(7) Other problems

Other problems in Southern Area include solid waste disposal problems in major urban centers of Galle and Matara, and strong winds in coastal areas of Hambantota especially during the Yala season. Poor drainage and flooding are also problems in coastal areas in Galle district.

1.3.3 Environmental issues by district

(1) Galle district

The following are major environmental issues identified in the district.

1) Soil erosion : Soil erosion (Table 1.5) and landslide (Table 1.6) in the district are results of deforestation, encroachment of forest reserves, land reclamation, blasting of rocks, and mining of clay. Those activities are distributed throughout the district, consequently causing floods as well.

2) Water pollution : Agro-chemicals have polluted the soil and water resources of the district (Table 1.7). Degradation of coastal and inland wetlands has also occurred due to human activities such as discharge of effluents (Table 1.8) and solid wastes into channels, application of chemical fertilizers and agro-chemicals, and over-exploitation of wetlands. The pollution by these means causes improper quality of drinking water, depletion of fish and insects (bees, butterflies, etc.), spread of weeds (salvinia, Japanjabara - Eichchornia crassipes) and depletion of vegetable plants (e.g. Mugunuwenna - Tetrameles nudiflora, Kekatiya - Pygeum zeylanmicum, etc.).

3) Coastal erosion : Coastal erosion (Table 1.9) has accelerated due to destruction of nearshore dead and living coral reefs (Table 1.10), removal of sand from beaches (Table 1.11), desultory usage of coastal lowlands and construction of unplanned coastal structures along the coast.

4) Lack of environmental administration : With a lack of the district administration, the District Environmental Agency has almost ceased to be in operation, and the need for a substitute has not been addressed.

(2) Matara district

Widespread and more serious environmental problems in the district are as follows.

1) Coastal erosion : Some of the "A" class roads along the coast are likely to be affected by coastal erosion. Midigama provides a typical example in Weligama division.

2) Depletion of forest cover : The gradual reduction of the forest cover is another main problem. The floral composition and the structure of original forests have been drastically changed due to human activities. In the district, forests have been used for activities such as land encroachment for cultivation of tea, illegal felling of trees for commercial purposes, and land clearance for chena cultivation. The protection of forest reserves is vital since they serve as watershed areas to upper tributaries of the Nilwala and Polatumodera rivers, preventing soil erosion (Table 1.12) and flood hazards as well as degradation of fauna.

3) Intrusion of saline water : Due to unplanned human activities and over-exploitation of fresh water resources, saline intrusion is evident. The intrusion of saline water is reported particularly in the coastal zone of the district where sand mining and the density of wells increase with the increasing human population.

4) Water pollution : During the past two decades, urbanization, industrialization and increasing human settlements in the district have contributed to polluting the surface water. For example, Table 1.13 shows polluted water levels for the Nupe canal in 1991.

5) Solid waste disposal : In Weligama and Matara urban centers, main roads have become garbage dumping grounds, as adequate facilities have not been provided by Urban Councils of the respective areas.

(3) Hambantota district

The district has suffered from almost the same environmental problems as mentioned for the other districts of Southern province. However, the following issues are more remarkable in the district.

1) Salinity of water and soil : The salinity of the groundwater constrains its use in the district. Also, there is geological evidence to suggest that a large part of the district is under the influence of marine intrusion for a considerable period of time. In Pallegama, for instance, a number of paddy lands that were successfully cultivated about 15 years ago, had been abandoned due to excessive salinity of water and soil. This condition has affected over one hundred families. At the Tennysonpura housing scheme area, families face the similar problem of water salinity, and several wells had to be totally abandoned. Salinity is not such a constraint in the area above 90 m.

2) Water pollution : The Walawe river, the sixth longest river in Sri Lanka, is subject to contamination of upstream waters during certain periods of the year, due to chemical wastes (Table 1.14). There is a high content of iron and fluoride in the groundwater. The western part of the district contains water that shows a high iron content, while deep aquifers of the eastern part show high fluoride levels. Shallow dug wells are the main source of drinking water in the district, and the people consume water that is undesirable in terms of health standards. For instance, certain dug wells in Hathporuwa contain 10 to 19 ppm of fluoride.

3) Deforestation and soil erosion : With the growing pressure upon land, coupled with the increasing number of the landless, the move towards chena cultivation has accelerated. Today, plots under chena cultivation have become larger, periods of cultivation lengthened, and intervals of "rest" for the rejuvenation of the soil shortened as mentioned already. This has resulted in deforestation particularly where chena cultivation has been carried out for long periods on hill slopes. The west of Katuwana is a case in point.

(4) Southern and southeastern parts of Moneragala district

Environmental problems in Moneragala district stem from its very nature being predominantly rural and agricultural. Moneragala is one of the few districts in the Country with a very high rural population (94.8%). Almost all the environmental problems are thus caused by economic activities in the rural/agricultural sector. Some problems are more acute and more localized in some divisions. Major environmental problems in order of occurrence and magnitude are : 1) soil erosion, 2) chena cultivation, 3) encroachment of forest and water resources, 4) deforestation, 5) mono-cropping of sugarcane and tobacco, and 6) gem-mining.

Most common problem in the district is soil erosion, and the next three common problems found across the district are chena cultivation, encroachment of reserves and deforestation. Owing to the rapid influx of population into the district, the natural forest cover of the district as a whole has been drastically diminished by around 70% during the period from 1956 to date. During the last few decades, thus, forest land has been cleared at an alarming rate (16,000 ha/year) for chena, logging and development activities.

Mono-cropping of sugarcane and tobacco presents another problem which has occurred during the past two decades and seems to become serious in a few divisions in very recent years. Gemming is localized in the southern and central part of the district.

Environmental problems are most acute in four divisions of the district within Southern Area, namely, Moneragala, Siyambalanduwa, Buttala and Tanamalwila, which suffer particularly from the first four environmental problems.

(5) Embilipitiya and Kolonna divisions of Ratnapura district

Although these divisions are predominantly rural, some attention should also be paid to the urban environment particularly with reference to health and sanitation problems. Major environmental problems in both divisions relate to gem-mining, deforestation, encroachment on forest and other reservations, soil erosion, and chena cultivation. Some problems occur widely but others are more localized.

1) Deforestation : Owing to chena cultivation and heavy logging operations the dense forest cover in the district has been reduced in recent years. The deforestation and over-exploitation of natural forests even on steep slopes exceeding 35 degrees or more have resulted in the depletion of valuable medicinal herbs, rare species of trees and lianas. Furthermore, such exploitation has caused to diminish or to make totally extinct many species of wild flora and fauna as well as rare varieties of inland fish. For example, in Embilipitiya, deforestation has taken place extensively and in particular the vulnerable slopes of Panamure, Maduwanwela and Sankapala areas have been cleared. Exploitation of forest for firewood is especially in evidence in both divisions. This form of deforestation is most marked in open forest and scrublands. Illicit felling is a problem in all divisions of the district, but the worst affected include Kolonna and Embilipitiya. A related aspect is the deforestation of patches of forest in patanas by the prevailing tendency to set the grasslands to fire. It is also found in Kolonna division. It is reported from both divisions that temporary drying-up of springs, wells and water courses is evident in dry periods because of the depletion of forest cover.

2) Encroachment of reservations : Encroachment on forest reserves is reported in particular from some divisions including Kolonna and Embilipitiya. It is evident that felling of trees on forest reserves takes place at two levels. The first is where the poor resort to unorganized felling and sawing of timber, primarily to eke out a livelihood. The second is where the operations are highly organized and carried out on a large scale. Opening up of forest reservations has not only caused damage to flora, but also resulted in the loss of fauna as reported from several divisions including Embilipitiya and Kolonna.

3) Gemming : The unfilled or partially filled abandoned gem pits provide a breeding ground for malarial and other types of mosquito. This has led to the increasing incidence of malaria in both divisions. Overcrowding under unhygienic conditions (lack of toilets and safe drinking water) where large scale mining takes place, has raised the incidence of water-borne diseases such as typhoid, para-typhoid, dysentery, infective hepatitis and enteritis.

4) Water pollution : Another specific case of water pollution is caused by the National Paper Corporation Plant at Embilipitiya which discharges toxic black liquor into the Walawe Ganga which not only exerts an adverse impact on the people, but also on the inland fish population. Besides, in Embilipitiya, water resources are polluted due to lack of sanitary facilities as well as flow of chemicals used in agriculture.

(6) Lahugala division of Ampara district

Unlike other districts or divisions in Southern Area, such environmental problems as soil erosion, coral/mangrove deterioration causing coastal erosion, gem-mining problems and urban/industrial pollution practically do not exist in Lahugala division. It is due to the least urbanized situation and limited natural resources.

However, the following three environmental issues common in the whole region are reported : 1) conflicts between men and elephants, 2) deforestation mainly caused by chena cultivation, fuel-wood cutting, etc., and 3) salinity problem along the coast.

1.3.4 Overall assessment of high-priority environmental issues of the region

Table 1.15 shows extent of priority of environmental problems existing in Southern Area summarizing implications and information both from documents available and hearings from official, experts, and local people as well as field surveys.

Environmental issues with higher priority could be roughly analyzed by district as follows.

(1)	Soil erosion :	Galle, Hambantota, Moneragala and Ratnapura districts
(2)	Deforestation :	Matara, Hambantota, Moneragara and Ratnapura districts
(3)	Chena cultivation :	Hambantota and Moneragala districts
(4)	Encroachment of reserves :	Moneragala and Ratnapura districts
(5)	Water pollution :	Galle, Matara, Hambantota and Ratnapura districts
(6)	Solid waste :	Galle and Matara districts

(7) Coastal erosion : Galle and Matara districts

(8) Saline water & salinization : Matara and Hambantota districts ; and

(9) Gem mining : Moneragala and Ratnapura districts

Table 1.1 Legislation on Environmental Protection and Management (1/2)

Legislation	Pollution Control					Natural Resources Management					
	Water	Air	Noise	Waste	Cultural	Soil	Water	Forest	Land	Parks and Wildlife	Minerals
Crown Lands Ordinance (1947)	●			●		●	●	●	●		
Thoroughfares Ordinance (1861 and 1953)				●			●		●		
Water Resources Board Act (1964)	●			●	●	●	●	●	●		
Nuisance Ordinance (1862 and 1946)				●							
Mines and Minerals Law (1973)									●		●
Soil Conservation Act (1951)						●		●	●		
Fauna and Flora Protection Ordinance (1937 and 1993)						●	●	●	●		
Water Hyacinth Ordinance (1909)	●						●				
Plant Protection Ordinance (1924)	●						●				
Forest Ordinance (1907 and 1966)							●	●			
Felling of Trees Ordinance (1951)								●			
Penal Code Section 271(1883)		●									
Housing and Town Development Ordinance (1915)											
Town and Country Planning Ordinance (1946)	●										
Tourist Development Act (1968)						●	●	●	●		●
Irrigation Ordinance (1900)							●				
Ceylon Tourist Board Act (1968)							●	●			
State Gem Corporation Act (1971)						●		●	●		
National Water Supply and Drainage Board Law (1974)	●					●	●		●		
Urban Development Authority Law (1978)									●	●	
Food Act (1980)	●										
National Environment Act (1980 and 1988)	●	●	●	●		●	●	●	●	●	●
National Aquatic Resources Research and Development Agency Act (198	●						●				
Land Development Ordinance (1935)						●	●	●	●		
Control of Pesticides Act (1980)	●	●	●			●	●	●	●		
Agrarian Services Act (1978)						●	●	●	●		
Sri Lanka Ports Authority Act (1977)	●								●		
Coast Conservation Act (1981 and 1988)	●			●	●	●	●		●		●
Marine Pollution Prevention Act (1981)	●	●		●							
National Heritage and Wilderness Act (1988)	●				●	●	●	●	●	●	

Table 1.1 Legislation on Environmental Protection and Management (2/2)

Legislation	Environmental Planning					Procedures			
	Land Use	Economic and Social	Conservation	Preservation and Heritage	Environmental Impact Analysis	Licensing and Registration	Penalties	Appeals	Institutional Management
Crown Lands Ordinance (1947)	●		●	●		●	●	●	●
Thoroughfares Ordinance (1861 and 1953)	●						●	●	●
Water Resources Board Act (1964)		●		●			●		●
Nuisance Ordinance (1862 and 1946)						●		●	●
Mines and Minerals Law (1973)	●					●	●		●
Soil Conservation Act (1951)	●	●	●				●	●	
Fauna and Flora Protection Ordinance (1937 and 1993)			●	●		●	●	●	
Water Hyacinth Ordinance (1909)							●	●	
Plant Protection Ordinance (1924)							●		
Forest Ordinance (1907 and 1966)							●	●	
Felling of Trees Ordinance (1951)								●	
Penal Code Section 271(1883)	●					●	●		
Housing and Town Development Ordinance (1915)	●					●	●		
Town and Country Planning Ordinance (1946)	●			●		●	●	●	●
Tourist Development Act (1968)	●	●	●	●	●	●	●	●	●
Irrigation Ordinance (1900)	●		●				●		●
Ceylon Tourist Board Act (1968)	●								●
State Gem Corporation Act (1971)	●								●
National Water Supply and Drainage Board Law (1974)						●			●
Urban Development Authority Law (1978)	●	●				●	●	●	●
Food Act (1980)						●			
National Environment Act (1980 and 1988)	●	●	●	●	●				●
National Aquatic Resources Research and Development Agency Act (1981)									●
Land Development Ordinance (1935)	●	●	●			●	●	●	●
Control of Pesticides Act (1980)	●	●	●	●		●	●	●	●
Agrarian Services Act (1978)	●	●	●				●	●	●
Sri Lanka Ports Authority Act (1977)	●	●				●			●
Coast Conservation Act (1981 and 1988)		●	●	●	●	●	●	●	●
Marine Pollution Prevention Act (1981)			●						●
National Heritage and Wilderness Act (1988)	●		●	●		●	●	●	●

