coastal and marine habitats and decline of their biodiversity

2.6.4. Degradation of environmental quality of site of special significance.

2.6. 1 Marine water pollution

Strategy/Main Project	Activity	Organisational arrangement		Legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
1. SEWAGE POLLUTION Reduce sewage pollution in critical marine waters in collaboration with respective authorities and communities through proper sewage treatment and disposal methods and by introducing appropriate market based instruments.	1. Assist the selected Local Authorities of Negombo, Marawila, Seeduwa, Wadduwa, Unawatuna, Waikkala, Beruwala, Moratuwa - Ratmalana, Wattala- Peliyagoda and Galle in reducing sewage contamination by improving sewage treatment and disposal methods with the assistance from the associated communities and private entrepreneurs. (N.B. sites are based on tourism sector master plan) .Two Pilot projects to be implemented in two areas from the above list, based on the commitment of local authorities)	M/H&PI, LA, NW S& DB, M/E&NR	CEA, MPPA, LUPPD, M/Indust.	CEA water quality standards for designated uses Amendments to the MPPA act for institutional strengthening LA to establish sewage management units	(Total cost US $ 75 million) US $ 5 million for two pilot projects in identified areas	Public-Private sector partnership LA funds GOSL contribution Donor Agency funding	NWS& DB M/E&NR CEA, MPPA	Study and implement appropriate measures which needs to be decided	NWS& DB, M/Indust. MPPA, M/E&NR CEA, LA, LUPPD, M/H&PI,	Localised awareness programmes for target groups Disseminate information through printed and other media NWS& DB, M/Indust M/H&PI MPPA, LA, M/E&NR CEA, LUPPD, NGO, CBO Media	Immediate for two area as pilot projects and 3-5 years for other sites
	2. Ensure sustainability of sewage pollution control by introducing appropriate market based instruments.	M/Environ	M/Indust., LA								>5 years for component 2 and 3
	3. Secure partnerships of Local Authorities and private entrepreneurs in sewage pollution control	M/Environ	M/Indust., LA, private sector								
2. INDUSTRIAL POLLUTION I. Identify high polluting industries emitting effluents that degrade the quality of marine waters and assist such industries by providing with appropriate pollution abatement/ cleaner production technologies and/or financial incentives; encourage relevant authorities responsible for relocation of high polluting industries that are situated outside industrial estates.	1.Facilitate access to information on technology on pollution abatement and on cleaner production and formulate a programme of action including financial assistance to promote Cleaner Production and Environmentally Sound Practices to industries	MEDIPIP	RISC, M/Indust., REDC	Regulations of the CZMP CEA standards BOI , UDA, M/E&NR and provincial guidelines	US$ 150,000.00	GOSL funds Funds from the industrialists Donor Agency funds	Provincial Environ Authority, BOI, NARA, CEA, MPPA, M/E&NR RISC, NCPC, MEDIPIP NPPD REDC	Study and implement appropriate measures	REDC, RISC, M/Indus , PC BOI, UDA, LA, CEA M/E&NR, NCPC, MEDIPIP, NARA, M/Finance NPPD	Localised awareness programmes for target groups Disseminate information through printed and other media CEA, LA M/Indust., MEDIPIP, CCD, Media CBO, NGO	Pilot project (activity 1) immediate and the other activities will continue for 3-5 years
	2. Assist or facilitate the Ministry dealing with industries, other relevant industrial development institutions and the Ministry of Finance to provide possible financial incentives to relocate high polluting industries that are situated outside industrial estates	MEDIPIP, M/Finance	REDC, RISC, M/Indust.		US$ 120,000.00						
	3. Carry out an assessment of the existing industries to identify the appropriateness of siting of industries in collaboration with CEA, BOI and Ministry of Industries. (desk study)	MEDIPIP, CECB	PC s & LAs, BOI, UDA CEA M/E&NR, RISC, NCPC, NARA,, NPPD M/Indust.		US$ 50,000.00						

Strategy/Main Project	Activity	Organisational arrangement		Legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
II Carry out regular monitoring of water quality in marine waters of industrial areas.	1. Assess the existing industrial estates to identify non –compliance.	NARA, Universities	CEA, M/E&NR	Stick to CEA standards, BOI , UDA, M/E&NR and provincial guidelines Amendments to the MPPA act for institutional strengthening	US$ 25,000.00	Public private partnerships Donor Agency funding	MPPA, CEA, M/E&NR, MEDIPIP NARA	Study and implement appropriate measures	MPPA, CEA, M/E&NR, MEDIPIP NARA Industrialists	Localised awareness programmes for target groups Disseminate information through printed and other media CEA, LA M/E&NR MEDIPIP Media, Industrialists, CBO, NGO, LA	3-5 years for all activities
	2. Initiate water quality-monitoring programmes to capture high incidence of pollution of water ways.(Pilot scale – 2year project in selected locations of 14 coastal districts)	NARA, Universities	CEA, M/E&NR		US$ 150,000.00						
	3. Formulate and implement a programme of action to ensure that development activities likely to pollute the marine waters adhere to CEA standards on disposal of effluents and waste.	NARA, CCD	MPPA, M/E&NR, MEDIPIP, LA		US$ 50,000.00						
3. SOLID WASTE DISPOSAL Prepare and implement site specific plans for solid waste management for critical sites	1. Identify five critical urban centres with industries / coastal tourist centres/ fishing harbours along the coast for which solid waste plans are most urgently needed and formulate site specific plans for solid waste management.	M/E&NR	UDA, LA CEA, CTB CCD, NARA, Private sector	CZMP, CEA, UDA guidelines and regulations	US $ 200,000.00 for all activities	GOSL funds, PC funds, Donor Agency funds, Private sector funding	CCD, CEA, UDA, NARA, M/E&NR, M/ Indust, CCD , CTB, MEDIPIP	Study and implement appropriate measures for waste minimisation	M/E&NR M/ Indust, CCD, CEA, UDA, LA, NARA, CTB , Private sector, MEDIPIP	Localised awareness programmes for target groups, Disseminate information through printed and other media M/E&NR M/ Indust, CCD, CEA, UDA, LA, NARA,CTB , Private secror, MEDIPIP Media CBO NGO	3-5years for all activities
	2. Assist the relevant agencies to implement plans.	M/E&NR	UDA, LA CEA, CTB CCD, NARA, Private sector								
	3. Update the database on solid waste collection.	M/E&NR	UDA, LA CEA, CTB CCD, NARA Private sector								
	4 Identify suitable options for final disposal of solid wastes.	LA	UDA, LA CEA, CTB CCD, NARA, Private sector M/E&NR								
	5. Assist Local Authorities to identify environmentally friendly disposal methodologies in environmentally less vulnerable locations.	LA	M/E&NR, M/Indust., MEDIPIP								

Strategy/Main Project	Activity	Organisational arrangement		Legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
	6. Encourage and assist relevant Local Authorities to implement environmentally sound ways of waste minimisation (as an alternative to haphazard dumping of solid waste in the Coastal areas) through projects for composting, biogas generation, etc. with community participation	LA	M/E&NR CCD, CEA Private sector MEDIPIP								
4. POLLUTION DUE TO UNPLANNED AQUACULTURE Prepare and implement zonal plans for aquaculture development in selected coastal areas and promote good aquaculture practices through awareness programmes	1. Prepare and implement zonal planning, with community participation for potential areas suitable for aquaculture development in the southern and eastern coasts.	DOF NARA	CCD, LUPPD LC, NAQDA	Review and introduce appropriate regulations and standards Clear policy on land use	US $ 50,000.00	Seed money from GOSL Private sector funding Donor Agency Regional Economic Commission Funding	NARA for research and DOF, NAQDA and Provincial Environment Authorities for monitoring	Implement a plan on precautionary measures to mitigate negative impacts	NARA NAQDA, DOF, Aquaculture farmers, LUPPD, LC, CEA, LA, Provincial Environ. Authorities	Localised awareness programmes for target groups, Disseminate information through printed and other media NARA NAQDA, DOF, LA, NGO, CBO, Media	
	2. Promote the formulation and legalisation of effluent standards for aquaculture development activities in collaboration with the relevant authorities.	NARA	CEA, NARA MPPA, PC, NAQDA		US $ 25,000.00						
	3. Prepare manuals/ guidelines (e.g. disposal standards) on good management practices for prospective developers to ensure the pollution of coastal and marine areas by aquaculture development is minimised.	NARA	NAQDA, CEA, LA Provincial Environ. Authorities Aquaculture farmers		US $ 25,000.00						
5.POLLUTION DUE TO UNAUTHORIZED UNDERSERVED SETTLEMENTS AND STRUCTURES Identify areas with unauthorized, under-served settlements and structures that contribute towards pollution and facilitate their relocation.	1. Identify suitable areas for resettlement through development of zonal plans.	CCD, NPPD	UDA, M/H&PI PC, LA, LUPPD, Regional Dev. Ministries	CZMP regulations	US $ 150,000.00	GOSL funds , Donor Agency funds	CCD,UDA, LUPPD PC,, LA Railway Dept., RDA, LUPPD M/H&PI, DWLC	Study and implement appropriate measures	CCD, PC,UDA, LA, Railway Dept., RDA, LUPPD, DWLC M/H&PI	Localised awareness programmes for target groups Disseminate information through printed and other media Media, CBO, NGO, CCD, UDA, DWLC	Activity 1 to be carried out immediately Others >5 years
	2. Coordinate with the relevant authorities and stakeholders for removal, relocation and upgrading of under-served settlements and structures in critical areas of the coast.	CCD , M/H &PI	PC, UDA, LA Railway Dept., RDA, LUPPD, NHDA		Amounts to be decided after implementation of Activity 1						
	3. Strictly enforce regulatory measures within the coastal region to prevent further unauthorized settlement.	CCD, LA	PC,UDA, LA Railway Dept., RDA, LUPPD M/H&PI		US $ 50,000.00						
	4. Identify sites of special significance that need close monitoring to prevent unauthorized settlements and to mitigate adverse effects of settlements.	CCD, Dept /Archaeology	UDA, CEA, LA, PC, DWLC ,		US $ 200,000.00						

Strategy/Main Project	Activity	Organisational arrangement		Legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation/ awareness	Project period
		Main responsibility	Support service								
6. POLLUTION DUE TO UNDESIRABLE AGRICULTURE AND LIVESTOCK PRACTICES IN UPSTREAM AREAS Identify sources of pollution caused by crops and livestock in surface waters entering the marine areas, formulate and implement an action plan for selected sites to enable improvement of water quality in collaboration with relevant agencies	1. Identify surface water bodies that are conveying excessive amounts of agricultural/livestock pollutants into marine waters and estimate the loads during wet and dry weather. (Kelani, Walawe, Kalu)	M/I&WRM Registrar of pesticides, CEA, Regional Dev. Ministries	DA, M/E&NR M/A &LSD NLDB	Regulations to be developed on POPS standards	US $ 75,000.00	CARP, Donor Agency funds	DA,ARTI, Registrar of pesticides, CEA, M/E&NR, M/A&LSD	Study and implement appropriate measures	DA, ARTI, M/E&NR CEA , LA, PC, M/A&LSD Registrar of pesticides	Localised awareness programmes for target groups. Disseminate information through printed and other media Media, ARTI, M/E&NR CEA LA, PC, M?A&LSD Registrar of pesticides CBO, NGO, AD, Farmer organisations Pesticide manufact . Companies	3-5 years for all activities
	2. Formulate site specific action plans for improvement of water quality for prioritised rivers and implementation of 02 pilot projects.	M/I&WRM, M/E&NR DA	CEA, LA, M/E&NR M/ A&LSD RoP NLDB		US$ 300,000.00						
	3. Assist the Registrar of Pesticides and other relevant authorities to take necessary steps to reduce excessive use of pesticides/fertilizer by providing necessary information to the farmers (through workshops, guiding manuals etc.	Registrar of pesticides	M/E&NR CEA , DA, LA,PC, M/A&LSD NLDB		US$ 100,000.00						
	4. Develop bio-indicators	M/E&NR	CEA, Universities NARA		US$ 50,000.00						

2.6.2 COASTAL EROSION

Strategy/Main Project/Main project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
1. SAND MINING I Review and formulate guidelines to regulate river sand mining in selected areas (Quotas, time and area limits) and imposition of monitoring schemes as proposed in the National Action Plan for the prevention of adverse environmental impacts due to unsustainable sand mining.	1. Enact and enforce restrictions on sand mining 2km downstream and 1km upstream of selected NWS& DB intakes, namely Bambukuliya in Maha Oya, Ambatale in Kelani ganga, Kalutara intake in Kalu ganga, Amugoda in Gin ganga and the Balakawela in the Nilwala Ganga.	M/I&WRM, GSMB, NWPEA,	CCD, LA, LC, SD, DS , NWS& DB CEA	CZMP guidelines Licensed mining operations Mines and Minerals Act Crown Land Ordinance	US $ 100,000.00	GOSL funds Donor Agency funds	CCD, GSMB, M/I&WRM, NWS& DB CEA	Identify badly eroded areas and plan contingency measures	CCD, GSMB LA, DS, Legal Enforcement Authority NWS& DB CEA	Programmes for target groups Disseminate information through printed and other media M/I&WRM,, CCD, NWS&DB, CEA, LA GSMB, CBO,NGO, Media	3-5 years for all activities
	2. Formulate guidelines to control sand mining in upper reaches of rivers.	GSMB	CCD		US $ 50,000.00 for activities 2-4						
	3. Ensure adherence to guidelines by licensed mining operations at suitable sites during certain periods.	GSMB	CCD								
	4. Facilitate periodic checking of sand mining to curtail unauthorized mining operations.	CCD, GSMB,	LA								