Main Sources : CEA, An Environmental Profile of the Ratnapura District, August 1993; and
USAID/Natural Resources, Energy & Science Authority, Natural Resources of Sri Lanka : Conditions and Trends, 1991

Table1.2 Extent of Coastal Features of Southern Area (Ha)

District	Mangroves	Salt Marshes	Dunes	Beaches Barriers and Spits	Lagoons and Basins Estuaries	Other Water Bodies	Marshes
Galle	238	185	-	485	1,144	783	561
Matara	7	-	-	191	-	234	80
Hambantota	576	318	444	1,099	4,488	1,526	200
Ampara(all district)	100	127	357	1,398	7,235	1,171	894
National Total Extent	12,189	23,819	7,606	11,800	158,017	18,839	9,754

Source : NATURAL RESOURCES,ENERGY AND SCIENCE AUTHORITY/United States Agency for International Development, Natural Resources of Sri Lanka : Conditions and Trends, 1991

Table1.3 Elephant Population in Southern Area

Location	Approximate number of elephants	
	Min.	Max.
Ruhuna (Yala) NP and surrounding area (Yala SN, Kataragama SA, Katagamuwa SA, Nimalawa SA, and Lumgamwehera Proposed NP)	350	400
Hambantota District outside Ruhuna NPÄiincluding Bundala NP, Wirawilla-Tissa SA, and Pallemalala SA)	150	160
Uda Walawe NP and surrounding area	150	200
Gal oya NP and Gal Oya NP(including Gal Oya Valley North East SA, Gal Oya Valley South East SA, Senanayake Samudra SA, and Budhangala SA)	300	325
Yala East NP and Kudimbigala SA	150	175
Sinharaja Forest Reserve	8	10
National Total	2,728	3,125

Source : Wildlife Heritage Trust of Sri Lanka, The elephant in Sri Lanka, 1994

Note : NP = National Park, SN = Strict Nature Reserve, and SA = Sanctuary

Table 1.4 Annual Rainfall and Average Temperature of Southern Area

District	Annual Rainfall (mm)											
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
GALLE	2556.9	1549.9	2245.4	2219.7	1694	2466.5	2421	2325.3	1797.5	2188.9	2210.4	2472.5
MATARA	3122	2044	2617	2895	2317	2609	2618	2179	-	-	-	-
HAMBANTOTA	1235	639	995.8	1048.5	973.1	889.5	-	825.9	1192.9	1283.8	603.2	918.1
MONERAGALA	1600	1060	1817	1543	1500	1636	1610	1508	-	-	-	-
RATNAPURA	4499.5	3355.1	4200.5	3975.9	3547	3013.3	4310.8	3733.7	3280.1	3321.2	3536.2	4041.5
AMPARA	-	725.5	1682.5	1188.9	-	-	-	947.6	-	-	-	-
District	Average Temperature (℃)											
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
GALLE	26.9	27.3	26.7	25.4	26.9	27.6	26.9	26.3	27.3	27.2	27	27.3
MATARA	-	-	-	-	-	-	-	-	25.3	-	-	-
HAMBANTOTA	27	27.6	27.4	27.1	27.5	28	28.2	27.5	27.7	27.5	27.3	27.4
MONERAGALA	-	-	-	-	-	-	-	-	-	-	-	-
RATNAPURA	27.5	28.2	27.2	27.3	27.6	28.9	28.2	27.9	27.7	27.6	27.6	27.5
AMPARA	-	28.5	27.8	28.3	27.5	28.7	28.3	28	-	-	-	-

Source : Statistics Department / Central Bank of SriLanka, Economic & Social Statistics of Sri Lanka, 1988-1989

: Statistics Department / Central Bank of SriLanka, Economic & Social Statistics of Sri Lanka, December 1994

Note : These figures were mesured at the certain station in each district, so that they do not necessarily show conditions for whole the district area.

Table 1.5 High Occurrence of Soil Erosion in Galle District

Division	Severe Soil-Erosion Area
Niyagama	Karawwa, Kathaula and Martupitiya
Tawalama	(common in hilly areas)
Neluwa	Lelwala, Gigummaduwa, Embalagedara and Mapita
Bope-Poddala	Kurundakanda and Mulana

Source : CEA, District Environmental Profile : Galle (Final Report), March 1994

Table 1.6 High Occurrence of Landslide in Galle District

Division	Severe Landslide Area
Elpitiya	Tibbotuwa, Aranyakele, Ketandol Watta, Awittawa, Berugodawela and Atahaulh nakanda
Niyagama	Mattaka, Motarwila and Atugalkanda
Tawalama	Panangala, Opata, Talangalla and Halvitigala

Source : CEA, District Environmental Profile : Galle (Final Report), March,1994

Table 1.7 Water Pollution from Agricultural Chemicals in Galle District

Division	Hazard type
Bentota	increasing alkalinity of the soil, infertility of the soil, depletion of birds, snails and insects.
Elpitiya	infertility of soil , depletion of fish in inland water pools, spread of skin diseases of fish and even in people.
Niyagama	infertility of soil , depletion of micro fauna and flora.
Tawalama	infertility of soil , depletion of microorganisms of soil and fish in inland water pools.
Nagoda	infertility of soil , depletion of microorganisms of soil, fish in inland water pools and vegetable herbs.
Neluwa	infertility of soil , depletion of microorganisms of soil, fish in inland water pools, vegetable herbs and spread of water-borne weeds.
Karandeniya	infertility of soil , depletion of microorganisms of soil and other insects as well as fish in inland water pools.
Ambalangoda	infertility of soil , depletion of microorganisms of soil and vegetable herbs, spread of water-borne weeds and mosquitoes.
Balapitiya	infertility of soil , depletion of microorganisms of soil and other insects as well as fish in inland water pools.
Hikkaduwa	increasing alkalinity of the soil,infertility of soil , depletion of birds, snails, leaches and other insects.
Baddegama	infertility of soil , depletion of microorganisms of soil and water-born plants.
Yakkalamulla	infertility of soil , depletion of fish.
Akmeemana	infertility of soil , depletion of fish.
Bope-Poddala	infertility of soil , depletion of microorganisms of soil.
Galle	infertility of soil , depletion of microorganisms of soil, fish in inland water pools, vegetable herbs and spread of water-borne weeds.
Habaraduwa	infertility of soil , depletion of microorganisms of soil.

Source : CEA, District Environmenta Profile : Galle (Final Report), March 1994

Table 1.8 Potential Pollutant Loads from Hotels on the Beach Environment in Hikkaduwa

Month (Year 1993)	Total number of guest nights	BOD (kg/day)	Phosphate (kg/day)	Nitrogen (kg/day)
January	23,068	14.53	1.08	5.38
February	21,452	13.5	1.0	5.0
March	21,543	13.57	1.005	5.02
April	13,022	8.2	0.61	3.04
May	9,149	5.76	0.43	2.1
June	7,367	4.64	0.37	1.72
July	6,168	3.89	0.29	1.44
August	14,338	9.03	0.67	3.35
September	11,835	7.46	0.55	2.76
October	11,239	7.08	0.52	2.62
November	15,168	9.56	0.71	3.54
December	19,945	12.6	0.93	4.66

Source : NAREPP/USAID, The Coastal Environmental Profile of Hikkaduwa, 1994

Table 1.9 Areas Subject to Coastal Erosion in Galle District

Division	Coastal Erosion Areas
Bentota	Warahena, Aturuwella, Galbada
Ambalangoda	Hirewatta, Patabendimulla
Hikkaduwa	Akurala/Kahawa, Godagama, Polwatta, Sinigama, Totagamuwa, Peraliyaa, Hikkaduwa, Kumarakanda, Thiranagada, Narigamama, Patuwana, Dodanduwa, Ratgama
Galle	Mahamodara, Dadalla, Kaluwella
Habaraduwa	Unawatuna, Talpe, Habaraduwa, Koggala, Piyadigama, Aranwala

Source : CEA, District Environmental Profile : Galle(Final Report), March 1994

Table 1.10 Number of People Involved in Coral Mining Industry along Southwestern Coast

Type of Activity	Number	Percentage
Mining of land outside the coastal zone	422	25.7
Collection of coral debris from beaches	306	18.6
Mining coral reef	199	12.1
Mining land inside the coastal zone	132	8.0
Lime kiln workers	242	14.7
Lime kiln owners	192	11.7
Transport of lime	62	3.8
Marketing of lime	29	1.8
Others	60	3.6
Totals	1,644	100.0

Source : CEA, District Environmental Profile : Galle (Final Report), March 1994

Table 1.11 Areas Where Sand Mining is Heavy in Galle District

Division	Areas where Sand Mining is Heavy
Karandeniya	Gin Ganga
Balapitiya	Induruwa, Kosgoda, Balapitiya
Galle	Gin Ganga outfall
Habaraduwa	Tattagalla, Pilana, Bogahagoda, Unawatuna, Watawana, Hatangala, Angulugaha, Welinkanda, Kahanda, Dompe, Annsiwatugoda, Udalamatta

Source : CEA, District Environmental Profile : Galle (Final Report), March 1994

Table 1.12 Occurrence of Soil Erosion in Matara District

Division	Soil Erosion Area
Weligama	Hallala, Puhulahena, Panetigama,
Dickwella	Urugamuwa, Dandeniya,Dodampahala
Kamburupitiya	Lenabatuwa, Tippalahena, Masmulla, Ullalla, Walakanda, Watukolakande
Pasgoda	Rotamba-Panakaduwa, Talapalakande, Batandura, Ginneliya, Kurutota Kanda, Panilkanda, Rammala Kanda
Malimboda	Elgiriya, Horagoda, Nape
Hakmana	Denagama, Ellewela, Kebitiyapola, Karatota, Pananwela
Mulatiyana	Horapawita, Kudapane, Ketapalakanda, Mulatiyana, Patramulla, Bamunugama, Kiriweladeniya, Mugunadeniya, Erillawa

Source : CEA, District Environmental Profile : Matara (Draft), September, 1995

Table 1.13 Polluted Water Levels for Nupe Canal

Sample point	Colour	Odour	Transparency (c.m)	Ph Value	Dissolved Oxygen mg/l	Ammonia Oxygen mg/l	Nitrate (mg/l)	Phospate (mg/l)
1	Dark green	foul	21.5	6	2.1	0.25	1.52	2.61
2	Dark green	very foul	15.5	5.8	1.8	0.49	1.6	5.61
3	Blackish green	foul	12.8	5.6	2.2	0.42	1.49	6.21

Source : CEA, District Environmental Profile : Matara (Draft), September 1995

Table 1.14 Water Quality Levels of Walawe River

Sampling Points	1	2	3	4
Ph value	7.1	7.6	7.3	7.5
Temperature (℃)	28.8	27	29	30.5
Dissolved Oxygen (ppm)	5.4	11.3	6.5	10.2
Chlorine (ppm)	2.4	0.6	1.1	1.2
Suspended solids (ppm)	138	44	88	21
Dissolved solids (ppm)	545	258	305	211
Alkalinity (Methyl-A)	4	2.4	2.9	2.9
Chemical Oxygen Demand (COD, ppm)	120	30	50	20
Biological Oxygen Demand after 3 days (BOD_3, ppm)	80	3.4	60	2.6

Source : Hambantota IRDP Office, Environmental Study : Hambantota District, June 1989

Table 1.15 Priority of Environmental Problems Based on Extent and Occurrence (1/2)

District/Division	1.Land and Water Resources						2.Forests and Biodiversity						3.Urban and Industrial Pollution				4.Coastal and Marine Resources						5.Energy and Mineral Resources		
	1-1	1-2	1-3	1-4	1-5	1-6	2-1	2-2	2-3	2-4	2-5	2-6	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	4-5	4-6	5-1	5-2	5-3
GALLE District	◎	○	△	△	○	△	△	○	○			○	◎	△	△	◎	○	◎	△	○	○		△	△	△
Bentota	○	△											◎				△	○		○					
Elpitiya	◎	○	△				△	○					○	△											
Niyagama	◎	○	△						○															△	
Tawalama	◎	△	△						△			○											△		
Neluwa			△			△						○													△
Nagoda		△	△						○				◎	△											
Karandemiya		△	△						△				○	△											
Ambalangoda		△		△									◎		△		○	◎		○	△				
Balapitiya													◎					○		○					
Hikkaduwa	◎			△									◎	△	△		○	◎	△	○	○				
Baddegama		△			○									△	△										
Yakkalamulla	○	△	△						△																
Akmimana		△	△	△					△				○												
Bope-Poddala	○	△		△									◎												
Galle		△			○			○					◎			◎		◎		○					
Habaraduwa	◎	△											○				△	○	△		○				
MATARA District	○	○	○	○	○		○		◎	△	○	○	◎	△	△	◎	○	◎		○	○	◎			○
Kotapola	○				△		○		◎		○	○													○
Pasgoda	○						○		◎		○	○													
Mulatiyana	○				△		△		◎	△		△													
Akuressa					○					△															
Malimboda	△	△		△	○																				
Kamburupitiya	○	△	○						◎																
Hakmana	△				○																				
Dikwella	△	○	○	○					○							○	○	◎		○	△	○			
Thihagoda		△		△	○																				
Weligama		○		○	△											○	○	◎		○	○	◎			
Matara		○	△	△	△								◎	△	△	◎	○	○		○	△	○			
Devinuwara		○	○	△									◎			○	△	◎		○					
Pitabeddara	○				△		○		◎			○													○
Welipitiya	○	△			△				○																

Table 1.15 Priority of Environmental Problems Based on Extent and Occurrence (2/2)

District/Division	1.Land and Water Resources						2.Forests and Biodiversity						3.Urban and Industrial Pollution				4.Coastal and Marine Resources						5.Energy and Mineral Resources		
	1-1	1-2	1-3	1-4	1-5	1-6	2-1	2-2	2-3	2-4	2-5	2-6	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	4-5	4-6	5-1	5-2	5-3
HAMBANTOTA District	◎		△	△	△		△	△	◎	△	◎	△	◎	△	△	△	△	△	△	△	△	◎			△
Weeraketiya			△	△			△	△					◎												△
Angunakolapelessa																									
Ambalantota							△	△					◎			△	△			△		○			
Hambantota			△				△	△	○	△		△	◎	△	△	△	△		△			○			
Sooriyawewa					△		△	△	◎	△	○		◎												
Lunugamwehera			△	△			△		◎	△	◎	△	○						△						△
Tissamaharama			△	△			△	△	◎	△	○	△	◎				△					◎			△
Tangalla	◎							△	○				◎				△	△		△	△	○			
Beliatta								△					◎				△					○			
Okewela			△	△																					△
Katuwana	◎				△				◎			△													
MONARAGALA District	◎			△		○			◎	△	◎	◎	△	△											○
Monaragala	◎			△		△			◎	△	○		△	△											○
Siyambalanduwa	○			△		△			◎	△	○	◎													
Buttala	○			△					○	△	◎	◎	△	△											○
Wellawaya	○			△		○					○	○													
Tanamalwila	○			△		△			◎		○	◎													
Kataragama	○			△		△			◎		○	◎													
RATNAPURA District	◎		○	○			○	○	◎	△	○	◎	◎												◎
Embilipitiya	◎		○	○			△	○	◎	△	○	◎	◎												◎
Kolonna	○		○	△			○	△	○		○	○													○
AMPARA District									○	○	○											○			
Lahugala									○	○	○											○			

Main References : 1) CEA, District Environmental Profile : Galle (Final Report), March 1994
2) CEA, An Environmental Profile of the Moneragala District, August 1993
3) CEA, An Environmental Profile of the Ratnapura District, August 1993
4) CEA, District Environmental Profile : Matar (Draft), September 1995
5) Hambantota IRDP Office, Environmental Study : Hambantota District, June 1989
6) CEA, An Environmental Profile of Hambantota District , December 1992

Notes : 1) Each number like "1-1","4-3", etc.corresponds to respective environmental problems in the following list of "Categories of Environmental Problems".
2) ◎=High Priority, ○=Second Priority, and △=Low priority although reported

CHAPTER 2 OBJECTIVES AND STRATEGY

2.1 Objectives for Environmental Development

2.1.1 National environmental objectives

National environmental objectives over a medium term have been established as follows (Public Investment 1995-99) :

(1) To identify and allocate roles and responsibilities of institutions dealing with environmental resources, and to strengthen them with authority ;

(2) To monitor the environmental resources to identify, isolate and quantify changes taking place along with economic development and social changes ;

(3) To take appropriate measures by way of policies, systems and methods for maintaining better environmental quality ; and

(4) To encourage public participation in environmental management through their active participation in development and resource utilization.

2.1.2 Environmental development objectives for Southern Area

There exist in Southern Area various kinds of environmental/natural assets of regional, national or even international importance. They include coral reefs, beautiful and unique beach and tea-plantation scenery, wetlands and lagoons, dense tropical rain-forest and mountainous dry forest, indigenous flora and fauna, clean inland water-bodies, silent and clean atmosphere, and the three types of climates as well as complicated terrain/soil structures which have long been nurturing the Area's environmental/natural diversity.

People in the Area have varied experiences and traditional techniques to live with their environment and natural resources, protecting them and simultaneously obtaining various benefits from them. They range from village-forestry approach, tank-irrigation system, local land-zoning and recycling of livestock/agricultural residues, to medicinal usage of local herb and tourism promotion focusing natural resources. The main theme is "sustainable management of environment" making full use of natural renewable resources in harmony with various micro-ecosystem functions/services.

Recently, these assets have begun to be damaged due to accelerated development and intensive human activities. Further environmental deterioration is easily predicted, as

further development and economic growth are promoted in the Area with weak environmental consideration as well as careless land use planning.

Environmental objectives for the Southern Area development are established in line with the regional development objectives. They have three components representing social, environmental and economic concerns. This dual structure of overall and sector objectives mutually supporting one another would ensure better the balance between these three concerns.

Based the environmental setting and development objectives of the Area, the following environmental development objectives are established taking into account the concepts of "sustainable development" and "wise use of environmental/natural resources".

Medium-term objectives aiming at mitigating the future environmental costs are:

(1) To conserve the culturally, scientifically and ecologically important environment and natural resources of non-renewable nature available in the Area; environmental elements subject to this objective are forest cover in and around critical lands, endangered species and wetlands/forests as their habitats, limited marine ecosystem, splendid scenery, etc; and

(2) To economically and socially utilize environmental goods/services and natural resources which have a renewable nature or an unrenewable but non-unique nature contributing to income growth, within the strict limitation of their renewable capacity so that their use does not adversely affect the other environmental elements to be conserved; elements subject to this objective are water, land, air, production and village forests, mineral resources, fishery resources, abandoned lands, tourism resources including flora, fauna, beach and scenery, etc.

A long-term objective aiming at increasing the future environmental benefits is:

(3) To enhance environmental quality as well as natural resource quantity, and further create a better amenity for local people's and tourists' welfare in Southern Area; elements under this objective cover waterfront area of rivers/ocean/wetlands in and along the populated lands, waterbodies, forests, biodiversity, fishery resources, residential/resort areas, etc.

2.2 Constraints to Environmental Management

In realizing the medium- and long-term objectives for environmental development in Southern Area, the following constraints are anticipated.

2.2.1 Weak institutional capacity for environmental conservation

There are very limited number of local government or community staff specialized in the environmental field. Although some of the provinces or districts concerned in the Area have established sections or committees to consider conservation activities, they severely lack technical staff who plan and implement activities. Limitation of manpower could be a critical bottleneck to solve potential environmental problems. Central governmental personnel stationed in the Area, who have responsibility for local environmental conservation from the national point of view and for coordination with local-level activities, are under stress with too much works to handle only by themselves. Recently many graduate trainees were assigned as environmental development assistants to local authorities under CEA.

2.2.2 Limited technical knowledge and its sharing

Sciences and experiences have proved that protection or restoration of almost any environmental elements could be accomplished using technologies available in the world, except for creation of extinct species. In Sri Lanka, universities and research institutes including the University of Ruhuna in Matara have been producing technical development and research outcomes in line with the Nation1s environmental concerns. In addition, local people in the Area have acquired traditional and indigenous techniques for sustainable and wise use of their environmental resources through the long history.

There exist a whole set of modern technology and indigenous techniques/systems for environmental conservation. The problem, therefore, is where to find, whom to contact, and how to apply. In Southern Area and even in the Country, it is quite difficult to find such established focal centers or opportunities where people can systematically learn from experienced local persons, accumulate for future options, transfer experiences and educate and exchange ideas on environmental techniques and wise-use approaches.

2.2.3 Financial constraint

It has been thought quite reasonable that the people exploit natural resources causing environmental degradation and pollution with little attention to conservation regulations,

when they prefer more food or income to good surroundings and amenity. This way of thinking is reflected also in the current national/local budget allocation on environmental management, which puts a small stress on the conservation projects, especially for rural areas compared with the development/production sectors. Consequently, it leads to insufficiency of financial, institutional and man-power resources ready for environmental consideration and actions. Limitation of the national budget influences the environmental fields most.

A recent line of thinking, however, is not development and high-income first. After the so-called "Basic Human Needs" are satisfied, environmental conservation has to be carried out along with development. Too fast exploitation of natural resources for development may cause much larger environmental costs to future generations than full expenditure for environmental protection at present.

2.3 Strategy for Environmental Management

To overcome three major constraints related to environment and natural resources, general strategic concepts below apply to environmental management in Southern Area :

(1) Comprehensive and integrated management of environment rather than specific point-based management ;

(2) Community/NGO participation in planning and implementation of projects ;

(3) Promotion of preventive measures for environmental management rather than mitigative or restoration ones ;

(4) Application and development of development-cum-environment approaches ;

(5) More attention to public pollution in urban areas, and to natural resources in rural areas ; and

(6) Active intervention into private industries by environmental check agencies.

More specific directions to pursue for environmental management are suggested in the following.

2.3.1 Improvement of environmental administration and law enforcement

A clear direction for environmental administration in Sri Lanka is devolution. Given the limited staff and financial capacities of local governments, however, taking actions at the

central level is a prerequisite. Coordination through the National Environmental Steering Committee (NESC) among government agencies involved in the management and protection of environment and natural resources should be much improved. This should aim not only at establishing policy guidance and directions to allow different agencies to formulate better programs but also at avoiding duplicating or mutually conflicting efforts to enable more resources to be allocated to local governments.

Then functional division between the central Government and local governments should be re-established. The Government should formulate policy measures through the Ministry of Transport, Environment and Women's Affairs (MTEWA), and establish standards and criteria in association with the Central Environmental Agency (CEA). Strict enforcement of EIAs is another function expected at the central level. Environmental monitoring and assurance of compliance with environmental law and regulations are among the functions to be fulfilled at local levels involving Urban Councils and other agencies and institutes as well as local people.

Given these prerequisites, the devolution of environmental administration needs to satisfy three conditions :

(1) increased participation of local people based on NGO communities or Pradeshiya Sabhas, in environmental and natural resources management ;

(2) strengthening of staff and financial capacities at the provincial/district level ; and

(3) improved communications among the central/local governmental agencies, the industrial sector and local people/communities.

District Environmental Law Enforcement Committees and municipal environmental councils would be instrumental in enforcing measures for environmental protection and management. This is particularly important for improvement of drainage facilities, solid waste disposal, and improvement of sanitation facilities. Participation of local people and communities would be essential particularly for monitoring and their activities should be organized at the division level.

2.3.2 Establishment of regional centers

In order to streamline conservation activities throughout the Area, environmental centers as a focal point should be created. Centers will serve as channels between governmental agencies and local communities, and function to appeal environmental value and uniqueness

of the Area through ecological zoning as well as environmental monitoring, and to collect and accumulate environmental information/data for expertise training and environmental education, helping to enhance public awareness against illegal mining, encroachment of forest reserves, over-exploitation of fish resources and other inadequate practices.

These focal centers will partially or wholely meet the objectives of existing proposals for environmental training centers. They could be built-in as a function of IRDP offices or the resource centers proposed by the Presidential Task Force for Southern Area Development.

2.3.3 Ecological land-use zoning and basic infrastructure planning

A more positive approach consists of land use zoning and planning for basic infrastructure to human settlements in anticipation of future development. Based on the huge amount of environmental studies already available to be complimented by more quantitative/economic surveys, clear demarcation or zoning for future development and environmental protection should be systematically conducted to provide environmental conservators/planners, EIA consultants, policy makers, investors and the local public with a baseline or integrated profile for various potential activities. The zoning is to be output and published in a form of maps to offer general image and quick reference of the Area's environmental situation.

Planning for basic infrastructure to settlements will help to control possible negative environmental effects. This applies particularly to solid waste management and traffic control measures.

2.3.4 Awareness promotion and environmental education

A prerequisite for active participation of local communities in environmental management is the improvement of communication between relevant government agencies and local communities. If they share essential environmental information, they can recognize environmental problems, discuss them, and try to solve them together. Also the environmental monitoring and evaluation can be done most effectively by local communities that may be affected by development activities.