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
II. Promote the use of offshore sand and other alternative technologies/sources and facilitate alternative employment opportunities for those who are engaged in sand mining.	1. Identify new technologies that minimise the use of sand for construction.	Univ. Moratuwa, NBRO, CEA	GSMB, CCD, ICTAD, Private sector	CZMP guidelines Licensed mining operations Mines and Minerals Act	US $ 200,000.00 for all activities	Donor Agency funds GOSL funds	CCD, GSMB, University of Moratuwa, NBRO, M/Indust.	Use of off-shore sand in state works Beach nourishment with offshore sand	GSMB,CCD M/Indust. Univ. Moratuwa, NDRO, M/ indist.	Programmes for target groups Disseminate information through printed and other media CCD, GSMB, University of Moratuwa, NBRO, M/ Indist.	From immediate to 5 years for all activities
	2. Create awareness on the benefit of the use of offshore sand and alternative sources in the construction industry.	CCD, M/Indust. NBRO,CEA	LA, Private sector, Chamber/ Constru. Industry, ICTAB								
	3. Facilitate private sector involvement in off shore sand mining.	M/F&OR BOI, CCD, GSMB, Chamber/Constru. Industry	ICTAD, MPPA, Private sector								
	4. Identify other sand deposits that can be mined without adverse environmental effects, determine sustainable yields, formulate and implement a plan for sustainable extraction of sand.	PCs CCD, GSMB	Univ. Moratuwa								
	5. Obtain inter-agency assistance to provide alternative employment for displaced river sand miners of the north western province	PCs, NWPEA M/Industries, Regional Dev. Ministries	Private sector								

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial Requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
2. SEA CORAL MINING Enforce legislation and regulations with community participation to prevent destruction of coral reefs and initiate customised communication programmes and promote the use of alternative sources of lime and promote alternative livelihoods and/or facilities for those engaged in activities that damage or destroy coral reefs.	1. Formulate and implement a management mechanism in collaboration with the law enforcement authorities, communities and LA.	CCD	Legal Enforcement Authority, LA,DWLC	CCD act; Fauna & Flora Ordinance CZMP guidelines and policies Mines and Minerals Act	US$ 200,000.00 for all activities	GOSL funds Donor Agency funds	CCD, M/Indust., Wildlife Dept. CECB, NBRO, Building Dept. M/Housing	Rehabilitation of community monitoring programme	CCD, M/Indust., DWLC, CECB, Legal Enforcement Authority, LA, Building Dept., M/Housing, Private sector, NBRO, ICTAB	Disseminate information through printed and other media Programmes for target groups. Media, CBO, NGO, CCD, Building Dept.,	From immediate to 5 years for all activities
	2. Formulate a programme of action for the implementation of policy on the ban of the use of coral based lime in state construction works.	CCD	Chamber/Constru c. Industries, Building Dept. M/H&PI								
	3. Provide appropriate publicity on alternative substitutes for coral based lime.	CCD	M/H&PI Private sector								
	4. Use market instruments to promote the use of substitutes to coral –based lime among different user groups and suppliers.	CCD	Private sector, NBRO, M/Indust.								
	5. Initiate a programme to identify and provide alternative livelihoods to those who are involved in activities that damage/ destroy the coral reefs in the western and eastern coasts with private sector participation.	CCD	Private sector, CIB, ICTAB CECB								
	6. Carry out customized communication programmes (including awareness creation) for identified target groups on laws/regulations relevant to preventing damage to coral reefs	CCD, LA	DWLC Legal Enforcement Authority								

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
3. UNPLANNED STRUCTURES Regulate development activities within / adjacent the coastal zone in accordance with relevant standards and through awareness programme.	1. Formulate and implement a programme of action to ensure adherence to coastal setback standards stipulated by the Coast Conservation Department.	CCD	DS,UDA, CTB LA, M/Tourism	CZMP guidelines and setback standards UDA,CTB guidelines	US $ 200,000.00 for all activities	GOSL funds Donor Agency funds	CCD, UDA, CTB Legal Enforcement Authority (monitoring)	Rehabilitation of community monitoring programme	Skill development of target groups in CCD DS,UDA, CTB LA, M/Tourism Hot. Asso. DS,UDA, Legal Enforcement Authority	Disseminate information through printed and other media Programmes for target groups CCD, CTB, M/Tourism Hot. Asso.	< 2years for all activities
	2. Develop a mechanism to conduct regular permit compliance monitoring surveys.	CCD	DS,UDA, CTB LA, M/Tourism Hot. Assoc. DS,UDA.								
	3. Develop a programme of action to ensure that new developments do not occur in areas prone to erosion and floods.	CCD	LA M/Tourism Legal Enforcement Authority , Hot. Assoc.								
	4. Demarcate coastal segments and display sign boards indicating the amended setback distances.	CCD	DS, UDA CTB LA, M/Tourism								
	5. Initiate a programme of action in collaboration with relevant state agencies to take legal action against non-compliance of stipulated setback standards.	CCD	CTB, Hot. Assoc. LA DS, UDA Legal Enforcement Authority								
	6. Train staff of Divisional Secretariats, GSMB and CCD to monitor compliance of setback standards.	CCD	M/ Housing, UDA Legal Enforcement Authority								
	7. Formulate a programme of action to identify alternative sites and to relocate unplanned structures.	CCD	CCD								
	8. Identify State owned reservations which need strict maintenance (e.g. RDA, SLRD owned) and develop a collaborative mechanism to maintain them.	DS,UDA, Railway, RDA									

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
4. DESTRUCTION OF BEACH VEGETATION Replant natural vegetation on beaches where natural vegetation is damaged.	1. Identify and establish suitable cluster/ community organisations to carry out replanting in critical areas where natural vegetation id damaged.	DF, CCD	LA, NGO, CBO, Universities	CZMP policies and guidelines Forest Ordinance	US $ 50,000.00	GOSL funds Donor Agency funds	Post monitoring on changes in bed load transport and effectiveness by Universities, CCD , DF	To be considered under district development plans /river basin management	DF, CCD, Universities	Programmes for target groups Disseminate information through printed and other media DF, CC Media, NGO, CBO	3-5 years for all activities
	2. Formulate management mechanisms and replant beaches with natural vegetation in collaboration with cluster/ community organisations	DF, CCD	CCD, LA, NGO, CBO, Universities								

2.6.3 Degradation of coastal and marine habitats and decline of their biodiversity

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
1. DESTRUCTION/ OVEREXPLOITATION OF RESOURCES WITHIN COASTAL AND MARINE HABITATS Formulate and implement appropriate management strategies in selected locations and declare critical sites as protected areas and suitable areas as eco-tourism areas	1. Establish effective communication tools with stakeholders to conserve and enhance ecological, aesthetic and recreational value of coastal and marine habitats.	M/E&NR, DWLC, M/FOR	CCD, LA	DWLC,DF, CCD Act, Legal Enforcement Authority	US $ 500,000.00 for all projects	GOSL funds Private sector funds Donor Agency funds	CTB, CCD, DF, DWLC, NARA.	Study and implement appropriate measures	CTB, CCD, DWLC,DF,	Disseminate information through printed and other media Programmes for target groups CTB, CCD, DWLC,DF, Media, CBO, NGO, LA	3-5 years for all activities
	2. Formulate a programme of action to protect coastal/ marine ecosystems through creation of a market for the non destructive uses of coastal resources which will increase the rural income.	M/FOR DWLC M/E&NR	LA								
	3. Declare suitable areas as eco-tourism areas and promote participation of private entrepreneurs to establish eco-tourism projects in these areas with the required community participation	DWLC CTB	Private sector								

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation/ awareness	Project period
		Main responsibility	Support service								
2. CONVERSION OF HABITATS Strictly enforce regulatory measures and communicate with LA and communities to establish protection societies and develop public awareness among them.	1. Coordinate with relevant agencies to formulate mechanisms and prepare guidelines to manage areas outside the jurisdiction of CCD.	DWLC, M/E&NR CCD	DF, DWLC UDA,NARA, CCD, Land Commissioners Dept	CCD setback standards and guidelines Permit systems UDA,CTB guidelines	US $ 100,000.00 for all activities	GOSL funds Donor Agency funds	CCD, UDA,CTB	Study and implement appropriate measures	CTB, CCD, DF, UDA DWLC, Legal Enforcement Authority	Disseminate information through printed and other media Programmes for target groups Media, CBO NGO, DS,LA	3-5 years for all activities
	2. Collaborate with Local Authorities and formulate protection societies for effective communication and education to enhance interest and commitment for conservation of coastal habitats.		CTB, DF, DWLC, UDA								
	3. Prepare and distribute printed materials on environmental significance of coastal habitats.	CCD, NWPEA	CTB, DF, DWLC LA								
	4. Take necessary collaborative action to prevent and mitigate problems of invasive plant and animal species.	CCD, NWPEA	CTB, DF, DWLC LA, M/ I&WM								

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation/ awareness	Project period
		Main responsibility	Support service								
3. HABITAT ALTERATION DUE TO UPSTREAM ACTIVITIES Coordinate with relevant organisations and develop mechanisms to reduce habitat alteration caused by upstream development activities.	Develop a mechanism to integrate coastal habitat management with watershed management to minimise pollution/siltation/ salinity changes caused by upstream development activities including irrigation works.	CCD, M/I&WM, M/E&NR	LA, CEA, DA, WRS	Review and introduce appropriate regulations and standards Review and adopt new legal provision CEA, AD standards	US $ 200,000.00 for all activities	GOSL funds Donor Agency funds	CCD, CEA, AD, M/I&WRM,. Registrar of Pesticides, WRS	Study and implement appropriate measures	CCD, AD, M/I&WRM,. CEA, WRS DF, NARA,	Disseminate information through printed and other media Programmes for target groups CCD, AD, M/I&WRM,. CEA, WRS DF, NARA Media, CBO NGO DS,LA	< 3 years for [illegible]
	Initiate a monitoring programme to determine the effects of agricultural run-off on coastal and marine waters	M/E&NR	NARA, WRS DA								
	Coordinate with relevant agencies to formulate programmes to regulate the excessive use of fertilisers and agrochemicals in agriculture.	DA Registrar of Pesticides	CCD, M/I&WRM,								

2.6.4 Degradation of environmental quality of sites of special significance

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation/ awareness	Project period
		Main responsibility	Support service								
1. HAPHAZARD DISPOSAL OF SOLID WASTES Minimize haphazard disposal of solid wastes in identified areas through suitable management and regulatory measures and through awareness.	1. Assist Local Authorities in Muthurajawela, Morawala in the Negombo beach, Madu ganga, Seenigama, Hummanaya, Bundala National Park and Nilaweli beach to identify Landfills in environmentally less vulnerable locations.	M/E&NR, CEA, M/HAPCLG	BOI-BII CCD, UDA, CTB, LA, DWLC BOI, BII	CCD, UDA, CEA, CTB, BOI,BII guidelines	US$ 100,000.00 for all activities	GOSL funds Donor Agency funds	M/E&NR , CCD, CEA,CTB,DWLC, UDA	Study and implement appropriate measures	CEA, M/E&NR CCD,UDA, CTB, DWLC	Disseminate information through printed and other media Programmes for target groups CEA, M/E&NR CCD,UDA, DWLC, CTB, Media, CBO, NGO, DS, LA	<2 years for all activities
	2. Encourage and assist relevant Local Authorities to implement environmentally sound ways of waste minimisation through projects for composting, biogas generation, etc. with community participation.	M/E&NR, CEA, M/HAPCLG	LA, NGO, CTB, UDA, CCD, M/E&NR, PC, DWLC, private sector BOI,BII								
2. LACK OF PROPER INFRASTRUCTURE FACILITIES Develop infrastructure facilities in the identified sites	1. Develop a program of action in collaboration with national and local authorities to develop/upgrade infrastructure facilities in critical religious/ cultural/ scenic areas.	M/ Environ., UDA, LA	DWLC, DF, LA, CTB, DNP, CCD, DS,PC, RDA,DOF, MPPA	CCD, UDA, CEA, CTB, RDA guidelines	US $ 100,000.00 for all activities	GOSL funds Donor Agency funds	CCD,UDA, DWLC, DF, CTB, DNP, RDA, DOF, MPPA	Study and implement appropriate measures	UDA, DWLC, DF, LA, CTB, DNP, CCD, DS,PC, RDA,DOF, MPPA	Disseminate information through printed and other media Programmes for target groups UDA, DWLC, DF, CTB, DNP, CCD, DOF, MPPA Media, CBO, NGO, DS,LA	>5years for all activities

Strategy/Main Project	Activity	Organisational arrangement		legal and enforcement mechanisms	Financial requirement	Financial mechanism	Research and monitoring	Contingency planning	HRD/ Education	Public participation / awareness	Project period
		Main responsibility	Support service								
3. DISPOSAL OF WASTEOIL AND OTHER CHEMICALS Ensure that all industries that are likely to cause physical alteration through their emissions to sites of significance are minimised through regulatory measures.	1. Develop a mechanism to ensure that the industries/ other activities within the significant sites adhere to guidelines pertaining to effluent discharge.	M/E&NR, NWPEA	CCD, UDA, MPPA, CEA	Amendments to legislation with regard to spill response and compensation CEA guidelines	US $ 100,000.00 for all activities	GOSL funds Donor Agency funds	CCD, UDA, M/E&NR, MPPA, CEA, DWLC, DF	Study and implement appropriate measures	CCD, UDA, MPPA, CEA M/E&NR, DWLC, DF	Disseminate information through printed and other media Programmes for target groups CCD, UDA, MPPA, CEA M/E&NR, DWLC, DF Media, CBO, NGO, DS, LA	3-5 years for all activities
	2. Declare and implement Special Area Management Plans for Muthurjawela, Morawala in the Negombo beach, Madu ganga, Seenigama, Hummanaya, Bundala National Park and Nilaweli beach.	DWLC CCD	M/E&NR, UDA, MPPA, DWLC, DF, CBO, NGO								
	3. Introduce and implement international rules and regulations for the disposal of waste oils and other chemicals during ship breaking and maintenance.	M/E&NR, CEA MPPA	M/E&NR, CEA								

2.7 Implementation of Policies, Strategies and Actions

The policies and strategies spelt out in this document require the implementation of a series of actions that are logical and well organised. This calls for a innovative approach in the implementation procedure where a greater emphasis is placed on the active participation of all stakeholders of the relevant priority areas as well as from the civil society.

The major task in the implementation procedure is the coordination and obtaining the cooperation and collaboration of agencies/ organisations responsible for prescribed actions. There is a multiplicity of agencies and institutions with their own legal framework to deal with some actions specified in this document. In some instances one specific action is being dealt with more than one authority and hence a good coordination is of utmost importance. Similarly, a quick and effective system has to be developed when a new policy or legal provision has to be adopted.

Taking these requirements into consideration the Government of Sri Lanka has already formed a top level inter sectoral committee consisting of Secretaries of the Ministries responsible for coastal and marine affairs, industries, housing and infrastructure, health, agriculture and lands and forestry and wildlife with the chairmanship of the Secretary to the Ministry of Finance, to deal with environmental policy and management. This committee (Committee on Environmental Policy and Management- abb: CEPOM) will be the apex of six sub committees of the sectors mentioned above. The Secretary of the relevant Ministry chairs each sub committee with the Secretary of the Ministry dealing with environment acting as co-chairperson. These sub committees will be represented by all stakeholders of relevant sectors, both government and non government.

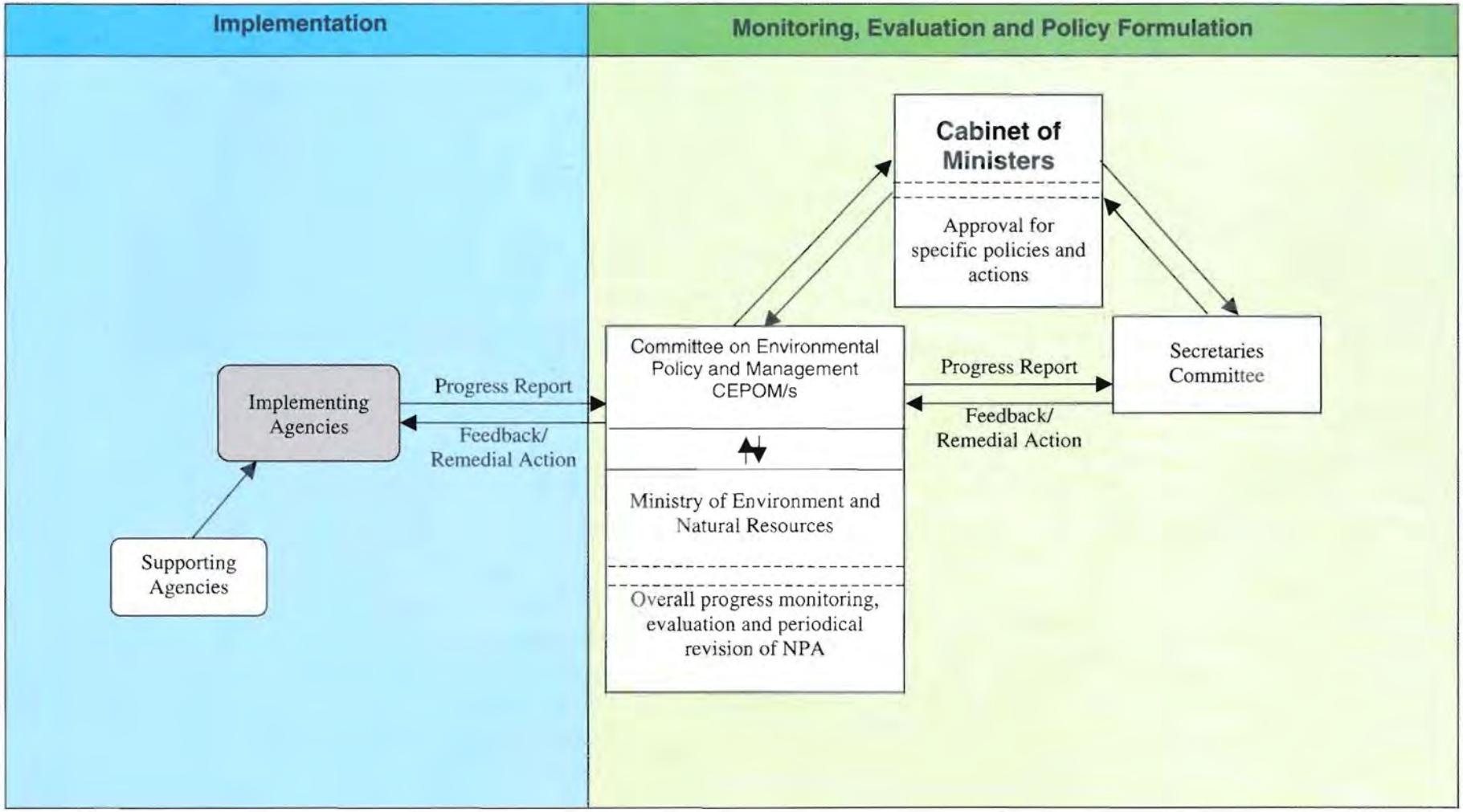
Implementation of the programme of actions proposed in this action plan (NPA) is the sole responsibility of each sub committee. Any additional inputs (i.e financial, new policy or legal provisions) will be dealt with by CEPOM.

Progress review meetings of sub committees will be held once in four months where the constraints will also be discussed that will later be resolved through CEPOM. CEPOM will be reporting all matters pertaining to the plan to the National Operations Secretariat established to monitor the progress of all projects that are to be aimed at the newest Government Policy "Regaining Sri Lanka".

Whilst it is desirable to achieve a full implementation, it may not be possible to do so due to constraints such as financial and implementation capacity. Thus implementation of actions that are most urgent under each area (which are indicated on a priority basis) from among the currently available resources is necessary. Establishment of pilot projects that are most urgent on a conceptual basis that can be extended subsequently to other areas experiencing similar adverse impacts will constitute the initial step in implementing the programme of action. This calls for a commitment at national level from the government to make available the necessary budgetary allocations to relevant agencies/institutions for implementation at least the priority areas of actions.

Project Implementation Mechanism

of the National Programme of Action for the Protection of Marine Environment from Land-based Activities



Part 03
Pilot Project Proposals

Proposal No 01

Project Name **Pilot Project on Solid Waste Management for Wattala Pradeshiya Sabha, Gampaha District, Western Province, Sri Lanka**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agencies	**Wattala Pradeshiya Sabah** **Western Provincial Council,** **Ministry of Provincial Councils and Local Government**
Project Period	**Five Years**
Project Cost	**US $ 510,000.00**

1.0 Background

Solid waste is a growing problem in Sri Lanka aggravated in the absence of proper management systems. Based on an island-wide survey carried out by the Ministry of Forestry and Environment in 1998, around 2700 tons of solid waste is collected by Local Authorities (LAs) per day from Sri Lanka. According to the Local Government regulations the management of solid waste is the responsibility of each LA. However majority of the LAs in the country have failed to manage the solid waste collected from their areas of jurisdiction due to lack of technical and financial resources.

Many environmental and health problems are created as a result of haphazard dumping of waste. Spread of communicable diseases, generation of flies and mosquitoes, malodors, and unpleasant landscapes with solid waste dumps are among the threats created by waste. Recent outbreaks of Dengue and repeated incidences of dysentery and similar diseases are caused by ad-hoc solid waste disposal. Air pollution caused by open dumps cause major social and financial problems to the communities in the area.

Solid waste generated in the country is mostly organic in nature. However with the increasing life styles of the people, more and more metal, non degradable plastics and polythene get added to waste, specially in suburban areas like Wattala. While non degradables put a burden on fire environment, the metals and toxic waste found in domestic, industrial and in clinical waste, when present in the waste pile cause severe hazards to the environment specially through the pollution of surface and ground water due to haphazard dumping of such waste.

Apart from a few success stories from small scale interventions, Sri Lanka has no integrated programs to address the solid waste management issues. The lack of infrastructure, human resources, institutional and legal instruments and financial resources has hampered the establishment of a functional mechanism for the proper management of solid waste.

2.0 Project Description

Wattala Pradeshiya Sabah (PS) is a Local Authority (LA) located in the Gampaha District in close proximity to the Colombo City. It covers an area of 54.6sqkm, with a population of 182,792. There are 32,320 households within this Local Authority area. Wattala PS is bordered by the Indian Ocean and a major canal flows through the area to join the sea. This canal is presently polluted with solid waste and other types of pollutants from industries. The Muturajawela Marsh the Negombo Lagoon eco system is situated within this LA area. There are major coastal ecosystems in the country, which also has a historic and cultural significance to Sri Lanka.

Wattala PS is a densely populated semi urban area with a large number of commercial establishments, industries, and households situated within its area of jurisdiction. The amount of solid waste generated from the area is about 14 tons per day and the Local Authority already has a rather established system for collecting of waste. More than 70% of the waste collected within the area consists of organic waste, making biodegradation possible in the short term.

One of the major constraints faced by local authorities in the country is the lack of appropriate waste disposal sites owned by the local authorities for environmentally sound disposal, such as sanitary landfills, and Wattala PS is no exception. Due to lack of proper disposal facilities the local authorities dump collected wastes in low lying areas such as in wetlands, barren lands, and in seashore creating environmental health and sanitation problems, bad odor, and pollution of surface and ground water.

However the Wattala PS has a distinct advantage in waste disposal over the rest of local authorities in the surrounding areas. This Local Authority owns a site of 125 km^2, which has been subject to an Environmental Impact Assessment for use as a sanitary landfill by the Local Authorities in the Colombo Metropolitan area with World Bank assistance in 1994. However, the project was not implemented and the site is still available. The Wattala PS would like to convert a part of this land for a semi engineered land fill to dispose of its waste in a more environmentally sound manner. It is also willing to share the land with other local authorities in the surrounding area who do not have any land for the construction of a sanitary landfill at a cost, because they. The Local Authority expects to enter into suitable partnerships with competent private sector or with Non Governmental Organisations (NGOs) for the construction and operation of this landfill on Build Own Operate (BOO)/Built Own Transfer (BOT) basis or in other acceptable legal methods. However funding will be necessary for the feasibility study.

2.0 Project Components

The proposed pilot project is based on the National Strategy for Solid Waste Management – which spells out the Government policy in managing solid waste. The National Strategy for Solid Waste Management (NSSWM) advocates reducing of waste generation over recycling and recycling over final disposal. Sorting out waste is strongly recommended to facilitate economically feasible recycling. The proposed project envisages to implement a pilot scale Solid Waste Management program to facilitate the implementation of the NSSWM island-wide.

Activity 1 Reduce Generation of Waste

The residents of the area will be educated to reduce the amount of waste generation through various methodologies. Large-scale awareness programs will be undertaken with special emphasis on school children to promote source reduction and source segregation. Guidelines to reduce waste Generation at source and other management options will be developed and published.

Activity 2 Sorting of Waste at Point of Generation

The project will facilitate sorting of waste at the point of generation using the national colour code designed for this purpose. The NGOs will have to play a major role in assisting the LA in this activity. The households will be supplied with separate waste bins to collect waste separately. Bins will be placed in strategic locations for the sorted waste. Special attention will be paid for the sorting of organic waste from paper, glass and polythene in order to reduce the cost for the recycling industry. Markets, commercial establishments and hotels that are the major generators of solid waste will be participating in these activities.

Activity 3 Establishment of a Proper Waste Collection System

The present waste collection system of the LA will be reorganized with new machinery, and equipment added. The SWM workers will be trained to carry out their activities more efficiently using hygienic practices.

Activity 4 Application of Cleaner Production Technologies

The industrialists and commercial establishments will be encouraged to adopt Cleaner Production principles. The National Cleaner Production Center under the Federation of Chambers of Commerce, Sri Lanka will be assisting in this venture.

Activity 5 Establishment of a Waste Exchange Centre

Establishment of a waste exchange centre to store waste will facilitate the recycling industrialists to come over and purchase the recyclables such as glass, paper, coconut shells, plastic and polythene. Memorandum of Understandings (MOUs) will be signed to establish such partnerships with these parties.

Activity 6 Generation of Bio gas and Composting

The National Engineering and Research Development (NERD) Center has already constructed a biogas plant to handle market waste generated

within the Local Authority area. However, it is not possible to feed unsorted waste into these plants, and hence these plants are not operating efficiently at full scale at present. Once the pilot project is in place, the waste will be sorted, and hence the organic component of the waste will be taken to the biogas plant which is situated within the Local Authority area itself. A quality control of compost will be developed.

Additional step to be taken to link with other LAs to obtain market garbage to facilitate these LAs to dispose market garbage in an environmentally sound manner. The existing system has a capacity to handle 50 Tons of market garbage per day.

Activity 7 Capacity Building and Human Resource Development

The Solid Waste Management (SWM) workers and the officials who are involved in the waste management area need to be trained in new Solid Waste Management (SWM) techniques. Their capacities should be developed to implement suitable SWM program

Activity 8 Feasibility and Environment Studies to establish a semi engineered landfill

Carrying out feasibility cum environmental study to establish a semi engineered land fill facility.(As a short and medium term solution)

Activity 9 Construction of a Sanitary Land fill

Construction of a sanitary landfill under Build Own Operate (BOO/Build Own Transfer (BOT) terms as a long term solution for final disposal.

Activity 10 Project Co-ordination and Monitoring Committees

A Project Co-ordination and Monitoring Committee to evaluate and monitor the progress of the implementation of the project will be established under the chairmanship of the Chairman of the LA. The committee will comprise of representation from the related agencies including M/E&NR, (CEA), Urban Development Authority (UDA), NRED Centre, Western PC, Universities, NGOs, media, etc.

Project Outputs / Benefits

Wattala PS is a semi urban local authority and there are small and medium industrial establishments ranging from garment , polythene, paint, metal and steel , timber processing, packaging , food processing and tourist hotels. In addition there are vegetable markets, super markets, fish and meat stalls generating more bio degradable waste to the waste stream. The Local Authority owns about 10 small carts and tractors for the waste collection and around 75 workers are employed. At present the waste collected is being dumped in a low land creating many problems. Some portion of the waste is put in the canal thus causing high pollution in the canal.