Using the above-mentioned centers and educational materials such as the environmental zoning maps through the existing community/NGO networks in the Area, people should be fully aware of the present and predicted future conditions of their surroundings, invisible environmental impacts/costs due to their own activities, and wise-use/sustainable life styles. They should be involved in local projects through planning workshops/seminars and actual implementation, and a system is to be established so that their own ideas for

conservation should be easily taken up by public offices. These approaches will provide some "on-the-life" environmental education, sense of responsibility as resource consumer/protector and close link with the established strategy. Also officials, consultants and private-sector persons related with environment should have more technical training on monitoring, planning, conservation measures and EIA procedures.

Preservation of bio-diversity is of increasing international concern, beyond the national interest. International networking would also be important for education and training in forest management and bio-diversity preservation. A regional node would be necessary for such a network, which may even be a national center for environmental research, education and training.

2.3.5 Integration of land and water management

Integrated management of land and water resources has more relevance in Southern Area where diverse environmental conditions are well balanced, and thus more vulnerable to human interventions. Solution to water problems may lead to creation of land problems or vice versa, as exemplified by the Nilwala Ganga flood control and soil salinity build-up in irrigated lands in the SEDZ.

Watershed management is essential under this strategy and to be supported by various land-based measures such as protection of forest reserves, reforestation, multi-storey farming and rehabilitation of home gardens. The traditional land-water ecosystem should be revitalized aiming at the retention of soil moisture in the SEDZ as it naturally integrates land and water management.

2.3.6 Establishment of strong financial support capacity

When it could be recognized by the public and local officials that any environmental goods/services are not free of charge by applying the above strategic approaches, the people's and public sectors' "willingness to pay" for environmental conservation and rehabilitation will increase in various ways. This would induce application of wise-use techniques that may cost a little bit higher than the conventional ones, active participation of voluntary conservation, activities, recycling of wastes, acceptance of more tax-payment to be used for conservation, and strict observation of regulation by polluting factories or local residents. While this could be expected in a long-run, funding sources for environmental conservation should be established in a short and medium term for purposes of counter-measures urgently required and implementation of the above institutional and educational strategy including mobilization of more conservation manpower. Some ideas

involve a funding system for EIA works, small-scale NGO activities, preventive measures of the private sector not covered by the existing public funds nor by major commercial banks/sectors, and high penalties on private enterprises not complying with environmental regulations like foresters, gem-minors, soil-excavators, factory-polluters, coral-minors, hotel-owners, fishermen, etc.

Financial incentives may be provided to increase "willingness to pay" for environmental conservation and rehabilitation by business enterprises. One way is to provide a subsidy for pollution control device.

2.3.7 Intensive and pilot-type conservation efforts by district/division

In order to prevent waste of limited resources in the Area, the priority for some environmental projects/programs should be put on most urgent/critical fields and areas. Experiences could be accumulated and learned through the centers recommended above to be made full use of at other similar problem sites in and outside of Southern Area. According to the analyses on the present environmental conditions, the current issues most likely of higher priority could be sorted out by district/division as summarized in Table 2.1.

Table 2.1 : Environmental Issues with Higher Priority in Southern Area

District/Division Issues	Galle District	Matara District	Hambantota District	Moneragala District in the Area	Embilipitiya & Kolonna Divisions	Lahugala Division
Soil Erosion	O		O	O	O	
Deforestation		O	O	O	O	
Chena Cultivation			O	O		
Encroachment of Reserves				O	O	
Water Pollution	O	O	O		O	
Solid Waste	O	O				
Coastal Erosion	O	O				
Saline Water & Salinization		O	O			
Gem Mining				O	O	

Figure 2.1 outlines relations among the environmental constrains, strategy and objectives, which show inter-links and a general action-flow framework among them. Figures in parentheses refer to related sections in this chapter.

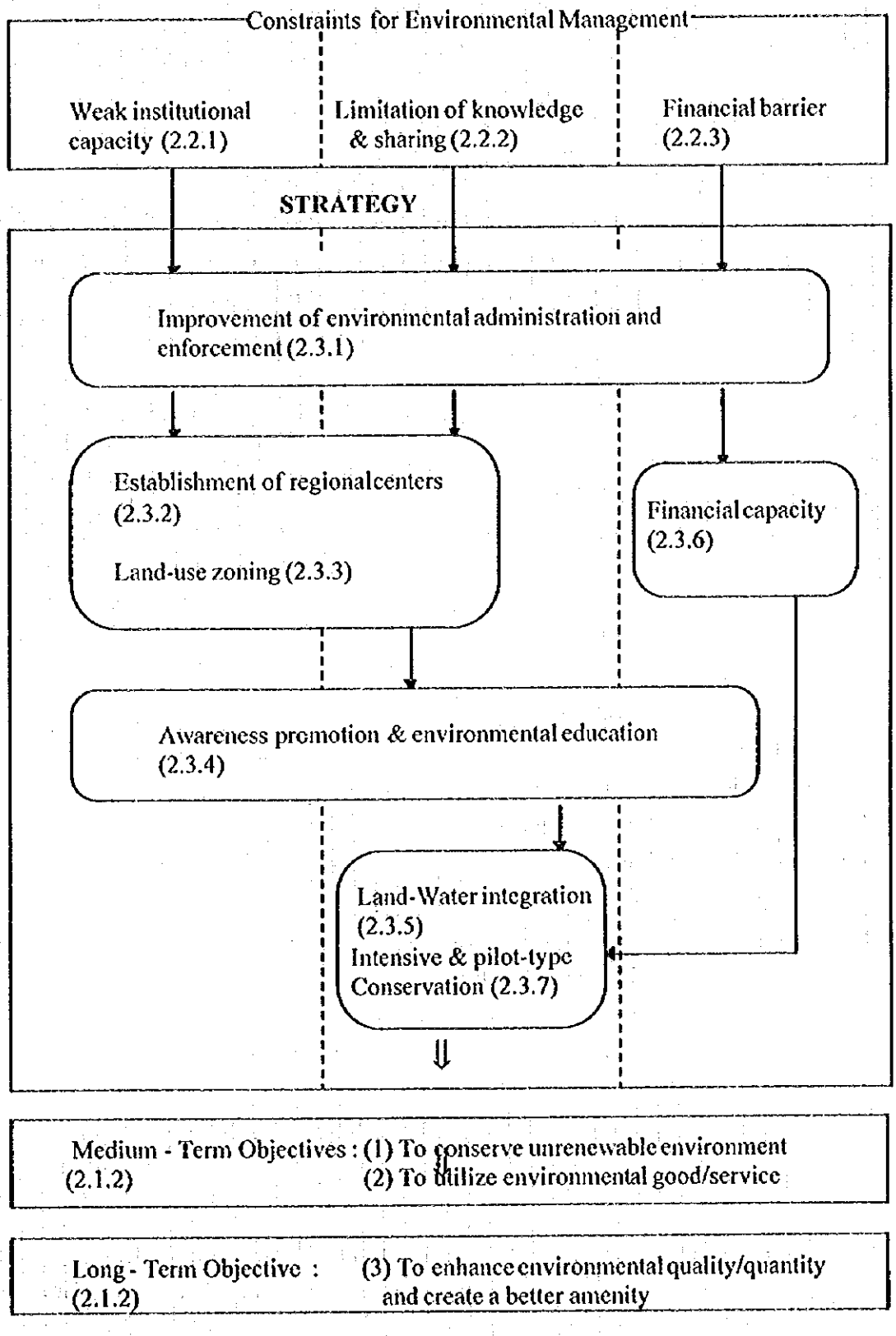

Figure 2.1 Relationships between Constraints, Strategy and Objectives

CHAPTER 3 MEASURES FOR ENVIRONMENTAL DEVELOPMENT

3.1 Basic Concepts to Deal with Environmental Issues in Southern Area

Basic concepts applicable to environmental conservation and sustainable development in Southern Area are clarified under the five resource categories. Specific measures are formulated applying these concepts and in line with environmental goals and standards stipulated in the existing environment-related laws/acts (Table 1.1).

3.1.1 Land and water resources

The important environmental issues outlined for the region are land degradation due to soil erosion, landslides, degradation of irrigated lands due to salinization and waterlogging, water shortages, water quality deterioration, changes in groundwater regime, and flash floods. The following ideas are valid in addressing to these issues and underlying causes :

1) Integrated land and water resources management to improve the land productivity,
2) Integrated management of minor tank ecosystems,
3) Implementation of the Soil Conservation Act,
4) Integrated pest management,
5) Shared control of natural resources,
6) Rehabilitation and replanting of degraded tea lands,
7) Reclamation of degraded land (saline lands, drainage, etc.),
8) Landslide hazard mapping and geological mapping,
9) Comprehensive river-basin plans for major river basins,
10) Water supply and sanitation programs to extend the coverage of adequate supply of drinking water and sanitation facilities,
11) Comprehensive surface water and groundwater quality monitoring program (including development of ambient water quality standards applicable to the region),
12) Management plans for polluted water bodies, and
13) Criteria development for assessment of groundwater resources.

3.1.2 Forests and biodiversity

Neither the region nor the Country yet has an integrated action plan for the conservation of its biological diversity. There are several efforts underway which can contribute to different aspects of biodiversity conservation, such as the Forest Sector Master Plan revision, marine ecosystem studies, work on agricultural germplasm, and ayurvedic materials research. These efforts should be integrated to identify additional policy and

institutional reforms as well as an investment agenda. However, immediate priorities for the region can be identified in the following key areas :

1) Expanding and improving professional networking and training programs in forest management and biodiversity conservation,
2) Public awareness and community participation programs in rural areas to support sustainable forest management and biodiversity conservation,
3) Well targeted conservation actions, involving local communities, designed to avert irreversible biodiversity losses, and
4) Establishment of a regional biodiversity data base, preferably based on a geographic information system features for easy use in biodiversity action plan preparation.

3.1.3 Urban and industrial pollution

The following two types of measures are required :

1) Preventive measures (approaches to manage and control industrial pollution), and
2) Damage control (pollution clean-up actions).

Preventive actions are more important and given priority in Southern Area. In particular, urban pollution control actions should focus primarily on the preventive side, while actions related to damage control or environmental quality improvement will take a form of demonstration projects designed to be easily replicable in other areas.

Strengthening of regulatory bodies such as the District Environmental Agencies (DEAs) and municipal environmental councils in Southern Area is of prime importance if effective programs on environmental protection and management are to be implemented, especially for the three areas of action related to urban and industrial environment :

1) improvement to drainage facilities,
2) solid waste disposal, and
3) improvement to sanitation facilities.

There is still a need for further analysis of regulatory and market-based incentives to support pollution prevention and control efforts. There is also a strong demand for expansion of common wastewater treatment facilities in new industrial estates to be established within the region.

3.1.4 Coastal and marine resources

The appropriate strategy to sustainable coastal resources management in the region will be successful implementation of pilot projects which are integrated into the fabric of national and local institutions and which provide experiences needed with integrated resources management to develop such programs. Potential short/medium-term project ideas which will help provide such experiences are as follows :

1) Water quality management for tourism development zones,
2) Sand management for the entire coastal zone in the region, and
3) Relocation of illegal coastal inhabitants.

3.1.5 Energy and mineral resources

As for the environmental aspect for energy resources, measures should consist of the following :

1) Regional fuelwood conservation (to extend the successful program to supply energy efficient stoves for local household use),
2) Industrial biomass energy conservation (to develop potential for substituting electricity with co-generation and biomass sources in industry),
3) Demand-side management (to take important steps toward improving the region1s energy efficiency with environmental benefits),
4) Development of renewable energy sources (to replace fossil fuels with other renewable energy sources),
5) Training in environmental assessment and related fields (to add environmental analysis skills to cadre of local energy experts), and
6) Vehicle pollution reduction (to address a key interface between energy and environment in the region)

Prerequisites for effective implementation of these measures are : 1) strong control agencies in mining, 2) enhanced awareness, 3) mineral database development, and 4) environmental education.

3.2 Projects and Programs

A total of 39 projects or programs are proposed under the current development master plan. Some are anchor projects of strategic importance for Southern Area1s development and are related also to other sectors, while the others target at specific environmental

problems. Several projects/programs are developed based on the on-going or pipe-line ones, whereas a major part of the list are newly formulated.