Expected Outputs from the Project

In implementing this pilot project, it is expected that the Wattala PS will have

1. An effective waste collection and transport system developed for the Wattala PS
2. A mechanism for re-use and recycling of solid waste, analyzed

and developed for the Wattala PS

3. Final waste disposal facilities evaluated and planned out.
4. Private sector provided with incentives to undertake solid waste management related business ventures
5. Research and development network planned to serve solid waste management needs
6. Strategies to promote for community participation and incentives for the public to actively participate in SWM
7. Education and awareness creation in SWM and capacity building and human resource development of the SWM officials
8. Effective law enforcement strategies in place
9. Financially viable institutional mechanisms developed for implementation, coordination and monitoring planned out
10. An effective Project administration system

Project benefits

1. The project will enhance the ability of the Local Authority to manage the waste generated in the area. Proper management of waste will improve living conditions of the area, and will enhance tourism and benefit the hotel industry.
2. Wattala being an area which is boarded by the sea, this project will eliminate the pollution load reaching the sea, thereby improving the marine eco system too. The Muturajawela Wetland, which is an important coastal ecosystem situated in the area will be substantively benefited by the implementation of the project, since presently it is being encroached upon to dump waste.
3. The project will specifically address the present problems of inadequate solid waste management issues in an integrated and sustainable manner in the Wattala PS area. It will also demonstrate to other LAs to deal with the problem of solid waste in an integrated manner.
4. It is expected that other LAs will make an effort to learn from experiences gained in this pilot project in order to implement similar projects in their areas and protect the marine environment from adverse impacts of haphazard disposal of solid waste. The project will implement strategies identified in the National Strategy for Solid Waste Management (NSSWM) and the collaboration of the relevant stakeholders will be obtained from the initial stage itself.

The Relationship of the Project to the National Polices and the NPA:

The Muturajawela Wetland, which has an extent of around 8000 Acres is the largest natural wetland in the South-West region of Sri Lanka. It is also one of the most important wetlands in the country. This wetland is situated in the Wattala PS area and presently several parts of this wetland is being filled with waste by Local Authorities and other entities, due to lack of proper waste management systems. Most of the major water ways flowing through the Wattala PS area is polluted due to the disposal of waste into these by commercial institutions and also by the people who live along the banks of these water ways. These activities pollute the marine

environment and the sea which borders the western boundary of the Wattala PS.

The proposed project is in conformity with the national policies and priority actions identified in the development activities of the government. It also conforms to the National Environmental Policy and the National Strategy for Solid Waste Management. The National Strategy for Solid Waste Management (NSSWM) outlines priorities in solid waste management and the proposed pilot project endeavours to translate a priority into action. It also demonstrates that the national Government could assist Local Authorities to manage solid waste by providing assistance required by the Local Authority in this manner. It also underscores the fact that solid waste management should be carried out in collaboration with all relevant stakeholders in an integrated manner.

Project Cost and Time Targets

It is expected that the project would envisage a substantial expenditure to implement the Pilot Project for a period of five years. The cost estimate for the project over a period of 5 years will be approximately US$ 510,000. The detail breakdown of the project cost together with time targets are given in the table.

No	Activity	Year 1 us $	Year 2 us $	Year 3 us $	Year 4 us $	Year 5 us $	Total us $
1	Reduce generation of Waste	5,000	5,000	5,000	5,000	5,000	25,000
2	Sorting of waste at point of generation	10,000	10,000	10,000	5,000	5,000	40,000
3	Establishment of a proper waste collection system	50,000	50,000	25,000	25,000	10,000	160,000
4	Application of Cleaner Production Technologies	5,000	5,000	5,000	5,000	5,000	25,000
5	Establishment of a waste exchange center/centres	10,000	-	-	-	-	10,000
6	Generation of bio gas system with quality control system for compost	5,000	5,000	-	-	-	10,000
7	Capacity Building and Human Resource Development	10,000	10,000	10,000	10,000	10,000	50,000
8	Feasibility and Environment Studies for a sanitary landfill	20,000	20,000	10,000	-	-	50,000
9	Construction of a Sanitary Land fill	-	-	50,000	50,000	30,000	130,000
10	Project Co-ordination and Monitoring Committees	2,000	2,000	2,000	2,000	2,000	10,000
11	Total	117,000	107,000	117,000	102,000	67,000	510,000

The Project envisages to provide a suitable solid waste management program for the Wattala PS. This project will be implemented as a pilot project to demonstrate how a successful solid waste management program could be implemented in the country. The contribution of the Government of Sri Lanka and the Wattala PS will be made available to provide necessary support services such as office space, information and data required etc. This project costs will also be met out of a cooperative effort by the Government and the Local Authority.

Proposal No 02

Project Name **Pilot Project on the Design of an Appropriate Sewerage System for New and Improved Settlements under the Lunawa Environment Improvement and Community Development Project, Western Province, Sri Lanka**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agency	**Ministry of Housing and Plantation Infrastructure,** **Moratuwa Municipal Council** **Dehiwala – Mount Lavinia Municipal Council,**
Project Period	**Five Years**
Project Cost	**US$ 510,000.00**

1.0 Background

The Lunawa lake basin is an environmentally degraded area due to a combination of human and natural factors affecting the area over a long period of time. It has been estimated that an area of seven Km^2 in Lunawa catchment has been subject to habitual flooding at a frequency of four to six times per year. Inundated depth of water is 50 to 100 cm and the duration is around ½ to one day. Lunawa Lake, which earlier supported a fisheries industry is now devoid of aquatic life to a significant extent and considered to be biologically dead.

The Lunawa Environment Improvement and Community Development Project (LEI&CDP) has therefore being implemented by the Ministry of Housing and Plantation Infrastructure. The objectives of the LEI&CDP is to improve the environment and to uplift the quality of life of people in Lunawa area by alleviating flood through the improvement of storm water drainage system, including the rehabilitation of existing canals and streams, creating a hygienic and pleasant environment through the improvement of storm water drainage systems and, upgrading the living condition of the (a) communities identified for resettlement (450HHs) and (b) under-served communities (11) in inundated area (441HHs).

2.0 Project Description

1). Lunawa Catchment comes under two Municipal Councils (MC), namely Dehiwala - Mt Lavinia MC (MLMC) (Lunawa North Catchment) and Moratuwa MC (MMC) (Lunawa South Catchment).

During the last decade, several large-scale flood control and environmental improvement projects were implemented. These projects attempted to provide technical solutions to the problems which persisted in low lying areas and the projects were typically viewed in an engineering perspective with very little involvement of beneficiaries and affected persons. The experience gained from the implementation of theses projects has revealed that the sustainability of the project and their benefit to people would have been enhanced and the adverse impact of the project-affected person could have been minimized if there were effective community participation in project implementation from the planning stage itself.

The lessons learned from the work during the last decade is experience led to a new innovative approach to improve the low lying environmentally degraded urban areas. This new approach is a strategy that enables an orective merger between participatory community development and human settlement components with technical solutions. As such the new project, Lunawa Environmental Improvement and Community Development Project was designed within this new framework of a technical and community development perspective with an objective to improve the environment and uplift the quality of life of people in the area by alleviating flood through improvement of storm water drainage systems, including the rehabilitation of existing canals and streams, thus creating a hygienic and pleasant environment in the Lunawa catchment area.

Therefore, the project's main component (Technical) of storm water drainage improvement is effectively supplemented and reinforced by a well-designed community development component. The grass-root level implementation of the project which adopts a participatory community based approach to ensure active beneficiary community involvement is coordinated by the two Municipal councils of the project Area, i.e. Dehiwala Mt. Lavinia MC and Moratuwa MC, while community involvement is facilitated by NGOs.

The LEI&CDP has been designed as a program which combines technical and social investment and building institutional capacity needed to support sustainable management of renovated canal system and sea outfall as well as waste disposal and proper disposal of sewerage. The involvement and participation of people living adjacent to the canal and the lake are integral features of the project which assure effective implementation of this project to achieve sustainable development.

2.1 PILOT PROJECT

The provision of sanitation to the resettled communities is a key issue and past arrangements for sanitation to low-income communities have not been completely successful and sustainable. It was therefore decided to apply to the Ministry of Environment under the National Program of Action for the Protection of Marine Environment from Land-based Activities in Sri

Lanka to implement a pilot project and develop sustainable cost effective, environmentally and socially acceptable solutions for sanitation needs of the resettled communities. The objectives of the pilot project are;

- To assess the sewerage disposal requirements of the proposed resettlement sites and upgrading sites and conduct feasibility studies for suitable sewerage disposal systems
- To design sewerage systems for the settlements and ensure all households in the resettlement sites use the developed sewerage system
- To develop sustainable maintenance system and systematic handover of ownership to operate the sewerage system

It was decided to select and design sewerage systems for one resettlement site and one improvement site selected from among the 22 sites coming under the LEI&CDP.

2.2 METHODOLOGY

The methodology adopted for the pilot project is summarized as follows:

1 Conducting a literature review for the following;
   - Selection of appropriate options for sewerage collection, treatment and effluent disposal
   - Enable the effective performance, maintenance and community acceptance of small-scale sewerage systems previously implemented in Sri Lanka
   - Upgrade the relevant municipal by-laws and regulations

2 Determine the views of the community regarding their sanitation requirements and satisfaction with current arrangements through a questionnaire survey

3 Select suitable systems for the two sites based on the literature review and the community survey

4 Design the systems for the selected sites

5 Develop sustainable financial and institutional measures for the successful operation and maintenance of the systems with provision for the handover of ownership of systems to the community

This report contains a description of the sites selected for the pilot project, a brief summary of the work carried out under the literature review and community survey and describes the work-plan for the remainder of the project.

3.0 Project Components

Following are the details of two pilot projects identified by LEI&CDP in the DMMC and MMC limits. Pilot projects have been selected to cover both onsite upgrading and resettlement.

3.1 Peerugahawatta (Resettlement Site)

Peerugahawatta is located in the Moratuwa MC area, boarding the Lunawa main canal this is a land earmarked for the resettlement

of approximately 106 families who are displaced due to the widening of Lunawa canals. The extent of the land is 1.4 ha.

The project proposes to distribute 50m^2 land plots proposed to be distributed among the respective families. Areas have been reserved for road, storm water drains and open spaces in the proposed layout plan. Water supply will be made available from the commencement date of the project.

Proposed Activities

An appropriate sewerage disposal method suitable to the resettlement project will be installed. In addition to the above, special emphasis will be given to identify a solid waste disposal system

3.2 Garden No 37 (Upgrading Project)

This is an underserved settlement identified under the onsite-upgrading component of the LEI&CDP with 77 households. Garden No 37 is located in the DMMC area bordering one of the secondary canals. Lands are planned to be regularized based on the principle that the proposed land blocks are to be kept to a minimum size of 50 m^2 as much as possible irrespective of the lands occupied by the families and with minimum dislocation of houses.

Proposed Activities

- **The activities are similar to that of the Peerugahawatte (resettlement site) and land areas will be reserved for the same in this upgrading site.**
- **In order to provide hygienic and clean environment within the settlements, it is important to introduce an appropriate sewerage disposal method suitable to the existing site conditions.**
- **Introduction of a proper solid waste disposal method in these settlements is also an important factor to be considered in providing a clean and hygienic environment.**

Project Activities

Activity 1 Literature Review

A detail literature review on appropriate sanitation options will be carried out. The review focuses on systems relevant to low-income communities. There is also a detailed study of the performance, maintenance and community acceptance of several on-site systems for low-income communities that have been implemented in Colombo and its suburbs since 1989 (Open University of Sri Lanka – report under preparation). Detailed guidelines for the design and construction of septic tanks are available in the draft Code of Practice developed in 2003 by the Sri Lanka Standards Institution.

Activity 2 Community Survey

A Community Survey will be carried out to assess the present conditions of the settlements. The questionnaire with eight sections was administered in Sinhala. The first two sections, identified as A and B deal with general details and the details of the toilets in each house which are common to every household. Afterwards the questionnaire deals with different sections applicable to households with toilets and for households with toilets shown separately.

Households with toilets are assessed with respect to

- Disposal of bath and kitchen water
- Performance of the toilet, reasons for failure and expenses incurred for maintenance
- Status and performance of effluent disposal system
- Required improvements in sanitation arrangements and willingness to contribute to the construction and maintenance of the improvements

The sections relevant to the households without toilets were

- Sanitation arrangements
- Disposal of bath and kitchen water
- Status, performance, maintenance and user satisfaction of the common toilets
- Required improvements in sanitation arrangements and willingness to contribute to the construction and maintenance of the improvements.

The questionnaire was administered to a total of 176 households in four areas as identified in Table 1. These areas were selected in a manner that a broad cross-section of existing sanitation arrangements, economic status of households etc. were represented. The number surveyed is approximately 30% of the total number of households that will be affected by improvement and resettlement activities under the LEI&CDP.

Table 1: Details of area coverage in the Community Survey

Name of Area	Number of Households Surveyed
37 Watta	76
Fishery housing scheme	55
Bangala Para	33
Michael Para	14

Selection of Sanitation Options

Based on a preliminary assessment of the literature review, previous experience, results of the questionnaire and an assessment of the site conditions, the following options are proposed for the two sites.

1 **Peerugahawatte (Resettlement Site)**

Simplified sewerage connecting 10 to 40 houses to a treatment unit consisting of a common septic tank followed by an anaerobic filter. The effluent from the anaerobic filter can be discharged to

the lagoon or further treated depending on the applicable regulations.

2 **37 Watta (Upgrading Site)**

On-site treatment by means of a septic tank for each house and the effluent from the septic tank can be collected by a simplified sewer for further treatment.

Regulatory Issues

The proposed solutions envisage the discharge of treated effluent to the canal. Such disposal may not conform to the relevant CEA regulations under very strict interpretation. Furthermore the Municipal regulations will have to be modified where necessary to accommodate the proposed solutions.

The Relationship of Project to the National Polices and the NPA:

This project is in conformity with the national policies and priority actions identified in Regaining Sri Lanka document in which all the development activities of the government are spelt out. The Lunawa lagoon and its eco system has been subject to deterioration due to pollution from industries and other land based activities. This project is one component of the rehabilitation of the Lunawa Lagoon. It will provide us with a model where the experiences and lessons obtained can be implemented under similar conditions.

Project Cost

It is expected that the project would envisage the following expenditure to implement the Pilot Project for a period of three years. The cost estimate of the project for a period of 3 years will be approximately US$ 507,103. The detail breakdown of the project cost is given below.

	ESTIMATE NO 01 -THE RESETTLEMENT SITE	
	Activity	Cost (US$)
1.	Land preparation and preliminary structures	31,000.00
2.	Sewer network	123,700.00
3.	Common septic tanks (3 nos) including anaerobic filters	104,000.00
4.	Treated effluent discharge points	72,165.00
5.	Establishment of a regular monitoring mechanism	15,464.00
6	Community orientation for management	10,310.00
	Sub total	356,639.00
	ESTIMATE NO 02 - THE UPGRADING SITE	
1.	Land preparation and preliminary structures	31,000.00
2.	Sewer network	104,000.00
3.	Community orientation for management and monitoring	15,464.00
	Sub total	150,464.00
Grand Total		507,103.00

Location Map of LEI&CDP

Proposal No 03

Project Name **The Study on Economic Significance of Coastal Region of Sri Lanka in the context of Social Political and Environmental Changes during the last decade**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agency	**Department of Coast Conservation**
Project Period	**One and Half Years**
Project Cost	**US$ 22,000.00**

1.0 Background

Sri Lanka is an island nation and the coastal region plays an important role in its economic development. The estimated coastline is seventeen hundreds km and over one third of its population lives in the coastal area. Twenty four percent of the country's land area is located in the coastal zone and more than sixty five percent of the island fish production is from the coastal area. The importance of the coastal region in the process of economic development has been recognized in various development activities. A variety of economic activities such as industries, tourism, transport and communications, wholesale and retail trade etc. Operate in the coastal region. The available economic statistics however are outdated. For instance, the latest available economic statistics on the coastal region is for the year 1989.

As a consequence of introducing the open market economic policies, several economic changes have taken place in the area of production and the service sectors in the coastal region. The level of pollution in the environment has also increased. Therefore it is imperative to update data and information based on the economic significance of the coastal region in Sri Lanka and to formulate and implement realistic coastal resources management and strategies in the context of social, political and environmental dynamics.

2.0 Project Description

At present Sri Lanka is divided into nine provinces which are again divided into 25 administrative districts, of which fourteen have maritime boundaries. These districts have seventy nine divisional secretariat divisions (D.S.D) with maritime boundaries. The total population in these fourteen maritime districts is estimated at 10.7 million (population survey in 2002). There is no separate coastal economic data base for DSDs. Also

there is no widely accepted definition of a coastal region in Sri Lanka. Some studies consider the coastal region to be in the area where economic activities are significantly influenced by proximity to the coast. The coastal region is generally considered as a DSD with maritime boundaries and an inland reach of up to 50 km.

Regional accounts serve economic planning development and management in several ways. These accounts provide a consistent and conceptual framework data base for planning and formulation of development projects. This is important in deciding allocation of resources among competing demands and privatization. These economic activities can be used as an analytical tool in economic policy formulation. For instance, they provide overall and sectoral growth rates, and economic relationship at a point or over a period of time. Regional accounts are also useful to analyze important aspects of a coastal region to evaluate the impact of national macro policies on various variables such as income distribution, employment, investment etc.

This study will estimate the Gross Domestic Product (GDP) for the coastal region by disaggregating national GDP in a recent year. Formulation and implementation of the Coastal Zone Management Plan (GZMP) is one of the major responsibilities of the Department of Coastal Conservation (DCC). The DCC generally revises the CZMP once in 4 years. The findings of regional coastal statistics can be used to formulate appropriate policies, strategies, programmes and projects of the department.

3.0 Project Components

The proposed pilot project is based on assisting the economic importance of the coastal region in the national economy. The project consists of 3 major activities in the context of social, political and economic and environmental, changes which have occurred during last decade and indicates the economic significance of national accounts.

Activity 1: Disaggregate GDP at national level into district level

Disaggregation of GDP at national level into District level using indicators involve. There are eleven sectors in the economy namely, Agriculture, Mining and Quarrying, Manufacturing, Construction, Electricity, Transport and Communication, Wholesale and Retail Trade, Banking and Real Estate, Public Administration, and Services. Indicators will be developed using several variables relating to gross output, revenue and employment in these sectors.

Activity 2: Disaggregate district level GDP into coastal DSD level.

The District level GDP is further disaggregated into Coastal DSD level at this stage. Indicators are developed using socioeconomic data at divisional level to breakdown district level GDP. Following is a summary of Coastal Regional GDP in different sectors.

Sectors	Indicators
Agriculture, forestry, fisheries and livestock	
Crops	Annual production quantity by crop for the DS divisions.
Forestry	Hectares of forested land, number of logs and quantity of firewood gathered.
Fisheries	Quantity of fish caught in the division (by species if possible)
Livestock	Size of herd by type of livestock in the division
Mining	
Gems Graphite, Clay and Mineral sand	Revenue from gross sales, Number of carats extracted by type. Revenue of gross sale, quantity shipped by type.
Manufacturing	Value added
Construction	
Residential	Number of houses built in the division by type of materials used and size. Approximate cost of construction of roads, bridges and other public works including dams, major irrigation projects etc
Non residential	Number. of new buildings or structures (Industrial, commercial, public buildings, farm structures), estimated cost of construction buildings.
Infrastructure	Number. and miles of new upgraded highways/roads, number and type of new bridges, other public works. Appox. cost of construction of roads, bridges and other public works, major irrigation projects etc. ,Irrigation work by type and value in division,
Land development	Land clearing and development (including dams, major irrigation projects etc.) No. of workers involved.
Utilities (Electricity, Gas and Water)	Number of accounts/ electrical services in the division by type (residential, commercial, factory etc.) New electric connections during the last year, revenue of CEB from the division Gas connection and revenue of gas company Water service connections (pipe) and revenue

Sectors	Indicators
Transport and Communication	
Road transport	CTB buses./ Private Buses gross revenue, number of buses, Motor vehicle registration, by type of vehicles, number. of employees
Air Ports and ports	Katunayake International Airport, Number. of passengers flights Regional airports. No. of flights/passengers Helicopter Service- No. of passengers/ flights Port: cargo loaded/unloaded in the port (no. of tonnes) ,Port revenue
Railway transport	Number of railway stations in the division; revenue collected by the stations, miles of rail tracks within the division Alternatives; number. of railway employees
Post offices	Number of post offices and sub post offices in the divisions, gross revenues from the post office in the division
Trade and Tourism	
Trade	Wholesale and retail trade Number of retail or wholesale trade outlets or stores in the division Gross revenue from retail and wholesale stores
Tourism	Number of hotels, motels and guest houses etc. in the division, bed capacity of each,
Finance Insurance, Real Estates and Business Service	
Banks	Number of Bank branches, total deposits, total loans and breakdown only by type in the division
Other financial Institutions Real Estate Companies	Rural and development banks, branches of insurance companies Number of real estate companies and agents or employees.
Private services	All other private services

Sectors	Indicators
Public Services	
Education	Private and public schools at all levels. Technical colleges and school music fashion, computer etc. Number. of students, number of teachers in the division
Health	Public and private hospitals and clinics in the division. Number of doctors, nurses, dentists opticians and so on.
Public Administration	Number. of public ministries, agencies, public corporations, number of employees. number of DS offices, Municipal councils, Gramaniladari,. amount of public expenditure.

Activity 3

The major objective of this activity is to conduct a survey and draft a report which will assist calculation of estimates for the Coastal Regional GDP (CRGDP). Some of the important areas identified are

1. Agriculture in the coastal region;
2. Mining and Quarrying in the coastal region;
3. Manufacture in the coastal region;
4. Services sector in the coastal region.

Project Out puts / benefits

The out put of the project will be as follows

1. Assessment of the current status of the major sectors in the coastal region. (E.g. Fisheries, Mining, Industries, Tourism, Urban development etc.)
2. Assessment of changes in each sector compared with the 1992 situation.
3. Estimation of the contribution from all sectors to the Coastal Regional GDP.
4. Forecast of prevailing trends based on 1992 and present findings.
5. Outline policy changes required in terms of the prevailing conditions of the economic significance of the coastal region.

Benefit of the project

The following benefits will be achieved through the project

1. The output of the project will improve the available data and information on coastal resources management policies in Sri Lanka.
2. The study will show the rapid changes that have occurred during the last decade in the area of economic, social and potential sectors.
3. Public agencies and other relevant agencies will be provided with the report in order to protect coastal environment and promote sustainable development.

The Relationship of Project to the National Polices and the NPA:

The coastal region is the largest and a very important economic sector in the Sri Lanka economy in terms of population, land area and economic services. The impact of national policies on the coastal region has not been evaluated at present. Findings and information on the economic significance of the relevant economic region would be greatly beneficial to the rest of the economy.

The project is in conformity will other national policies and actions stated in 'Regaining Sri Lanka' document which incorporates the current development strategies.

Project Cost and Time Targets

It is expected that the project would envisage the following expenditure to implement the Pilot Project for a period of one and half years. The cost estimate for the project will be approximately US$ 22,000. The detail breakdown of the project cost together with time targets are given below.

The estimated cost of the project is US$ 22,000 for a period of one and half years. The detailed breakdown of the project cost based on different activities is given below

No	Activity	Year 1				Year2		Total
		1st Qr	2nd Qr	3rd Qr	4th Qr	1st Qr	2nd Qr	Us$
1.	Literature survey and develop methodology	3,500						3,500
2.	Basic data and information collection*	2,500	2,500					5,000
3.	Data analysis		1,500	1,500				3,000
4.	Conduct survey and draft reports which are not available at present but are required to calculate coastal regional GDP			3,000	3,000			6,000
5.	Drafting report				1,000	1,500		2,500
6.	Preparation of the final report					2,000		2,000
7.	Submission of the final Report						X	
8	Total	6,000	4,000	4,500	4,000	3,500		22,000

*data and information collection and survey include cost of travelling, and subsistence.

Proposal No 04

Project Name **Pilot Project for the preparation of a zonal plan for the development of aquaculture in Hambantota District, Southern Province, Sri Lanka**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agency	**Ministry of Fisheries and Ocean Resources, National Aquatic Resources and Development Agency,**
Project Period	**Two Years**
Project Cost	**us $ 50,000.00**

1.0 Background

National Fisheries Development Plan envisages to develop aquaculture in order to boost domestic fish production as well as the foreign exchange earnings through fishery products exports. There are only two aquaculture practices that can match the industrial dimensions in Sri Lanka, namely, shrimp aquaculture and ornamental fish culture. Shrimp aquaculture and ornamental fish culture currently earn around SLR million 5000 and 680 respectively.

According to the development plan it is envisaged to expand the shrimp aquaculture into areas outside North-western coast and to develop other aquaculture practices in the island. However, there is resistance from community as well as environment concerned groups against expansion of shrimp culture into areas outside North-western coast. It is believed that the rapid expansion of the shrimp aquaculture industry without a prior zonal plan for its development in North-western coast led to many environmental problems, user conflicts and disease outbreaks in shrimp aquaculture. Hence, development of zonal plans for the development of aquaculture has become an essential pre-requisite in order to meet the set targets in the national fisheries development Plan.

2.0 Project Description

Hambantota District is located in the Southern Province of Sri Lanka. The area of Hambantota District was selected due to increasing interest shown in the development of shrimp culture projects by the private sector. In 1997 an area with an extent of 879 acres in Koholankala was identified to develop a shrimp aquaculture complex.

Evaluation of coastal lands and water resources for the suitability and environmental compatibility to different land base and water base aquaculture practices is to be conducted using a scaled-weighted checklist. The checklist includes physical, chemical and socio-economic parameters as well as regulatory and other development parameters. Parameters of the checklist which need periodic monitoring will be carried out to cover both rainy and non-rainy periods of the year. Two sets of criteria will be developed and utilised to evaluate the suitability and environmental compatibility of different aquaculture practices, along with the scales which indicate the magnitudes of each parameter in the evaluation. The sum of the results of the scales and weight assigned for each criteria for a given area will indicate its suitability for the selected aquaculture practice as well as the degree of environmental compatibility or incompatibility. Areas identified through this process will be designated as aquaculture zones including the identified practices.

3.0 Project Components

This project proposes to develop an environmentally sound zoning plan for aquaculture development on a pilot scale basis. In this regard National Aquatic Resources Development Agency (NARA) proposes to locate the pilot project in Hambantota District of the Southern Province where in the past, several entrepreneurs wanted to develop aquaculture projects. However they were unable to proceed with the project due to social and environmental issues. NARA believes that a proper planned aquaculture development prepared with community participation will pave the way for aquaculture development in the Southern Province. Therefore the proposal will be developed using participatory community appraisal techniques.

The present proposal for the development of a zonal plan for Hambantota District was prepared taking into account the outcomes of the community participatory appraisals held in Hambantota District.

Activity 1 Carry out a preliminary land use survey and preparation of a land use plan.

Conducting a preliminary land use survey on the present land use pattern has to be carried out in consultation with the local authorities, divisional secretaries, and land use planners. A land use plan has to be prepared showing the existing land use pattern

Activity 2 Preparation of a draft zoning plan

Preparation of a draft Zoning Plan identifying suitable locations for aquaculture development has to take into account the proposed development program, the eco system, and other related factors. It is proposed to carry out a preliminary land use survey on the present land use pattern. This has to be carried out in consultation with the local authorities, divisional secretaries and land use experts

Activity 3 Community Appraisal Programme

A community appraisal programmes will be carried out among the residents and the fishing communities to obtain the necessary information

regarding suitable areas for aquaculture and to obtain a feed back from the community regarding the draft land use zoning plan.

Activity 4 Finalisation of the Zoning plan

The draft zoning plan prepared in Activity 2 will be finalized incorporating the results of the community appraisal. A database will be prepared based on the Zoning plan.