Environmental-related anchor projects/programs

(SA-19) GIS-Oriented Regional Information System Establishment
(SA-20) Environmental Fund for Southern Area
(SA-21) Environmental Monitoring and Animating Center
(SA-22) Integrated Management of Coastal Resources
(SA-23) Multiple-Use Forest Management
(SA-24) Eco-Tourism Development
(SA-25) Appropriate Toilet Facilities for Households

Agriculture-cum-environmental project

(AG-7) Abandoned Tanks Renovation Project in Moneragala and Ampara Districts

Tourism-cum-environmental projects

(TO-8) Sinharaja Forest Visitor Center
(TO-12) Research Institute of Bird

Water/Sanitation-cum-environmental projects/programs

(WS-14) Treatment Facilities for High Fluoride and Iron Contents in Water
(WS-16) Piped Sewerage Systems with Treatment and Disposal Facilities
(WS-17) Piped Sewerage Systems for Major Coastal Urban Centers
(WS-18) Innovative Sewerage Systems Pilot Installation

Urban system-cum-environmental program

(UR-3) Urban Administration in Sri Lanka

Social-cum-environmental project/program

(SO-12) Integrated Malaria Control and Prevention
(SO-18) Specialized Technical Training and Commercial Centers

Environment specific projects/programs

(EN-1) Wetland Conservation and Management
(EN-2) Environmental Rehabilitation of the Nilwala and Nupe Canals
(EN-3) Coastal Belt Protection
(EN-4) Soil Resources Inventory at Scale 1:50,000 for Southern Area
(EN-5) World Bio-Diversity Research Institute

(EN-6) Wastewater Treatment for Fishery Communities
(EN-7) Promotion and Extension of Efficient Fuelwood-Stoves in Rural Area
(EN-8) Solid Waste Disposal Management
(EN-9) Gem-Mining Regulation and Health Project
(EN-10) Functional Improvement of National Parks
(EN-11) Cooperative Planting Promotion
(EN-12) Integrated Watershed Management
(EN-13) Wood-Based Industry Improvement Project
(EN-14) Environmental Wise-Use Research and Training Center
(EN-15) Wet-Zone Forest Management through Community Participation
(EN-16) General Conservation Center for Forest-cum-Wildlife Reserve Area
(EN-17) Ecological Management of Soil Erosion and Minor Tanks in SEDZ
(EN-18) Biological and Environmental Zoning

3.3 Relations among the Proposed Projects/Programs

Tables 3.1 and 3.2 summarize phasing and target areas of the anchor and other sector projects/programs.

Table 3.1 Schedule of Proposed Projects for Environment in Line with Objectives and Strategy

Medium-Term Objectives	Conservation of unrenewable environment Utilization of environmental goods/services		
Long-Term Objective	Enhancement and creation of environment		
Phases	I (1997 ~ 2000)	II (2000 ~ 2010)	III (2010 ~)
Strategy 1 : Administration Improvement	UR-3, EN-17		
Strategy 2 : Center Establishment	SA-22, SO-18	TO-12, EN-5, EN-15	
Strategy 3 : Land-use Zoning	SA-19, EN-4	EN-19	
Strategy 4 : Awareness Promotion	SA-21	EN-7	TO-8
Strategy 5 : Land and Water Integration	EN-12, EN-13	SA-23, EN-2, EN-8, EN-14, AG-7, EN-18	
Strategy 6 : Financial Capacity	SA-20		
Strategy 7 : Intensive and Pilot-Type Conservation	WS-17, EN-3, EN-10,	SA-25, WS-14, WS-16, EN-1, EN-6, EN-9, SO-8, EN-16	SA-24, WS-18

Table 3.2 District/Division Covered by Proposed Projects

District/Division Project No.	Galle District	Matara District	Hambantota District	Moneragara District in the Area	Embilipitiya & Kolonna Divisions	Lahugala Division
SA-19	O	O	@	O	O	O
SA-20	@	O	O	O	O	O
SA-21	O	@	O	O	O	O
SA-22	@	O	@			O
SA-23	@	@				
SA-24	@	@				
SA-25	@	@	O	O	O	
AG-7				@		O
TO-8		@				
TO-12			@			
WS-14	@		@			
WS-16				@		
WS-17	@	@	@			
WS-18	@		@			
UR-3	national and regional levels					
EN-1	@		@	@	@	
EN-2		@				
EN-3	@	@				
EN-4	regional level					
EN-5			@			
EN-6	@	@	@			O
EN-7		@		O	@	
EN-8	@	@				
EN-9		O		O	@	
EN-10			O	@		O
EN-11				@		
EN-12	regional level					
EN-13	regional level					
SO-12			@	@		
SO-18	@	@	@		@	@
EN-14			@			
EN-15	@					
EN-16				@		
EN-17			@	@		@
EN-18	regional level					

Note : @ = major focal districts/divisions, O = other covered districts/divisions

3.3.1 Integrated implementation of proposed projects/programs by phase

Project implementation is phased into three time periods, i.e. Phase I (1997 ~ 2000), Phase II (2000 ~ 2010) and Phase III (2010 ~). The medium term objectives aiming at mitigating future environmental costs are to be accomplished within Phases I and II, while the long-term objective aiming at increasing future environmental benefits will be met during Phases II and III.

(1) Projects/programs for improvement of environmental administration and law enforcement (**Section 2.3.1**)

The most urgent and basic need for environmental management is full function and its enforcement of environmental administration in the region. Administrative strengthening at the central level has already commenced under various types of projects and financing, focusing on the Central Environmental Agency, Department of Environment, Forestry Department, Department of Wildlife Conservation, Coastal Conservation Department, etc. in addition to regulation revision and EIA procedures.

Local efforts should be made on environmental administration for Southern Area, particularly for pollution control in urban area and flora and fauna conservation in rural area. The project "Urban Administration in Sri Lanka" (UR-3) which is nation-wide but covers a large urban area in the region will be most appropriate to strengthen administrative functions of local governmental offices or committees related to urban environment issues such as air and water pollution, noise, solid waste and coastal erosion, in addition to other urban administrative aspects. "General Conservation Center for Forest-cum-Wildlife Reserve Area in the South" (EN-16) is to promote more efficient and responsible conservation activities of FD and DWLC by letting information shared, strengthening their administrative power, and clearly demarcating their responsibilities, at a regional level. Both projects should be initialized in Phase I, to facilitate implementation of the remaining environmental projects/programs.

(2) Projects/programs for establishment of regional centers (**Section 2.3.2**)

Under the regionally enforced administrative framework, technical support is also important for implementation of any environmental measures. There is yet a severe lack of technology/techniques for environmental conservation and improvement ranging from pollution control measures, environmental management planning, EIA surveys, coastal protection, and biodiversity conservation to wise-use and sustainable approaches, although some central institutes or research centers have being accumulating parts of them.

As focal points at a local level to actively initiate accumulation of environmental technical knowledge, scientific research, expertise training, pilot conservation projects and national/international exchange of sustainable techniques, some centers specialized in more important or urgent environmental qualities have to be established in the region, in cooperation with existing national centers or the University of Ruhuna. Such locally-based environmental centers will develop techniques and approaches most suitable to the region, and are expected to feed back their output to other problem areas in the Country.

Shorter-term projects (for Phase I) in line with this center-formation strategy are "Integrated Management of Coastal Resources" (SA-22) and "Specialized Technical Training and Commercial Centers" (SO-18). SA-22 is supposed to establish a training and research center for coastal management financed by a foreign donor, which will contribute to solution of coastal erosion, mining problems and lagoon/wetland conservation. Although SO-18 is proposed for the social development sector, it can also be a center where quick applicable techniques are transferred to local businessmen and workers by means of anti-pollution technical courses as part of specialized technical training.

For Phase-II, "Research Institute of Bird" (TO-12) and "World Bio-diversity Research Institute" (EN-5) are proposed. These project ideas could be jointed together and in association with another on-going JICA project "Plant Genetic Resources Center" under the Department of Agriculture. It is significant that a center related to biodiversity is established within the region. Another Phase-II project "Environmental Wise-Use Research and Training Center" (EN-14) is more resource utilization/development-oriented. This center focuses on comprehensive research, accumulation and training on active approaches to sustainable development using environmental and natural resources in the region. It will provide local people with clear concept of sustainability and concrete methods to obtain income from environment.

(3) Projects/programs for ecological land-use zoning and basic infrastructure planning (Section 2.3.3)

Southern Area has various kinds of environmental assets and environmentally sensitive areas. Several studies have been done on these but their results have not been compiled for further use such as land-use planning, formulation of conservation strategy and EIA baselines. Information on some environmental aspects is unsatisfactory.

"GIS-oriented Regional Information System Establishment" (SA-19) and "Soil Resources Inventory at Scale 1 : 50,000 for Southern Area" (EN-4) will accomplish provision of

updated and systematic information on essential environmental elements. "Biological and Environmental Zoning" (EN-18) is proposed to follow up these projects, in Phase II. Main output of the project will be a high-quality environmental zoning maps including basic environmental facilities such as monitoring stations, water purification systems, solid waste dumping sites, etc. based on the first two projects. These three GIS-zoning projects will constitute initial activities of the centers proposed above.

(4) Projects/programs for awareness promotion and environmental education (Section 2.3.4)

Whether the region's environment is properly protected and improved depends upon local people's and government's willingness to do so. This willingness is subject to people's awareness and knowledge of environment, especially about environmental value and severeness of potential pollution. People's concern on environment is proved to be very often dependent on environmental knowledge.

"Environmental Monitoring and Animating Center" (SA-21) is oriented to environmental awareness promotion and education among the region's communities rather than scientific studies or researches in specific environmental aspects. This center will be a key source to familiarize local residents with their environmental conditions and potential risks. The biological and environmental zoning maps made under EN-18 could serve good educational materials. Following this Phase-I project, "Promotion and Extension of Efficient Fuelwood-Stoves in Rural Area" (EN-7) is implemented to educate rural people on importance of forests and energy saving through further extension services for efficient stoves. "Sinharaja Forest Visitor Center" (TO-8) will use this natural world heritage as designated by UNESCO to promote tourists' and local people's awareness to biodiversity value of nature.

(5) Projects/programs for integration of land and water management (Section 2.3.5)

"Cooperative Planting Promotion" (EN-11) and "Integrated Watershed Management" (EN-12) are to be carried out in Phase-I aiming at systematic reforestation and forest management in critical areas due to deforestation. The following six projects are proposed for Phase II:

- Multiple-use Forest Management (SA-24),
- Abandoned Tanks Renovation Project in Moneragala and Ampara Districts (AG-7),
- Environmental Rehabilitation of the Nilwala and Nupe Canals (EN-2),
- Solid Waste Disposal Management (EN-8),

- Wood-based Industry Improvement Project (EN-13), and
- Ecological Management of Soil Erosion and Minor Tanks in SEDZ (EN-17).

Projects AG-7 and EN-17 might be combined, if project areas are similar. EN-2 and EN-8 focus on water and soil in urban areas, where water pollution or soil contamination is adversely affecting shoreline and marine ecosystems. Both SA-24 and EN-13 attempt to utilize forest goods/services efficiently on a sustainable basis protecting soil and water resources of the river upstreams concerned.

(6) Projects/programs for establishment of strong financial support capacity (Section 2.3.6)

As willingness to pay for environment of local people and the Country increases reflecting promoted awareness and education on environment in addition to improved income level, much expanded financial support could be expected in the long run. However, environmental degradation cannot wait for such gradual change of people's view of environment. Therefore, as a quick and timely financial support, "Environmental Fund for Southern Area" (SA-20) is strongly recommended. This project is to offer a small amount of money to localized and urgent environmental actions by local communities as well as EIA surveys and anti-pollution measures by small industries.

(7) Projects/programs for intensive and pilot-type conservation efforts (Section 2.3.7)

Within the limited resources of expertise and money for the region, environmental projects/programs should focus on the most urgent environmental issues in most needed areas. Then their experiences and outcomes should be applied to other areas step by step, because a lot of environmental techniques are still under development and not of cook-book nature due to types of ecosystems and natural conditions which vary area by area. Among the proposed environment-related projects/programs, the following projects are in line with this strategic concept.

Phase I (1997 ~ 2000)

The following projects address to most urgent local environmental problems:

- Piped Sewerage Systems for Major Coastal Urban Centers (WS-17),
- Coastal Belt Protection (EN-3), and
- Functional Improvement of National Parks (EN-10).

Eco-tourism Development (SA-24) will also be initiated in Phase I.

Phase II (2000 ~ 2010)

The projects for this phase aim at accomplishing the two medium-term objectives, i.e. to conserve the culturally, scientifically and ecologically important environment and natural resources of unrenewable nature available anywhere in the Area, and to economically and socially utilize environmental goods/services and natural resources which have a renewable nature or an unrenewable but non-unique nature contributing to income growth, within the strict limitation of their renewable capacity so that their use does not adversely affect the other conserved environment:

- Appropriate Toilet Facilities for Households (SA-25),
- Treatment Facilities for High Fluoride and Iron Contents in Water (WS-14),
- Piped Sewerage Systems with Treatment and Disposal Facilities (WS-16),
- Wetland Conservation and Management (EN-1),
- Wastewater Treatment for Fishery Communities (EN-6),
- Gem-mining Regulation and Health Project (EN-9),
- Integrated Malaria Control and Prevention (SO-12), and
- Wet-zone Forest Management through Community Participation (EN-15).

Phase III (2010 ~)

The projects for this phase will be implemented based on technology and institutional and financial supports accumulated through implementation of other projects. However, preliminary planning or pilot implementation may be undertaken during early phases. The following project will meet the long-term objective to enhance environmental quality and to create a better amenity for local people's and tourists in Southern Area:

- Innovative Sewerage System (WS-18).

3.3.2 Area-wise and functional relationships between projects/programs

As summarized in Table 3.2, each proposed project/program has its specific target district/division. Some of them should be extended to other areas. Table 3.3 summarizes how some projects solve specific environmental problems in districts and divisions in Southern Area based on Table 3.2 and Table 2.1.

Table 3.3 Proposed Projects by Area and Environmental Issue

District/Division Issues/Project No.	Galle District	Matara District	Hambantota District	Moneragara District in the Area	Embilipitiya & Kolonna Divisions	Lahugala Division
Soil Erosion	O		O	O	O	
Project No.	EN-12	EN-12	En-12, EN-17	EN-12, EN-17	EN-12	EN-12
Deforestation		O	O	O	O	
Project No.		EN-7		EN-11	EN-7	
Chena Cultivation			O	O		
Project No.			EN-17	AG-7, EN-17		AG-7
Encroachment of Reserves				O	O	
Project No.	EN-1		EN-1	En-1, EN-10	EN-1	
Water Pollution	O	O	O		O	
Project No.	WS-14, WS-17, EN-6	WS-17, EN-2, EN-6	WS-14, WS-17, EN-6	WS-16		
Solid Waste	O	O				
Project No.	EN-8	EN-8				
Coastal Erosion	O	O				
Project No.	SA-22 EN-3	EN-3	SA-22			
Saline Water & Salinization		O	O			
Project No.		EN-2				
Gem Mining				O	O	
Project No.			SO-12	SO-12	EN-9	

Appendix : Major Past and On-going Projects/Programs Related to Environment

1. Projects / programs for overall management of land and water resource

(1) National Sand Study (SRL/NAT/0042 ; 91/011)
Implementing Agency : Central Environmental Authority (CEA)
Location : country-wide including Southern Area
Description : This policy/planning-oriented project is to survey damage to coast and rivers due to sand depletion for advice on remedies. (Refer to 'Coastal Resources Program' for more detail.)
Donor and Foreign Investment : Netherlands, US$ 0.524 million in total
Duration : 1991 ~ 1994

(2) NAREPP Policy, Institutions & NGO Components (SRL/NAT/0028 ; 383-0109)
Implementing Ministry : Ministry of Environment & Parliamentary Affairs (MEPA)
Implementing Agency : CEA
Location : country-wide including Southern Area
Description : It is to apply environmental economics to environmental policy, to develop legal and regulatory framework, to analyze and improve management at MEAP/CEA and other key agencies, to review and revise CEA corporate plan and MEPA management plan, and to develop environmental cells at key agencies, including environmental impact assessment as well as the Asia Foundation Environmental NGO Strengthening Program.
Donor and Foreign Investment : USAID, US$ 7 million in total
Duration : 1991 ~ 1996
Present Status : The whole NAREPP was planned to be during 1990 ~ 1998 with US$ 19 million donated by USAID.

(3) Environmental Cooperation Program : Policies & Institutions Components (SRL/NAT/0008 ; LKA027)
Implementing Ministry : MEPA
Implementing Agency : CEA
Location : country-wide including Southern Area
Description : Its activities include institutional support to MEPA, CEA and divisional environmental authorities, human resources development training, and policy studies to update environmental legislation.
Donor and Foreign Investment : NORAD, US$ 0.5 million in total
Duration : 1989 ~ 1996
Present Status : The whole Environmental Cooperation Program was planned to be during 1989 ~ 1994 with US$ 3.6 million donated by NORAD.

(4) NAREPP Policy, Educational Components (SRL/NAT/0028 ; 383-0109)
Implementing Ministry : MEPA
Implementing Agency : CEA
Location : country-wide including Southern Area
Description : It is to develop master's environmental programs at 4 universities, to enhance faculty training through policy research exchanges, and to provide graduate school scholarships and research support, as well as for EIA training programs.
Donor and Foreign Investment : USAID, US$ 1 million in total
Duration : 1991 ~ 1996
Present Status : The whole NAREPP was planned to be during 1990 ~ 1998 with US$ 19 million donated by USAID.

(5) Environmental Cooperation Program : Educational Components (SRL/NAT/0008 ; LKA027)
Implementing Ministry : MEPA
Implementing Agency : CEA, National Institute of Education (NIE), University Grants Commission (UGC), etc.
Location : country-wide including Southern Area
Description : Its activities include development of school curriculum and resources at all levels, primary and secondary school participatory programs on environmental management, environmental awareness programs, and research support.
Donor and Foreign Investment : NORAD, US$ 1 million in total
Duration : 1989 ~ 1995
Present Status : The whole Environmental Cooperation Program was planned to be during 1989 ~ 1994 with US$ 3.6 million donated by NORAD.

(6) Agricultural Land Conservation, or Land Use Planning (SRL/NAT/0002 ; 816-SRI-SP)
Implementing Agency : Department of Irrigation (DOI), Provincial Councils (PC) of Uva and Sabaragamuwa, and Central Province
Location : Uva and Sabaragamamuwa provinces
Description : It is to provide assistance to PCs in "Erodible Areas" for soil conservation purposes, and to improve in land-use planning at the national and district levels to maximize benefits to the agricultural sector.
Donor and Foreign Investment : ADB, US$ 19.3 million in total
Duration : 1986 ~ 1995
Present Status : These activities under this program look also for the other provinces.

(7) Land Tenure Promotion
Implementing Ministry : Ministry of Lands Irrigation & Mahaweli Development (MLIMD)
Implementing Agency : Land Commissioner
Location : Galle and Polonnaruwa districts
Description : It is for immediate action aimed at bringing Land Development Ordinance (LDO) permits closer to free titles on an experimental basis.
Cost : US$ 100,000 in total
Donor and Foreign Investment : USAID, Rs.54 million
Present Status : It is underway.

(8) Planning Support Project, Phase III (SRL/NAT/0047)
Description : This project is geared towards validating the results and structures of the former Remote Sensing Project and to support a demand driven production of spatial data and its competent application at the various level.
Donor and Foreign Investment : Switzerland, US$ 0.57 million
Duration : 1992 ~ 1995

(9) Land Rehabilitation (SRL/NAT/0064)
Donor and Foreign Investment : Switzerland, US$ 4.746 million
Duration : 1993

(10) Conservation Farming Program (SRL/AGR/0037 ; 8420432)
Description : It is to replace chena cultivation by better methods of farming, experiments and training in weed control, erosion protection, mulching and mixed cultivation.
Donor and Foreign Investment : German Agency for Technical Cooperation (GTZ), US$ 1.17 million in total
Duration : 1986 ~ 1994

(11) Sustainable Development of Tree Crop Investment (SRL/AGR/0201 ; TA-1869)
Donor and Foreign Investment : ADB, US$ 350,000
Duration : 1993 ~ 1994

(12) Southern Area Development Plan (SRL/ARE/0079 ; SRL/89/011)
Location : Southern area
Description : It is technical assistance to design, implement & coordinate various multi-sectoral development studies in infrastructure development, agricultural production & processing, fisheries, environment, tourism and industry.
Donor and Foreign Investment : UNDP, US$ 1.06 million
Duration : 1991 ~ 1995

(13) Water Supply & Sanitation Rehabilitation (SRL/SOC/0050 ; CR.1700)
Donor and Foreign Investment : International Development Association (IDA)/WB, US$ 37 million in total
Duration : 1989 ~ 1995

(14) Rural Water & Sanitation (SRL/SOC/0084 ; SRL/89/004)
Donor and Foreign Investment : UNDP/IBRD, US$ 0.94 million in total
Duration : 1990 ~ 1993

(15) Community Water Supply & Sanitation (SRL/SOC/0145 ; 2442)
Donor and Foreign Investment : IDA, US$ 24.3 million in total
Duration : 1993 ~ 1998

(16) Water & Sanitation (SRL/SOC/0151 ; YW202)
Implementing Agency : CEA, and National Water Supply & Drainage Board (NWSDB)
Description : General objectives are ;
(a) reduction of incidence of water & sanitation-related diseases, specially among children, and
(b) promotion of primary environmental care
Specific objectives are ;
(a) to enhance knowledge of rural water facility caretakers in operation and maintenance, and public health personnel in water and sanitation,
(b) to develop information, education and communication material, and
(c) to create awareness among school children about environmental protection with emphasis on safe water and environmental sanitation
Donor and Foreign Investment : UNICEF, US$ 2.26 million in total
Duration : 1992 ~ 1994

(17) Community Water Supply & Sanitation (SRL/SOC/0175 ; 2442)
Implementing Agency : Community Water Sanitation Project Unit (CWSPU)
Description : Its objectives are ;
(a) to develop systems and institutions for community based planning, implementation, operation and maintenance of cost-effective and sustainable water supply and sanitation,
(b) to implement community based schemes in rural areas and small towns, and
(c) to prepare a follow-up project which would apply the community-based approach to extend coverage to other distincts in the country
Donor and Foreign Investment : IDA, US$ 24.3 million in total
Duration : 1993 ~ 1998

2. Projects/programs for forests and biodiversity protection

(1) Natural Areas in the South East Dry Zone (SEDZ)
Location : South-east dry zone
Description : It is study-oriented within the Southern Area Development Program under RDD/MFP.
Donor and Foreign Investment : UNDP
Duration : 1995 (7 months)
Present Status : to be finalized by October 1995

(2) Block IV of the Yala National Park
Location : Block IV of the Yala National Park
Description : It is study-oriented within the Southern Area Development Program under RDD/MFP.
Donor and Foreign Investment : NORAD
Duration : 1995 (a half month)
Present Status : Its implementation was postponed from January to September 1995, so to be finalized.

(3) Forest Plantation Management & Training Project
Location : degraded dry zone in the country including Southern Area
Description : It is for block planting as part of the Forestry Sector Development Project including other projects such as Forestry Research & Information, Forest Sector Master Plan Revision. It is also to identify and demarcate mangroves, and to carry out biological/socio-economic studies.
Donor and Foreign Investment : World Bank, US$ 31 million in total
Duration : 1990 ~ 1996
Present Status : Forestry Sector Development Project II has also started for 1996 ~ 2000.

(4) Participatory Forestry Project (SRL/AGR/0182 ; L-1183)
Implementing Agency : Department of Forest (FD)
Location : 24 districts in the country including Southern Area
Description : It is for development of homestead gardens, farmer woodlots with other approaches to 15,000 ha of public and private land. And other main objectives are ;
(a) to increase tree planting by farmers and thereby create employment opportunities, incomes, and reduce poverty and rehabilitate environmentally degraded areas, and
(b) to strengthen the institutional capability of FD to expand its programs for non-forest tree planting, adaptive or on-farm research, extension delivery systems and privately operated village nurseries
Donor and Foreign Investment : ADB and Australian Government, US$ 25 or 10.5 million in total
Duration : 1993 ~ 1999

(5) Wetland Conservation & Protected Area Management Project (SRL/NAT/0041 ; 91/013,92/007)
Implementing Agency : Natural Resources Management Division of CEA, National Wetland Steering Committee (NWSC)
Location : Palatupana Maha Lewaya, Bundala National Park, Bentota Estuary, Wirawila-Tissa Sanctuary & Yoda Wewa, Koggala Lagoon, Udawalawe, and Karagan Lewaya in Southern Area, (as well as wetlands in the other area)
Description : This policy/planning-oriented project is to identify priority sites through ecological survey and to prepare 10 conservation management plans with strategies for wetlands, which are similar to the SAM(Special Area

Management) approach of CRMP(Coastal Resource Management Project) under NARA. Project activities include creation and updating of a national database concerning wetlands, prioritization of wetlands for conservation and management effort, preparation of conservation management plans for selected wetland areas, and provision of guidance for implementation of these plans.

Donor and Foreign Investment : Netherlands Government, US$ 1.488 million in total
Duration : 1991 ~ 1999
Present Status : Some source reports that it will be finalized in 1995/96.

(6) Sinharaja Conservation Project, Phase II
Implementing Agency : FD, Department of Wildlife Conservation (DWLC), etc.
Location : Sinharaja
Description : It consists of research studies and formulation of management plan, including demarcation of boundaries, establishment of a buffer zone, visitor facilities as well as awareness/education.
Cost : Rs. 48 million
Donor and Foreign Investment : NORAD, US$ 1 million
Duration : 1994 ~ 1998
Present Status : Phase I was implemented by NORAD during 1988 ~ 92 with Rs. 7 million.

(7) National Conservation Review
Implementing Agency : FD, DWLC, IUCN, etc.
Location : wet zone forests in the country including Sinharaja
Description : It is for inventory of wet zone forests.
Donor and Foreign Investment : UNDP and FAO
Duration : 1993 ~ 1996

(8) Wetland Conservation
Implementing Agency : NWSC with Coastal Conservation Department (CCD), CEA, etc.
Location : Rekawa and Hikkaduwa lagoons
Description : It is to develop private-public partnerships for sustainable management of critical wetland sites, under CRMP/NAREPP.
Cost : US$ 200,000
Donor and Foreign Investment : USAID
Present Status : It is underway.