Activity 5 Preparation of an Environmental Assessment Report

An Environmental Impact Assessment will be carried out for the areas identified in the Zoning Plan for proposed aquaculture development. Based on the outcome of the EIA study, the Zoning Plan will be converted into an Implementation Plan.

Activity 6 Preparation of an Implementation Plan

A project implementation plan will be prepared based on the Zoning plan prepared in Activity 4 incorporating the suitable administrative mechanism to implement the Plan.

Activity 7 Project Co-ordination & Monitoring Committees

A Project Co-ordination and Monitoring Committee (PCMC) to evaluate and monitor the progress of the implementation of the project will be established.

This committee will be chaired by the Secretary to the Ministry of Fisheries and Ocean Resources. The committee will comprise the representation from the related agencies including NARA, M/E&NR, CEA, NAQDA, Southern PC, Divisional Secretaries, Land use Planning Department, Local Authorities, NGO, media, etc.

Expected Outputs /benefits from the Project

In implementing this pilot project, it is expected to achieve the following benefits/outputs;

1. An effective Zoning Plan on Aquaculture Development Plan for Hambantota District will be developed
2. A proper implementation mechanism for aquaculture development in the Hambantota District will be established.
3. Identification of the existing eco system and suitable locations for aquaculture development in the future will be accomplished.
4. Preparation of guidelines to implement sustainable aquaculture development within the Hambantota District will be completed.
5. Creation of awareness among the community on the benefits of the sustainable aquaculture development will be achieved.
6. Research and development to improve the productive and environmental conservation will be carried out.
7. Creation of new employment generation activities to be achieved.

The Relationship of Project to the National Polices and the NPA:

Unplanned aquaculture development is one of the major land based activity which has direct impact on the pollution of the marine environment. During the last two decades unplanned aquaculture has caused severe

damage to the coastal eco system and the marine environment of the North- Western part of Sri Lanka. Since it is a major foreign exchange earner, this industry should be developed with necessary controls and protection to the environment and related eco systems. Preparation of a Zoning Plan for sustainable aquaculture incorporating necessary guidelines will protect the coastal and marine environment and would lead to sustainable aquaculture development.

The development of Southern Area is one of the major thrust areas identified by the Government and this activity would further facilitate the efforts of the Government for the sustainable development of the South.

Project Cost and Time Targets

It is expected that the project would envisage the following expenditure to implement the Pilot Project for a period of two years. The cost estimate for the project for a period of 2 years will be approximately US$ 50,000. The detail breakdown of the project cost together with time targets are given below.

No	Activity	Year 1				Year 2				Total US$
		Qtr 1 Us $	Qtr 2 us $	Qtr 3 us $	Qtr 4 us $	Qtr 1 us $	Qtr 2 us $	Qtr 3 us $	Qtr 4 us $	
1	Carry out a preliminary land use survey and preparation of a land use plan.	3,000	3,000							6,000
2	Preparation of a draft zoning plan		2,500	3,500	4,000					10,000
3	Community Appraisal Programme			3,000	3,000					6,000
4	Finalistion of the Zoning plan				4,000	4,000				8,000
5	Preparation of an Environmental Assessment Report						2,000	3,000		5,000
6	Preparation of an Implementation Plan							2,000	3,000	5,000
7	Project Co-ordination and Monitoring Committees	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	10,000
8	Total	4,250	6,750	7,750	12,250	5,250	3,250	6,250	4,250	50,000

Proposal No 05

Project Name **Pilot Project to Control River Sand Mining in the Deduru Oya River Basin to Mitigate Marine and Coastal Environmental Degradation in the North Western Province, Sri Lanka**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agency	**Ministry of Provincial Council and Local Government, North Western Provincial Council,**
Project Period	**Five Years**
Project Cost	**US$ 510,000.00**

1.0 Background

Watershed is a functional unit of the marine and coastal ecosystem. It governs mainly the marine and coastal sand balance and sustenance of most of the marine and coastal eco-systems such as mangroves, estuarine systems, mud flats, sea grass beds etc. Any adverse alteration in riverine water quality, water quantity or bed load etc, could lead to a replication of adverse impacts in higher magnitude in marine and coastal eco systems. In this context, the practice of sand mining, especially from river beds and banks, which leads to alter both the qualitative depletion of water and alteration in the bed flow of river, is a prioritized land based activity in the process of developing mitigatory measures for the protection of marine and coastal eco-system from solid waste.

2.0 Project Description

The pilot project is programmed in a manner, that it could be generally exercised as a model through out the country to control excessive sand mining. In this context, selection of a representative area for the pilot project is an essential step for the success of this exercise. The national committee for the preparation of a revised action plan, which comprises of multi disciplinary expertise and officials, decided to implement pilot project in the North Western Province (NWP) on the basis of the above selection criteria and considering the willingness of the Provincial Environmental Authority of the North Western Province (PEA-NWP) to undertake the project.

The PEA-NWP is the only provincial level environmental agency in the country having a Provincial Environmental Statute as per the provisions of the 13th Amendment to the Constitution of Sri Lanka, 1987. The Provincial

Environmental Statute (PES) No. 12 of 1990, which was enacted in terms of the concurrence list of the 13th Amendment, provides the legal backing to establish the PEA-NWP, in 1991. The land area in the province extending over 5176.32 sq.km. claims a significant proportion of countries marine and coastal eco-systems including, sites of special significance.

The province comprises of two administrative districts, namely Puttalam and Kurunegala. Puttalam district covers mostly dry zone part as well as the entire coastal zone of the province. The province consists of two main river basins namely, Deduru Oya and Ma Oya although, nine water streams flow across the territory of NWP. These two river basins significantly govern the formation and sustenance of marine and coastal eco- systems. Amongst the two river basins, Deduru Oya basin is entirely situated within the Province, except for the small portion of the head of the river system, which lies in the Central Province but treated legally as inter Provincial River. Deduru Oya, which flows across all the climatic and agro - ecological zones of the Province claims a river basin area of 2700 sq.km. However, in contrast to strong control over sand mining from Kelani River and Maha Oya, the pressure on Deduru Oya for sand mining has significantly increased. In this context, Deduru Oya river basin which is a geographical entity enclosed almost within a single administrative entity, (the NWP) is a unique scenario that meets with the appropriate site selection criteria for the project. Thus the project coordinating committee of the PEA-NWP, selected Deduru Oya basin as a suitable area for the project within NWP. However in order to overcome the temporal and financial constraints, the study was restricted to Deduru Oya main stream and adjoining eco-systems, excluding its fourteen tributaries.

3.0 Project Components

According to the results of the analysis carried out for the study, river sand mining is a key issue in relation to the marine and coastal environmental degradation. In the process of developing strategies to control marine and coastal environmental degradation due to river sand mining, main issue have been organized in a priority order based on the extent of their significance as listed in the table below. Control of existing mining practices, avoid, minimize or mitigate impacts and restoration of critically degraded riverine eco-systems are considered as the options available for the formulation of strategies and actions under the activity plan. The strategies and the activities there under, have been organized in such a way to address the base line social issues which govern the extensive sand mining from riverine eco-system.

The main causes of river sand mining and identified control strategies.

Cause of river sand mining	Control strategy
i. Ineffective enforcement of existing laws and regulations and lack of effective legislation.	Strengthen the law enforcement activities and strengthen existing laws and regulations.
ii. Lack of awareness.	Enhance public awareness and introduce community participatory programmes.
iii. Non-availability of proper government policy.	Formulation of guidelines for sustainable utilization of river sand.
iv. Abuse of fragile riverine eco-systems by the local community mainly due to poverty.	Empowerment of community, engage in sand mining to get partnership for achieving project objectives.

The specific objective of each identified strategy, major environmental components and subject to be protected and the key activities and actions their under to achieve the objective are discussed briefly as follows.

3.1 Strengthening of law enforcement activities and strengthening existing laws and regulations.

Objective: Control the illegal and excessive sand mining by the enforcement of existing regulations efficiently as well as review and update regulations for improving their effectiveness.

Components: Control illegal and excessive river sand mining and destructive practices in mining and transportation of river sand to protect the river bed, banks and associated fragile eco-systems.

Activities: utilise existing administrative mechanism or establish a proper administrative mechanism to exercise the prevailing regulations and review and update the same regulations in order to effectively address the issues associated with excessive sand mining.

3.1.1 Establishment of an administrative mechanism.

1. Establishment of a Law Enforcement Committee (LEC) in respect of river sand mining.
2. Strengthen the law enforcement capacity of Geological Survey and Mines Bureau
3. Establish a mechanism to incorporate recommendations and guidelines of LEC
4. Strengthen the law enforcement capacity of other relevant agencies such as PEA-NWP, DSs, LAs, the Police and the D/Forest..

3.1.2 Review and update the prevailing regulations pertaining to river basin management.

1. Establish a sub committee including legal and technical experts
2. Organize seminars and workshops to obtain views from the stakeholders, affected community and experts in the field.
3. Review existing legal provisions for sand excavation in the relevant laws; and recommend amendments.
4. Organise public hearings and expert consultation to review new regulations.

3.2 Enhancement of Public awareness.

Objective: Enhance public awareness in order to promote better practices and to eradicate wrong practices in sand mining in order to minimize adverse impacts upon marine and coastal eco-systems.

Components: Eradication of destructive practices in sand mining and obtain community participation in controlling excessive sand mining through awareness are considered under this strategy.

Activities: Two main tools identified to enhance public awareness to reach the objective are to conduct various categories of awareness programmes on the subject and organise various community participatory mechanisms in the implementation of river sand mining control programme.

Conduct awareness programmes.

The target groups identified are, school children, people engage in mining and related activities; encroachers in fragile areas (river banks etc.), people in construction industry, public officers, political leadership and community in general. The programmes will particularly address various aspects such as the functioning of riverine eco-system as a unit, social implications arising from sand mining, regulations on controlling the issue and possible substitutes for river sand etc.

3.2.2 Community participatory activities.

The target groups already identified will be given opportunities to participate particularly in the implementation of project activities, process of decision making and legislation formulation on sand mining control.

3.3 Formulation of Guidelines for Sustainable Utilisation of River Sand.

Objective: Introduce an appropriate policy frame work that guides the country to control and minimize river sand mining.

Components: Control the large scale use of river sand, especially as a building material in the country by providing substitute sand from sea to reduce commercial scale operation of river sand mining.

Activities: Two main tools to be incorporated for the formulation of policy measures are, direct control of sand mining and promote substitutes or substitute sources for river sand especially in the construction sector. The activities includes

3.3.1 Appoint panel of experts on short term basis (01 year) to formulate new policy, analysing existing policies and recommendations of the LEC

3.3.2 Organise seminars and workshops to strengthen political leadership community leaders, researchers, public officials and professionals in building and the construction sector.

3.3.3 Obtain views and concerns prior to and after the formulation of guidelines.

3.4 Adopt measures to obtain community participation in sand mining control and fragile ecosystem conservation and restoration.

Objective: Control excessive sand mining and destructive practises and sustain the control measures by changing attitudes and obtaining participation of the community.

Component: The people utilise fragile areas for sand mining thus endangering the resource in the fragile ecosystems. Stakeholders have to be made aware of negative consequences blowing from their actions and also empower them to protect the riverine eco-system and restore the system to it s original position

Activities: The two fold activities identified are empowerment of encroachers in fragile areas and also other people depending on sand mining due to poverty and the restoration of riverine eco-system, in particular the fragile areas, which are degraded due to excessive river sand mining.

3.4.1 Empowerment of the community.

Enhance skills, capabilities and the standard of living among the encroachers who live in fragile areas and bring about extensive damage through river sand mining and also the people engaged as labourers in sand mining industry through the preparation of a land use plans for management of river reservations and fragile eco systems. Regularising the community of encroachers by providing ownership rights to the lands, formation of community groups and community development centres, awareness creation, skill development programmes, providing necessary infrastructure and guidelines for self employment, facilitation of vulnerable groups like children, women and elderly people through welfare programmes to enhance their living standards and involving communities to get involved in the project implementation activities.

3.4.2 Restoration of the degraded areas of the river.

Restoration of the extensively degraded localities in riverine system as a result of sand mining is an essential action in order to maintain the status of eco system at current level and to sustain the control measures adopted through this project. The key actions identified are

- conservation of fragile riverine eco-systems (river banks and adjoining regions,) through demarcation of reservations, preparation of a database on land tenureship, existing land use practices and on severely degraded sites, adopting soil erosion control mechanisms and river bank stabilization measures .

- Identification of critically damaged river bed deposits and adopt modern technological methods for the restoration of such degraded localities.

- Identification and demarcation of the most vulnerable catchment areas, preparation of a database, and adaptation of protective agricultural practices with erosion prevention methods and development of a plan for river sand mining. The most vulnerable area of catchment fall within the Divisional Secretariats of Dodangaslanda, Keppetigala, Ridigama, Ibbagamuwa and Mawathagama.

3.5 Project implementation mechanism.

Existing administrative structure and capacities are inadequate for the implementation of a project of this nature, which essentially requires inter-disciplinary management approaches, considering the Deduru Oya river basin as a single management entity.

1 Establish an advisory committee for the coordinated management of the project implementation by incorporating relevant stakeholders including local level instructions.

2 All activities identified should be implemented through the "Project implementation office" established under the general administration of the PEA-NWP. Suitable officers should be appointed on contract basis and technical and administrative arrangements should be made available to complete the task within the given period of time.

3 Establish sand mining control project secretariat with necessary infrastructure (instruments and man power) facilities

Project Cost and Time Targets

It is expected that the project would envisage the following expenditure to implement the Pilot Project over a period of two years. The cost estimates for the project for a period of 2 years will be approximately US$ 276,200.00

The detail breakdown of the project cost together with time targets are given below.

The Financial Requirements and Time Schedule.