(9) Development of Wildlife Conservation & Protected Area Management (SRL/NAT/0040 ; SRL/92/G31)
Implementing Agency : DWLC
Location : country-wide including Southern Area
Description : It is directed at the conservation at the conservation of the biological diversity of Sri Lanka and is an institution building project, designed to raise the technical and management capabilities of the DWLC and establish a representative and functional national protected area network.
Donor and Foreign Investment : UNDP, US$ 4.09 million in total
Duration : 1992 ~ 1997

(10) Wildlife & Nature Protection Society (SRL/NAT/0044 ; 90/001)
Implementing Agency : Wildlife & Nature Protection Society (WNPS)
Description : It is to improve functions of WNPS.
Donor and Foreign Investment : Netherlands, US$ 25,000 in total
Duration : 1990 ~ 1993

(11) Plant Genetic Resources Center (SRL/AGR/0047)
Implementing Agency : Department of Agriculture (DOA)
Description : It is to improve the collection and conserve plant genetic resources.
Donor and Foreign Investment : Japan International Cooperation Agency (JICA), US$ 4.07 million in total
Duration : 1988 ~ 1995

(12) Environmental Management in Forestry Development (SRL/AGR/0060 ; SRL/89/012)
Implementing Agency : FD
Description : It is to strengthen institutional capacity in FD for FEM and to introduce environmentally & technically sound plantation establishment and management practice.
Donor and Foreign Investment : UNDP and FAO, US$ 2.33 million in total
Duration : 1989 ~ 1995

(13) Forestry Research & Information Project (SRL/AGR/0148 ; 178-502-007)
Description : It is for collection and provision of information for efficient afforestation, resfforestation, agroforestry and improved forest management, as well as for promotion of conservation activities and interactions in the forestry sector.
Donor and Foreign Investment : UK1s Overseas Development Administration (ODA), US$ 7.08 million in total
Duration : 1990 ~ 1995

(14) Forestry Land Use Mapping Project (SRL/AGR/0150 ; 178-502-006)
Description : It is for reforestation and better management of national forest estate, as well as for reduction of siltation rate of Victoria and other reservoirs.
Donor and Foreign Investment : ODA, US$ 2.34 million in total
Duration : 1989 ~ 1995

(15) Institutional Strengthening of the Forest Department (SRL/AGR/0186 ; TA-1777)
Implementing Agency : FD
Description : It is further strengthen FD1s overall capacity to engage in forestry development, including training & extension services, and its ability to serve rural farmers rather than just regulate them, an advisory technical assistance is proposed to strengthen the programming implementation and monitoring capabilities of the FD and its operational units.
Donor and Foreign Investment : ADB, US$ 0.82 million in total
Duration : 1993 ~ 1999

3. Projects/programs for urban and industrial pollution control

(1) Metropolitan Environmental Improvement Program (MEIP)
Implementing Ministry : MEPA
Implementing Agency : CEA, Urban Development Authority (UDA), Ceylon Institute of Scientific & Industrial Research (CISIR), etc.
Location : country-wide including Southern Area
Description : It includes such activities as Clean Air 2000, industrial pollution management study, and feasibility studies for common industrial wastewater treatment plants.
Donor and Foreign Investment : World Bank and UNDP, US$ 3 million in total
Duration : 1990 ~ 1995
Present Status : The Phase III of this project has just started for about 3 years.

(2) Natural Resources & Environmental Policy Project (NAREPP) (SRL/NAT/0028 ; 383-0109)

Implementing Ministry : Ministry of Transport, Environment & Women's Affairs (MTEWA), and Ministry of Policy Planning & Implementation (MPPI)

Implementing Agency : CEA

Location : country-wide including Southern Area

Description : This urban & industrial environmental management-type project includes efficient pollution reduction through environmental audits (with MEIP), EPL & other regulations review, ambient water quality monitoring, and community-based environment management demonstrations. This project comprises the following 6 components ;

1) Policy & institutional development,
2) Urban & industrial environmental management,
3) Biological diversity conservation,
4) Coastal resources management,
5) Participatory watershed resources, and
6) Public participation in environmental management

Cost : US$ 25 million

Donor and Foreign Investment : USAID, US$ 19 million in total

Duration : 1992 ~ 1996

Present Status : The whole NAREPP was planned to be during 1990 ~ 1998 with US$ 19 million donated by USAID.

(3) Industrial Pollution Reduction Program (SRL/NAT/0049)

Location : country-wide including Southern Area

Description : It is for cost-effective reduction techniques for textile, distillery and other selected industries to reduce pollutant discharge. It will accomplish this objective by providing direct support for selected demonstration factories to allow them to improve their processes and thus reduce pollutant generation at the source.

Donor and Foreign Investment : UNIDO and UNDP , US$ 2.16 million in total

Duration : 1993 ~ 1996

(4) Pollution Control for Selected Industries, or Industrial Pollution Control Phase I & II (SRL/NAT/0043;90/020 and 91/010)

Implementing Ministry : MEPA

Implementing Agency : CEA

Location : country-wide including Southern Area

Description : Its activities consist of feasibility studies for textile, rubber, desiccated coconut, pesticide and tourist industries, as well as waste water treatment plant for rubber industry. It also aims at development of environmental quality standards.

Donor and Foreign Investment : Netherlands Government, US$ 1.83 million in total

Duration : 1991 ~ 1997

(5) MEIP Policy & Institutions Components

Implementing Agency : National Environmental Steering Committee (NESC), UDA, etc.

Location : country-wide including Southern Area

Description : It is for NESC administrative support, geographic management information system (GMIS) at UDA, laboratory accreditation scheme, development of environmental cells at UDA, WPC and private sector, industrial pollution management policy statement, and enforcement of strategy task force.

Donor and Foreign Investment : World Bank and UNDP, US$ 0.5 million in total
Duration : 1990 ~ 1995

(6) Restration for Urban Water Bodies
Implementing Agency : Kandy MC
Location : Galle
Description : It is to prepare restoration plans for urban water bodies subject to deteriorating water quality in cities.
Cost : US$ 500,000 in total
Donor and Foreign Investment : NORAD, Rs.200,000 only for Galle
Present Status : It is underway. MEIP/NAREPP economic valuation study is proposed.

(7) Industrial Water Quality Monitoring
Implementing Agency : CEA
Location : some water-bodies including Koggala
Description : It is to identify sampling points in key areas where industrial development is planned, as well as to collect, analyze and publish quarterly water-quality data.
Cost : US$ 25,000 in total
Donor and Foreign Investment : USAID
Present Status : It is partly underway. The Concept Paper (CP) from CEA mentioned that monitoring of environmental quality in 12 water-bodies including Koggala, where major industrial development was being planned, had been done by the Institute of Fundamental Studies (IFS).

4. Projects/programs for coastal and marine resource management

(1) NAREPP Coastal Resources Management Project (CRMP) (SRL/NAT/0028,383-0109)
Implementing Ministry : MEPA
Implementing Agency : CCD and NARA
Location : country-wide including Hikkaduwa and Rekawa lagoon in Galle
Description : It is to assist CCD to implement and update the Coastal Zone Management (CZM) Plan, to assist NARA with research related to CZM planning and implementation through participation in two SAM (Special Area Management) sites, and for SAM projects in Hikkaduwa and Rekawa Lagoon as well as training in coastal management for CCD, NARA, DWLC, NGOs and other agency personnel concerned.
Donor and Foreign Investment : USAID, US$ 2 million in total
Duration : 1991 ~ 1996
Present Status : The whole NAREPP was planned to be during 1990 ~ 1998 with US$ 19 million donated by USAID.

(2) Coast Conservation Project, Phase II
Location : country-wide including Southern Area
Description : It consists of shoreline structures for coastal protection and technical assistance in engineering works. This is action-oriented project following the 'Strengthening of the Coast Conservation Department' project (GTZ, 1988~1984, SRL/NAT/0005, 8720625 as donor number, US$ 5.2 million).
Donor and Foreign Investment : GTZ, US$ 0.75 million in total
Duration : 1994 ~ 1996

(3) Control of Coral Mining
Implementing Agency : Southern Provincial Council
Location : Southern province
Description : It is to implement a planned program to provide alternate employment and land to those engaged in coral mining, under CRMP in association with NAREPP.
Cost : US$ 100,000
Donor and Foreign Investment : USAID, US$ 12,000 for study
Present Status : Its study is underway.

5. Projects/programs for energy and mineral resource management

(1) National Fuelwood Conservation Project (NFCP)
Implementing Ministry : Ministry of Power & Energy, and Ministry of Energy Conservation
Implementing Agency : Ceylon Electricity Board (CEB) in rural areas, and NGOs in urban areas
Location : country-wide including Southern Area
Description : It is to introduce 500,000 improved fuelwood stoves in both rural and urban areas. Energy-efficient wood-stoves have been developed, disseminated and installed in over 300,000 households as part of NFCP.
Duration : 1984 ~ 1994
Present Status : Despite of the success and importance of the NECP, CEB ended its participation. Additional efforts are required to maintain and expand this valuable program.

(2) Awareness Program for Gem-miners
Implementing Agency : National Gem & Jewelry Authority (NGJA)
Location : Ratnapura and Matara
Description : It uses confiscated security deposits to rehabilitate/replant, on limited scale, abandoned open mines and damaged river banks.
Duration : 1993 ~ 1994
Present Status : This was some ad hoc, so a more regular and wider awareness programme should be conducted for the gem miners, which should also be extended to include other artisanal miners. This is proposed to be implemented by NGJA with NGO participation and the Geological Survey & Mines Bureau (GSMB) assistance.

(3) Localization of Gem Deposits in Sri Lanka (SRL/NAT/0016 ; 91-1023)
Donor and Foreign Investment : International Development Research Center (IDRC), US$ 0.32 million in total
Duration : 1988 ~ 1994

Forest and Protected Area Management

SECTOR REPORT 6 LAND AND ENVIRONMENT

PART 3 FOREST AND PROTECTED AREA MANAGEMENT

CHAPTER 1 EXISTING CONDITIONS

1.1 Present National Policy for Forest and Protected Area Management

1.1.1 National forest policy

The National Forest Policy (NFP) for Sri Lanka, approved by the Government in March 1995 has been drawn up to provide clear directions for development of the forestry sector. The policy acknowledges that a large part of forests should be completely protected for the conservation of biodiversity, soil and water resources in view of heavy depletion of natural forests.

The key areas emphasized by the policy are:

- conservating biodiversity, soil and water resources (with high priority);
- empowering local people and communities in the management and protection of forests;
- building partnerships with local people, NGOs, and the private sector in all forestry development activities, including conservation and forest resource expansion;
- assigning a key role for the private sector in establishment and management of industrial forest plantation;
- developing home gardens and other agro-forestry systems (as one of the key strategy components for meeting the increasing demand for both subsistence and industrial wood);
- reorienting and strengthening both state and non-state forestry institutions.

The private sector in this policy refers only to the local private sector including farmers, cooperatives, communities, local companies and other private sectors.

The new Forestry Sector Master Plan (FSMP) is a comprehensive bio-physical, environmental, socio-political, and economic projection of the forestry sector's optimal development based on the NFP of 1995. The FSMP intended to guide decision making at national, regional and local levels, covering the period 1995- 2020.

1.1.2 National wildlife policy

The National Wildlife Policy (NWP) approved by Parliament in 1988 has the following main objectives:

- to maintain ecological process and life sustaining systems;
- to preserve genetic diversity, especially the biodiversity and endemic biota; and
- to ensure the sustainable utilization of species and ecosystems which are of immediate and potential importance to support the people.

The policy guidelines formulated under these objectives are:

- to identify the specific objectives of wildlife conservation;
- to reassess objectives for protected areas;
- to recognize human use in protected areas;
- to recognize multiple use in protected areas with reference to consumptive and non-consumptive uses;
- to establish zones for different activities in protected areas;
- to introduce an effective policy of management;
- to decentralize administration;
- to recognize research and education as priority needs;
- to establish inter-institutional links;
- to recognize importance of ex-situ conservation; and
- to formulate and implement a National Conservation Act incorporating the above guidelines.

1.2 Institutional Framework for Forest and Protected Area Management

Forest and protected area management is undertaken by government agencies and state corporations as well as farmers, industries and NGOs. Among government agencies, protected area management is undertaken by the Forest Department (FD) and the Department of Wildlife Conservation (DWLC), while production forestry is undertaken by FD and State Timber Corporation (STC).

Forest Department (FD)

FD under the Ministry of Agriculture, Lands and Forestry (MALF) is responsible for wood production and biodiversity conservation based on the Forest Ordinance and the National Heritage Wilderness Area Act. FD has jurisdiction over forest reserves, proposed forest reserves and some other state forests. Forest reserves under FD are formerly for production purpose except for recently identified conservation forests. The

other state forests (OSFs), which comprise less than 200 ha in the dry zone and 20 ha in the wet zone, are managed by the Local Administrators. Larger forests under this category are administrated by FD. Most of the operations are carried out in the field through 18 Divisional Forest Officers (DFOs) in charge of 18 divisions comprising of 68 ranges and 341 forest beats. FD had 1,806 staff in 1995 including 954 technical staff. The field staff significantly use their time on legal enforcement activities and on granting and monitoring the use of various permits.

Department of Wildlife Conservation (DWLC)

DWLC is responsible for the conservation of wildlife and biodiversity based on the Fauna and Flora Protection Ordinance. In the 1960s - 1980s DWLC was attached to various ministries responsible for tourism. DWLC was transferred in late 1994 to the Ministry of Public Administration, Home Affairs, Plantation Industries, and Parliamentary Affairs (MPAHAPIPA) from the Ministry of Forestry and Irrigation. DWLC is responsible for the operation and management of National Parks, strict nature reserves, nature reserves, jungle corridors and sanctuaries. The field operations have been organized into five regions, each under an assistant director. In 1995 DWLC had 810 staff including 154 technical staff. DWLC staff in Southern Area comprises 230 people, of which 80 persons work in the Yala National Park.