No	Activity	Year 1 (us $)				Year 2(us $)				Total (us$)
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	Qtr 7	Qtr 8	
1.0	**Strengthening law enforcement activities and strengthening existing laws and regulations.**									
1.1	Establishment of an administrative mechanism.	7,000	15,000	10,000	15,000	-	-	-	-	47,000
1.2	Review and update prevailing regulations pertaining to river basin management.	-	-	-	2,500	3,500	3,500	-	-	9,500
2.0	**Enhance Public awareness.**									
2.1	Conduct awareness programmes	-	5,500	7,250	4,850	5,350	4,850	4,850	5,350	38,000
2.2	Community participatory activities.	-	-	2,000	6,400	6,900	8,400	7,900	7,400	39,000
3.0	**Formulation of Guidelines for Sustainable Utilisation of River Sand**	-	-	2,000	4,000	1,650	1,100	1,050	1,200	11,000
4.0	**Adopt measures to obtain community participation in sand mining control and in conserving and restoring fragile ecosystems.**									
4.1	Empowerment of the community.	-	1,000	3,000	8,000	8,250	5,250	4,700	3,500	33,700
5.0	**Restoration of the degraded areas in the river.**	-	-	12,500	12,000	11,000	15,000	12,500	-	63,000
6.0	**Project implementation mechanism.**	4,375	4,375	4,375	4,375	4,375	4,375	4,375	4,375	35,000
7.0	**Total**	**11,375**	**25,875**	**41,125**	**57,125**	**41,025**	**42,475**	**35,375**	**21,825**	**276,200**

Proposal No 06

Project Name **The study on the assessment of squatter settlements and their linkages to coastal pollution along the coastline from Negombo to Kalutara**

Executing Agency	**Ministry of Environment and Natural Resources**
Implementing Agency	**Department of Coast Conservation**
Project Period	**One Year**
Project Cost	**US$ 12,850.00**

1.0 Background

The coastline from Negombo to Kalutara is located in the west coast of Sri Lanka and traverses through the administrative districts of Gampaha, Colombo and Kalutara. The total length of the coastline is approximately eighty kilometres and it is the most densely populated area in the three districts. The major urban centres, commercial nodes, transportation network and fishing centres are located in this coastline. During the last two decades, the environment of this coastal segment was under pressure to accommodate increasing population growth, in-migration and ad-hoc development. The population growth rate in Gampaha and Colombo districts has been increased by 1.9 and 1.3 percent respectively during the last two decades while the corresponding figure for the Kalutara district is 1.2 percent. The growth rate in the former two districts is above the national average of 1.2 percent. Population densities according to ranking order show that Colombo and Gampaha which are the largest districts in terms of population size rank as 1 and 2 and the Kalutara district ranks as 3

With the rapid population growth and the development activities taking place in these districts, human settlements gradually concentrated around the coastal areas. With these developments, land became a scare resource and prices were escalating. In such circumstances empty spaces along the coastline were attractive to those who were unable to afford housing elsewhere. A new wave of population migration into the coastal areas from north and eastern part of the country also appeared to have taken place during this period due to the war situation. Besides the above factors, rapid development of commerce, trade and tourism in the coastal areas too significantly contributed to the population concentration. In the

absence of proper coastal land management, the expansion of squatter settlements in the coastal areas was unavoidable.

In terms of spatial distribution, most of the illegal squatter settlements on this coast line have been located in the coastal reservations, railway reservations and road reservations. Specifically these settlements are concentrated in the areas such as Eththukala, Porutota, Wellavidiya, Duwa and Palliyawatta in Gampha district; Modera, Mattakkuliya, Dehiwala, Angulana and Moratuwa in Colombo district and along the marine drive from Moratuwa to Panadura river mouth and Kalutara North in Kalutara district.

At present, approximately five thousand housing units are found in this stretch of coastline. These houses are temporary, semi-permanent or permanent in nature and the majority of housing units comprise of semi permanent structures. Most of them do not have proper sanitation and waste disposal facilities. Hence they tend to use the coast as a dumping ground for waste. Apart from the degradation of aesthetic quality, it causes damage to the fauna and flora of the coastal environment and create user conflicts.

2.0 Project Description

To ensure the long term sustainability of the coastal resources, it is important to minimize the negative impacts of squatter settlements located within the coastal areas. The piece meal approaches originating from the central level agencies were not effective enough to control and minimize the negative impacts of illegal settlements on the coastal lands. As a result, the problem further aggravated with the increased rate of illegal encroachments. In considering the implementation, deficiencies in the past and the prevailing social, political and economic complexities related to the problem, it is important and timely to formulate and adopt a holistic approach based on reliable information to minimize the gravity of the problem.

At present the problem is confined to the west coast of the island, but it may expand to other coastal districts as well due to the failure in implementing a realistic approach to manage the coastal resources. Therefore a pilot intervention that will be implemented in the west coast could be replicated in the other coastal districts to minimize the degradation of the coastal environment. It is obvious that the whole management responsibility of this exercise cannot be vested with a single agency and hence a proper mechanism should be introduced to share the responsibilities among central agencies, local government agencies, private sector institutions and the concerned communities.

The main objectives of this study are;

a) To assess the number of squatter settlers and the socio-economic conditions of the occupants.
b) To analyze main causes/factors that influenced the settlers to encroach and continue with illegal occupation within the coastal reservations.
c) Assessment of the nature and the significance of coastal pollution linked to these settlements.

d) To explore realistic management options i.e. institutional, legal, development, awareness creation etc. to minimize the environmental degradation and to improve the quality of the coastal environment in the area.

e) Formulation of replicable management guidelines to curtail illegal encroachments.

f) Identification of mechanisms to ensure long term sustainability of coastal environment.

Study area:

The study area covers the coastline from Negombo to Kalutara within the jurisdiction of the following Local Authorities;

District	Local Authority	Category/Area
Gampha	Negombo	Municipal Council
	Wattala- Mabole	Urban Council
	Jaela	Urban Council
Colombo	Colombo	Municipal Council
	Dehiwala-Mt.lavinia	Municipal Council
	Moratuwa	Municipal Council
Kalutara	Panadura	Urban Council
	Kalutara	Urban Council

3.0 Project Components

The proposed pilot project is based on 05 major components in the context of social, political and economic and environmental changes which have occurred in the study area during the last decade and its impact on the coastal pollution. The major components of the project and related sub activities are listed below

Activity 1:

Assessment of the number of squatter families and their socio-economic conditions within the study area

Sub activity 1 : Compilation of information related to the development of the squatter settlements within the study area.

Sub activity 2 : Preparation of an inventory of illegal households within the study area.

Sub activity 3 : Administration of a socio-economic survey covering 30% of the total household population and four numbers of stakeholder workshops.

Activity 2:

Analysis of factors which influenced on encroachments and illegal settlements within the study area

Sub activity 1 : Collection of relevant information through focused group discussions (FGD) in selected sites.

Sub activity 2 : Conducting an intra household survey to support the information derived from step 1 above.

Activity 3:

Assessment of the nature and significance of the coastal pollution linked to illegal settlements.

Sub activity 1 : Prepare an estimation of amount and nature of solid waste generating from the squatter settlements through secondary information.

Sub activity 2 : On site assessment of current volume of solid waste generating from household and location of dumping

Activity 4:

Formulation of practical management options to minimize the negative impacts of existing settlements and improve the quality of the coastal environment

Sub activity 1 : Assessment of the effectiveness of past management interventions i.e. policy, institutional, development and awareness creation adopted by government and other agencies.

Sub activity 2 : Formulation of new forms of management options through stakeholder workshops.

Sub activity 3 : Consensus building on formulated management options through stakeholder workshops.

Sub activity 4 : Conducting an opinion survey of the settlers on adequacy and appropriateness of proposed management options/alternatives i.e. resettlement sites and services improvement, etc.

Sub activity 5 : Assessment of possible alternatives available with the relevant LAs on resettlement, waste minimization and urban growth management.

Activity 5:

Formulation of replicable guidelines to curtail future encroachments

Sub activity 1 : Identification of responsible authorities/individuals of vacant coastal land/reservation.

Sub activity 2 : Review of existing legal basis for managing state reservations.

Sub activity 3 : Formulation of draft guidelines to manage vacant coastal land/reservations.

Sub activity 4 : Stakeholder agreements on the draft guidelines

Sub activity 5 : Identification of means to adopt new guidelines as local authority regulations.

Project Out puts / benefits

The out put of the project will be as follows

1 Assessment of number of squatter families and their socio-economic conditions.

2 Analysis of factors influencing encroachments and illegal settlements within the study area.

3 Assessment of nature and significance of the coastal pollution linked to illegal settlements.

4 Outline of the practical management options to minimize the impacts of illegal settlements and associated coastal pollution.

5 Formulation of guidelines to curtail future encroachments and manage similar coastal land in other coastal districts.

Benefit of the project

The following benefits will be achieved through the project

1. The output of the project will improve the available data and information relative to coastal resources management policies in Sri Lanka.

2. The study will show the changes that have occurred in the last decade in the area of housing, encroachment and their linkages to coastal pollution.

3. Related agencies will be provided with the report in order to protect coastal environment and sustainable development.

The Relationship of Project to the National Polices and the NPA:

The coastal region is the largest and a also a very important economic sector in the Sri Lankan economy in terms of population, land area and economic services. The impact of national policies on the coastal region has not been evaluated before. Findings and information on the housing and squatter settlement and their linkages to the coastal pollution will be greatly beneficial in the implementation of policies and action plans related to the coastal environment.

The project is in conformity will other national policies and actions stated in the current development strategies.

Project Cost and Time Targets

It is expected that the project would envisages the following expenditure to implement the Pilot Project for a period of one year. The cost estimate for the project will be approximately US$ 22,000. The detail breakdown of the project cost together with time targets are given below.

Activities and Sub Activities	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Cost in us $.
Activity 1					
Compilation of information on the development of squatter settlements	1,000.00				1,000.00
Preparation of an inventory of settler households	3,000.00				3,000.00
Conducting of the sample socio-economic survey	3,250.00				3,250.00
Activity 2					
FGDs		500.00			500.00
Intra household survey		500.00			500.00
Activity 3					
Desk study to estimate amount and nature of solid waste generating		300.00			300.00
On site assessment of solid waste generation		500.00			500.00
Activity 4					
Assessment of past management interventions			500.00		500.00
Stakeholder workshop for formulating new management options			500.00		500.00
Opinion survey			600.00		600.00
Assessment of alternatives on resettlement, waste minimization and urban growth management			600.00		600.00
Activity 5					
Review of existing legal basis				250.00	250.00
Formulating draft guidelines				250.00	250.00
Stakeholder workshop				400.00	400.00
Identification of new guidelines				200.00	200.00
Sub total					**12,350.00**
Report preparation				500.00	500.00
Grand Total	**7,250.00**	**1,800.00**	**2,200.00**	**1,600.00**	**12,850.00**

ANNEX 1. ON GOING SITE SPECIFIC PROJECTS AS AT 2003

No	Project	Objectives	Project components	Funding Agency	Implementing Agency	Executing Agency	Project period and cost	Present Interventions
01	Hikkaduwa Coastal Zone Management Project	To improve the environment and welfare of people in Hikkaduwa through sustainable solid and liquid waste management systems and minimize marine pollution	• Solid waste management • Pipe borne sewerage system • Community building • Project management	Aus AID	NWS&DB and Hikkaduwa PS	M/HPI and M/ PC& LG	2000-2004 Rs. 271 million	• 75% of sewerage and sanitation component has been completed. • Garbage collection is done free of charge and a mechanism will be identified to levy charges on commercial premises in the area.
02	Establishment of a shrimp farm monitoring and extension centre in the Puttalam District	To collect and collate all information on farms, issuing management licences, monitoring each farm to ensure environmental aspects are strictly followed by the farmers and advise on the mitigatory measures.	• Establishment of a Monitoring and extension Center. • Develop a mechanism to absorb unauthorised farms in the area to the mainstream. • Develop a monitoring mechanism	GOSL	NAQDA	M/F&OR	initiated in 2001 Rs 18.5 million	• Monitoring and extension centre established. • Monitoring mechanism is being developed
03	Kelani River Pavithra Ganga Programme	To keep Kelani River waters clean based on an integrated watershed management approach.	• Identification of major issues/areas to be addressed. • Establishment of a water quality monitoring system to identify sources of pollution • Identification of environmentally sensitive areas to take steps to avoid location of medium and high polluting industries • Development and implementation of Action plans for 13 Local Authorities to keep the river clean • Implement mitigatory measures to reduce river water pollution • Implementation of a Tree planting programme along the river banks to reduce bank erosion. • Establishment of Monitoring committees under 13 LAs to monitor the progress of the activities and take remedial action to mitigate river pollution	EAIP/ World Bank	M/E&NR	N/E&NR, Western Provincial Council, Water Board, SLR&RC, Forest Dept, Irrigation Dept, CEA, 13 Local Authorities in the river basin.	1998-2003 3.6M	• A Water Quality (WQ) Monitoring system has been established in collaboration with stakeholders to monitor the WQ at 12 identified locations. WQ data displayed in 24 WQ display boards (both side of the river) are updated bi-weekly. • Integrated plans for 13 local authorities in the river basin have been developed. Several activities are being implemented. Disaster management plan also included. • Tree planting along the river banks are being carried out. • Fifty (50) waste audits have been carried out for industries located in the river basin to facilitate application of cleaner production technologies in the industries in the river basin to mitigate pollution. • Several awareness programs for government officials school children, and the public were carried out. Awareness materials such as leaflets, posters were prepared.

No	Project	Objectives	Project components	Funding Agency	Implementing Agency	Executing Agency	Project period and cost	Present Interventions
04	**Clean Industry Development Project**	Integrating CP into industrial development in order to reduce industrial pollution by employing a strategy for Cleaner Production	• Formulate policies, strategies and actions to integrate concepts of CP into industrial development • Develop strategies and guidelines to introduce CP principle in the design and operation of industrial estates • Mount a national campaign to promote CP in industrial activities	ADB	M/ED,IP&IP IRG(UK) & Management Lanka Pvt Ltd	M/EDIP & IP	2002 -2003 95% Completed	• CP policy for Sectors on Land, agriculture, Tourism & Health already developed
05	**Hambantota Integrated Coastal Zone Management Project (second phase)**	Prevent resource degradation through planning and awareness building and other preventive measures in the coastal belt of Hambantota District	• Introduction of Integrated Solid Waste Management practices • Introduction of preventive measurements for solid waste disposal along the coast through govt, NGO, CBO and general public • Interventions for resource rehabilitation and preventive measures for selected sites • Implementation of specific pilot projects • Introduction of sustainable management of fisheries in inland coastal waters • Zoning of the sand dune areas • Sustainable management of sensitive coastal areas	NORAD NORK 10 Million	M/F& OR	CCD	2001-2004	• Solid waste management plans were introduced to Hambantota UC and is being introduced for the other UCs in the area. • Preventive measures were taken for solid waste disposal along the coast through effective actions of Govt. NGO, CBO and general public in the area. • Small scale interventions and actions for resource rehabilitation/ prevention of degradation at selected sites were carried out. • Implementation of specific projects on restoration of canals, dredging of lagoons, sewage discharge control and mangrove restoration with CBOs • Introducing sustainable fisheries management methods in lagoons/estuaries • Zoning and demarcation of sand dune areas • Ensuring sustainable management of prioritized sensitive areas of high ecological social and economical significance • Improve waste water management in UCs.
06	**Lunawa environment Improvement and community development project**	Upgrading the community's living conditions through provision of improved infrastructure at resettlement sites and rehabilitation and improvement of existing canals and structures in drainage area of Lunawa Lake	• Improvement of storm-water drainage system in the area • Upgrading of under-served settlements and resettlements • Institutional strengthening	JBIC	Min of HPI and SLLRDC	Ministry of HPI	2002 -2008 Rs 7900 million	• Target households have been earmarked • Land reclamation for resettlement is being done • Technical designs for canal improvements commenced

No	Project	Objectives	Project components	Funding Agency	Implementing Agency	Executing Agency	Project period and cost	Present Interventions
07	Protected area management and wildlife conservation project	Establishing ecotourism capacity within the DWLC, ensuring the conservation of Sri Lanka's biodiversity	• Participatory adaptive management of pilot protected areas • Collaborative biodiversity conservation planning • Sustainable financing for local community partnership building and development	ADB	DWLC , My/Env & Nat Resources	My/Env & Nat Resources	2001-2006 Rs. 3115.5 million	• The initial activities for the enhancing DWLC management and institutional devt has commenced. • Initial activities to strengthening technical capability, eco-tourism capacity at DWLC , Bio diversity monitoring and evaluation is ongoing • Participatory management of pilot protected areas have been selected and 07 pilot projects identified. • An action plan to finalise the National Bio Diversity Conservation action Plan has drawn up . TOR for the same has already prepared. • A fund establishment Committee was established to support the need for a sustainable endowment .
08	Coastal Resources Management Project	Enhance environmental protection of coastal areas & contribute to poverty reduction among fishing communities through interventions that will establish sustainable systems for integrated management of coastal resources	• Coastal stabilization • Coastal environment and resources management (Preparation of Special area management plans for 7sites) • Fisheries resources management and quality improvement through community based activities. • Coastal water quality monitoring • Institutional strengthening	ADB/ Netherlands	Min of fisheries & Ocean Resources, CCD and Dept of Fisheries	Ministry of Fisheries & Ocean Resources	2000-2005 US$ 80 million	• Bathymetric surveys and Sand surveys are being carried out • Sand nourishment for 2 identified sites completed • Lagoon rehabilitation ongoing • Improving and construction of fishery harbours ; 01 under construction, 02 improvement • Coastal water quality monitoring is carried out for 13 locations form Kalpitiya to Hambanthota. The locations were identified based on urbanisation, tourism development and Industrial developing.
09	Relocation and modernization of tanneries at Bata Atha industrial estate	Relocation of Tanneries situated in and around Colombo in a modern Industrial Estate with common Treatment facilities & downstream development of the leather industry	• Recovery of chrome • Common treatment plant for effluents for all the tanneries • Development of semi finished leather hased products • Relocation of a high polluting industry sector in an environmentally sound manner	NORAD and UNIDO and GOSL (M/ED,IP&IP	M/ of ED,IP & IP	M/ of ED,IP & IP	Rs. 700 million project period; 1998 -2004	• Common effluent plant designed • 60% provision of infrastructure completed • 50% Establishment of individual establishments completed

No	Project	Objectives	Project components	Funding Agency	Implementing Agency	Executing Agency	Project period and cost	Present Interventions

10	**Upper watershed management project**	Sustainable natural resource management in critical watershed through integrated participatory watershed management for improved livelihood and human development	• Rehabilitate and sustainable manage and protect critical watersheds
			• Improve incomes of the project beneficiaries
			• Strengthen the capacity of agencies in charge of watershed management
			• Facilitate establishing a medium to long term watershed management policy
				ADB , GOSL & Beneficiaries	Min/Env & Natural Resources	Min/Env & Natural Resources	Us $ 23.7 M	• Participatory rehabilitation and protection of forest
								  • Buffer zone planting 4000ha
								  • Small timber farming 2000ha
								  • Home garden development 15000 families
								  • Boundary survey, demarcation marking and planting 800 km
								  • Stream reservation 134 km
								  • Road side planting 80km
								  • Planting in public lands 100ha
								• Promotion of conservation oriented farming system
								  • On farm soil conservation 10.000ha
								  • Off farm soil conservation 400 km check dams and 500 ha of stone terraces
								• Capacity building and institutional strengthening
								  • Project administration and management, training of farmers, field level officers, & project staff and consulting services

11	**Integrated Resources Management Programme (IRMP)**	To establish an optimal management process for the wetland ecosystem consisting of the Muthurajawela Marsh Sanctuary and Negombo estuary by the year 2002	• Institutional development and strengthening • Empowering of local communities by establishing a community leader network for resource management • Creation of public awareness • Resource management of Muthurajawela and Negombo estuary • Strengthening land use planning in Gampaha District • Management of external threats • Preparation of technical reports • Studies on marsh and estuarine system • Pilot projects such as ecotourism. income generating etc.	Govt. of Netherlands	Central Environmental Authority	The Royal Netherlands Embassy	1998 –March 2003 5.6 million gilders	Project was successfully completed after successful completing the activities specified. Some of the completed activities are as follows. • Community leader network for resource management for Muthurajawela/ Negombo wetland system established • Creation of public awareness • Resource management of Muthurajawela and Negombo estuary • Strengthening land use planning • Preparation of technical reports, management plans • Establishment of a Muthurajawela Visitor Centre • Carry out pilot projects on income generating activities on eco tourism through Visitor Centre • Create awareness among the residents living in the catchments areas on the importance of protecting the estuarine eco system

Annex 1. On going site specific Projects as at 2003

No	Project	Objectives	Project components	Funding Agency	Implementing Agency	Executing Agency	Project period and cost	Present Interventions
12	**Beira Lake restoration and environmental improvement project**	Restoration of the Beira Lake and Environment Improvement of its surroundings	• Environmental improvement and rehabilitation of the lake • Resettlement of the shanty dwellers in the reservations • Control of lake water pollution from industries • Sewerage improvement	World Bank (CIDA) & GOSL	UDA	M/Western Region Development	2001-2005 2.0 b SLR	• Sewerage improvement for the South West Lake completed. • Rehabilitation of the South West Lake completed. • Resettlement of the encroachers in the South West Lake completed. • Environmental Improvements and Landscaping /Tree planting work ongoing
13	**NERD Bio Gas generation project**	Implementation of a sustainable Waste disposal system Organic Waste	• Construction 0f 16 bio gas digesters • Implementation of a sustainable waste collection system for market waste	GOSL	NERD Centre Wattala PS	My/ PC& LG	2001-2003	• Construction of bio gas digesters completed.

First National workshop was held on 17th and 18th October 2002 at Hotel Club Palm Bay, Marawila with the participation of the all the stakeholders.

Inauguration Ceremony

Inauguration Ceremony

Addl. Secretary Mr. W.R.M.S Wickrmasinghe making the inaugural speech at the workshop

Ms. L.P Batuwitage Director/Environment Team Leader explaining the workshop objectives

Comments by one of the Stakeholder

Some of the participants at workshop

National Consultant Prof. J. Jinadasa explaining the draft report to participants

Some of the participants at workshop

Group photo

NPA Finalization workshop was held on 3-5th July 2003, Deer Park Hotel, Grirtale,with the participation of the all the stakeholders.

Inauguration Ceremony

Inaugural session

Presentations by the consultant/ participant

Some of the participants at workshop

Some of the participants at workshop

Some of the participants at workshop

Some of the participants at workshop

Some of the participants of the workshop

Beach Cleanup & Awareness Programme at Morawala, Negombo.






A beach cleanup and awareness programme on Morawala, Negombo was carried out with the participation of school children on 9th June 2003. About 250 students from 5 schools in the surrounding area participated in this programme. The programme included cleaning of the Morawala beach, awareness creation waste management and Marine pollution due to similar land-based activities. The programme was assisted by the Coast Conservation Department, Divisional secretary, Negombo, Zonal Education office, Negombo and Negombo Municipal Council.

REFERENCES:

1. Anon, 2002a. Management Information Systems, Ministry of Industrial Development, December, 2002.

2. Batagoda, B.M.S., De Alwis A, Gunawardene, P., Seneviratne, A. and D. Karunaratne, 2000. An overview of socio-economic opportunities for the South Asian Seas Region in connection with UNEP/GPA strategic action plan on sewage. Report submitted to South Asia Co-operative Environment Programme.

3. Beny, R., 1970. *Island Ceylon.* London: Thames and Hudson, UK.

4. Byrne, G. and Nanayakkara, A., 2002. Alternatives for river sand. Final Report. Unpubl. Coastal Resources Management Project. Component B: Institutional Strengthening.

5. Central Bank, 2000. Central Bank of Sri Lanka 2001. *Annual report of 2000*, Colombo: Central Bank of Sri Lanka, Sri Lanka.

6. Coastal 2000, 1992. A resource management strategy for Sri Lanka's coastal region, Published by CCD- CRMP Sri Lanka and CR Centre, Rhode Island, 81p

7. Cooray, P.G., 1984. *An Introduction to the Geology of Sri Lanka (Ceylon)*. (2ed.) Colombo: National Museum of Sri Lanka.

8. CZMP, 2003. Revised Coastal Zone Management Plan, 2003 under preparation. Coast Conservation Department of Sri Lanka.

9. DCS, 2000. Food balance sheet for major animal protein sources in 1999.Department of Census and Statistics.

10. Department of Census and Statistics, 2001. *Census of population and Housing 2001: preliminary release* ,Colombo Department of Census and Statistics

11. Marine Pollution Prevention Authority, 2002. Database on accidental spills in Sri Lankan waters.

12. Firth, O.B., 1997. Small fisherfolk and shrimp big business. Logos, Vol.35 (4).

13. Katupotha, K. N. J., and Wickramasinghe, U. 1999. Study on "Rapid Assessment of Coral Mining along the Southwest and South Coasts of Sri Lanka. unpubl. Coast Conservation Department.

14. Manchanayake, E.P. and Madduma Bandara, C.M., 1999. Water Resources of Sri Lanka. Colombo: National Science Foundation.

15. Mangor, K., 2002. Background document for the Chapter on shoreline Management of the second revision of the CZMP. Unpub. Institutional Strengthening Component of the Coastal Resources Management Project, ADB TA NO. 3477-SRI

16. MEDIPIP, 2002. Ministry of Enterprise Development Industrial Policy and Investment Promotion, 2002

17. ME&NR. 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.

18. MOF, 2003. Budget estimate (1995-2000), Finance Secretariat, Colombo.

19. MOFE, 1999. Personnel Commitment on solid waste disposal, Sampathpaya, Battaramulla, Sri Lanka.

20. MOFE, 1999. Database of municipal Waste in Sri lanka. Colombo: Ministry of Forestry and Environment.

21. MOFE,2001. State of the Environment. Colombo: Ministry of Forestry and Environment .

22. Mubarak, A. M., 2000. Water pollution in :*Natural Resources of Sri Lanka 2000*: Colombo. National Science Foundation.

23. NARA, 2001. Sri Lanka Fisheries Year Book 2000. National Aquatic Resources Research and Development Agency.

24. Rajasuriya, A., and White, A. 1995. Coral reefs of Sri Lanka: Review of their extent, condition and management status. Coastal management, Vol. 23, pp77-90

25. Rajasuriya, A. and Premaratne, A. , 2000. Seas at the millennium: An environmental evaluation. Volume II, regional Chapters: The Indian Ocean to the Pacific. Edited by C. Sheppard, Pergamon press: 175-187.

26. Siriwardene, P.P.G.S.N., 1999. Shrimp culture in Sri Lanka: The benefits, problems and constraints associated with the development and management and responses to address problems. FAO Fisheries Report No. 572, Bangkok: FAO Technical Consultation on Policies for Sustainable Shrimp Culture.

27. UNDP, 2000, Cost benefit analysis of the proposed sewer network at Moratuwa/Ratmalana in Sri Lanka as a measure to protect coastal areas from land based sources of pollution. A UNEP report for the Global Programme of Action for the Protection of the Marine Environment from land based activities under project GP/1100-98-11/2207 to SACEP.

28. Samarakoon, J.I.and pinto, L., 1988 Synthesis report for information on critical habitats in the coastal zone . Workshop on critical habitats in the coastal zone CCD/USAID/URI pp106

29. Swan, B. 1983. An Introduction to the Coastal Geomorphology of Sri Lanka. Colombo: National Museums of Sri Lanka.

30. Wijesinghe, L.C.A.de S, Gunatilleke, I.A.U.N., Jayawardene, S.D.G., Kotagama, S.W. and Gunatilleke,C.V.S., 1993. Biological Conservation in Sri Lanka: A national status report, IUCN, Sri Lanka.

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES
"SAMPATHPAYA"
82, Rajamalwatta Road, Battaramulla
Sri Lanka.

Telephone: +94 11 2887453 Fax: +94 11 4412285
Email: envpolmg@sltnet.lk, coordinator@wow.lk

Printed by - Paramount Print Pack (Pvt) Ltd. Tel: +94-11- 2 910809