State Timber Corporation (STC)

STC is a government corporation responsible for procurement and sale of logs mainly from state-owned forests and for production and sale of sawnwood and furniture. It operates nine sawmills, five impregnation plants, two furniture factories, two mechanical workshops and 42 wood depots. STC is not a major wood supplier. STC gets a major share of its income from selling wood, benefiting from its monopoly access to the state forests. STC has no responsibility for reforestation.

Wildlife Trust

The Wildlife Trust was created in 1991 with the participation of the Government, NGOs and the private sector for the purpose of conserving Sri Lanka's natural heritage by enhancing opportunities for public and private investment in the conservation and enjoyment of these resources.

1.3 Forest and Protected Areas in Southern Area

Sri Lanka has a wide range of topographical and climatic variation which contributes to rich ecosystem diversity. Lowland tropical rain forest contains most of the floral diversity

with high endemism. Of total of 619 woody species identified in the wet zone, 302 species are endemic. Faunal endemism is also very high with 25 species of molluscs, 52 insects, 30 fish, 30 amphibians, 50 reptiles, 111 birds and 25 mammals.

There are a number of lowland rainforests which are very rich in biodiversity. Many of these forests, however, are fragmented and many species of fauna and flora are considered to be endangered, vulnerable or rare according to the IUCN Red Data Book classification.

1.3.1 Natural vegetation

Natural forest areas in Southern Area for each district are indicated in Table 1.1. In Southern Area, main forest types are: lowland rainforest with rainfall more than 2,500 mm and elevation lower than 1,000 meters in Galle and Matara districts; moist monsoon forest with rainfall between 1,800 mm and 2,500 mm in Moneragala district; dry monsoon forest with rainfall less than 1,800 mm in Moneragala, Ampara and Hambantota districts. Large areas of sparse open forest are found in Hambantota and Moneragala districts (Figure3.1).

Table 1. 1 Natural Forest Area in Southern Area by District - 1992

(Unit: ha)

District	LRF	MMF	DMF	RDF	SMF	SOF	Total
Galle	22,270	0	0	0	0	1,819	24,089
Matara	13,321	1,617	515	0	518	1,952	17,923
Hambantota	221	738	19,166	3,707	0	55,082	78,914
Moneragala	681	25,710	113,627	4,581	17	29,655	174,271
Ratnapura	394	482	311	0	1,348	66	2,601
Ampara	0	1,417	52,854	7,046	0	3,747	65,064
Total	36,887	29,964	186,473	15,334	1,883	92,321	362,862

Source: Forest Department, 1992
LRF: Lowland rain forest, MMF: Moist monsoon forest, DMF: Dry monsoon forest, RDF: Riverine dry forest, SMF: Sub-montane forest, SOF: Sparse open forest

1.3.2 Forest cover and classification

Since the existing protected area network does not include a representative sample of biodiversity, particularly in the wet zone, an optimal protected area systems (PAS) network is in a process to be defined. Based on the result of Conservation Reviews, conservation forests under FD have been identified. At present, these conservation forests are the only "protected areas" under FD. In order to reclassify forests, four types of forests are categorized in the FSMP for different management purposes as shown in Table 1.2. It should be noticed that multiple use forests in Class III (production forest

reserves) under FD are not protected areas. However, multiple use on protected areas under DWLC is introduced by the National Wildlife Policy.

Table 1. 2 Land Use Classification for Forest and Protected Areas

Class	Land Use Purpose	Activities Allowed	Area in Southern Area
I	Strict protection for biodiversity, soils and water and historical, cultural, religions and esthetic values	Research	Sinharaja Forest Reserve Yala Strict Nature Reserve
II	Conservation with Non-extractive uses	Scientific research Regulated nature-based tourism Control collection of NWFPs	National Parks Sanctuaries Conservation forests
III	Forests for multiple uses buffer zones to protect Class I and Class II forests	Sustainable wood production NWFPs	Other forest reserves for production
IV	Forest plantations and agroforestry systems in state lands		Other forest reserves for production

The new classification of forests is presently on-going, aiming to combine protected area networks under FD and DWLC (Figure 3.2). The difference between Class III and Class IV is confusing. It seems that Class III includes natural forests and Class IV has only plantations. In Class IV forests, it is likely that land can be leased for long term basis to local villagers, communities and private companies. Legal status of forest can be protected (Class I and Class II), reserves for wood production purpose (Class III and Class VI, here called production forest reserves) and others. Forest cover for each classification is given in Tables 1.3 and 1.4.

Table 1. 3 Forest Cover Type for Protection and Production Forests

(unit : ha)

	Protected Areas (Class I + II)	Production Forest Reserves	Others	Total
Lowland Rainforest	16,659	10,192	10,036	36,887
Moist Monsoon Forest	6,055	3,627	20,282	29,964
Dry Monsoon forest	94,484	25,064	66,925	186,473
Riverine Dry Forest	8,362	3,989	2,983	15,334
Sub Montane Forest	0	0	1,883	1,883
Sparse and Open Forest	40,060	4,061	48,200	92,321
Non-Forest	42,526	25,345	--	67,871
Total	208,146	72,278	150,309	430,733

Source: JICA Study Team based on National Forest Geographical Information System

Table 1. 4 Forest Cover for Each Classification in Southern Area

(Unit: ha)

		Protected Areas (Class I + II)	Production Forest Reserves	Other	Total
Galle	NDF	11,970	5,972	4,328	22,270
	SOF	255	852	712	1,819
	NOF	4,315	7,449	0	11,764
Matara	NDF	5,237	5,432	4,784	15,453
	SOF	100	491	1,361	1,952
	NOF	994	2,152	0	3,146
Hambantota	NDF	19,057	1,370	3,405	23,832
	SOF	28,038	2,109	24,935	55,082
	NOF	10,267	9,026	0	19,293
Moneragala	NDF	68,492	1,132	74,975	144,599
	SOF	8,973	384	20,298	29,655
	NOF	20,886	787	0	21,673
Ratnapura	NDF	0	47	1,140	1,187
	SOF	0	0	66	66
	NOF	2,460	2,301	0	4,761
Ampara	NDF	20,804	28,919	11,594	61,317
	SOF	2,694	225	828	3,747
	NOF	3,604	3,630	0	7,234
Southern Area	NDF	125,560	42,872	100,226	268,658
	%	60.3	59.3	67.5	
	SOF	40,060	4,061	48,200	92,321
	%	19.2	5.6	32.5	
	NOF	42,526	25,345	---	67,871
	%	20.4	35.1	---	
	Total	208,146	72,278	148,426	428,850

Source: JICA Study Team based on National Forest Geographical Information System
Natural Dense Forest: NDF (Lowland Rainforest, Moist Monsoon Forest, Dry Monsoon Forest, Sub-Montane and Riverine Forest); Sparse and Open Forest: SOF; Non-Forest: NOF

Although most of natural forests are either in protected areas or forest reserves (47 % in protected areas and 16 % in production forests), large percentage of natural forest (37 %) is still not zoned. These forests are mainly found in dry monsoon forests in Moneragala and Ampara districts. Moreover, large forest areas in Galle, Matara and Hambantota (total area 12,000 ha) districts are also not covered in productive or protected areas. Appropriate management policies for these forests need to be indicated. In protected areas 60 % is covered by dense forest, while 19 % is sparse open forest and 21 % not

forested. The protected areas without forest cover are mainly in Moneragala and Hambantota districts. Conservation forests in Southern Area are summarized in Table 1.5.

Table 1. 5 Conservation Forests in Southern Area

Name	Designation	Division	Area (ha)
Sinharaja	NHWA	GAL	3016
Kannelya	FR	GAL	6024.5
Dellawa	PR	GAL	2236.3
Kombora-Kottawa	PR	GAL	1,624.6
Kandewattegoda	PR	GAL	358.6
Tiboruwakota	OSF	GAL	600.0
Welihena	FR	MTR	296.3
Kekunadura	FR	MTR	379.9
Nakiyadeniya	PR	MTR	2236.3
Viharakele	FR	MTR	625.1
Oliyagankele	FR	MTR	486
Diyadawa	FR	MTR	2,447.7
Rammalakanda	FR	MTR , HAM	1702.9 (1698.1 in HAM and 4.8 in MTR)
Kalubowitiyana	OSF	MTR	100.0
Kurulugala	OSF	MTR	175.0
Silverikanda	OSF	MTR	1,000

Source: Forest Department, Galle: GAL, Matara: MTR, Hambantota: HAM

1.3.3 Protected areas under FD

Conservation forests in the wet zone are already identified by FD. There are 16 conservation forests located in Southern Area, including one National Heritage Wilderness Area, seven forest reserves, four proposed forest reserves and four other state forests. More conservation forests in the dry zone are planned to be identified. The total area of conservation forests already identified in Southern Area is 22,709.2 ha (13,260 ha, 7,751.1 ha, 1698.1 ha in Galle, Matara and Hambantota districts, respectively).

Of the 16 conservation forests in Southern Area, management plans for Sinharaja, Kanneliya, Dadiyagala and Nakiyadeniya (KDN) Forest Complex, Dellawa, Oliyagankele and Welihena, Viharakele, Kandawattegoda, Kekanadura and Kottawa-Kombala forest reserves were prepared by IUCN by April 1995. Two other state forests (Kurulugala, and Silverikanda) are planned to be included in the Sinharaja forest complex. According to the management plans, these forests are zoned into strict protection, traditional use and cultural areas. Nature-based tourism will be promoted in some potential sites.

1.3.4 Protected areas under DWLC

There are one strict nature reserve, seven National Parks and fourteen sanctuaries in Southern Area. Protected areas under DWLC comprise 1,667 ha in Galle, 56,685 ha in Hambantota and 142,432 ha in Moneragala, 24,106 ha in Ampara districts for a total area of 224,890 ha (Table 1.6).

Table 1. 6 Protected Areas under DWLC in Southern Area

Name	District	Status	Area (ha)
Yala Strict Natural Reserve	HAM	SNR	28,904
Yala (Block I - V)	HAM,MON	NP	97,459.5 13,679.2 in HAM, 83780.3 in MON
Lunugamwehera	MON	NP	17100
Uda Walawe	MON,RT	NP	30821
Gal Oya	MON	NP	4180.6
Bundala	HAM	NP	6,216
Yala East (Block I -II)	AMP	NP	18148.6
Lahugala Kitulana	AMP	NP	1554
Honduwa Island	GAL	SA	8
Telwatte	GAL	SA	1424
Parapaduwa Nun's Island	GAL	SA	189
Hikkaduwa Marine	GAL	SA	45
Rocky Islets (Ambalangoda)	GAL	SA	1
Kataragama	MON	SA	1,004
Gal Oya Valley South-East	MON	SA	5546.1
Kalamatiya - Kalapuwa	HAM	SA	712
Madunagala	HAM	SA	791
Nimalawa	HAM	SA	1,065
Pallemalala	HAM	SA	138
Weerawila - Tissa	HAM	SA	4,170
Katagamuwa	HAM	SA	1,010
Kidumbigala	AMP	SA	4403
Total			224,889.8

Source: DWLC NP: National Park, SA: Sanctuary, SNR: Strict Nature Reserve

1) Yala (Ruhuna) National Park

Yala, located in the southeastern portion of the SEDZ, is the oldest National Park in Sri Lanka. Block I of the Park was declared in 1938 together with the Yala strict nature reserve. Blocks II to V were added in 1954, 1967, 1969 and 1973, respectively. Main attraction

of the Park is rich wildlife: elephant, wild buffalo, spotted deer, leopard, wild boar, and peafowl as well as dry zone natural vegetation. Block I has no thick forest but only sparse forests, riverine forests, scrublands and some open spaces. It is characterized by intensive visitation by tourists. Dry monsoon forest covers 44%, 80% and 92% of Blocks II, III and IV respectively, while sparse forest covers 45%, 15% and 6% of these blocks. Dry monsoon forest of Yala Block IV is probably the only remaining undisturbed dry monsoon ecosystem in the Country. The river basins in the area were originally a prime habitat supporting a large elephant population. It is estimated that the Yala National Park together with the Yala strict nature reserve has 350-400 elephant population.

2) Bundala National Park

Bundala has been declared as a National Park in 1992 and is famous for its migratory bird life. In October 1990 it was recognized as a wetland of international importance, specially as a Waterfowl Habitat under the Ramsar Convention. Flamingos, garganey, pintail ducks, black-winged stilts, painted storks, green shanks, egrets, herons, ibises, pelicans, spoonbills, cotton teals and turnstones are the principle birds of the Park. In addition to watching migratory and sedentory birds there are opportunities to see elephants. There is a small resident elephant herd numbering about 20 animals as well as migrants from the Yala complex. Five brackish lagoons occupy 2,250 ha or 36% of the area of the Park, three of them are used for the production of salt. Canals, bunds and basins abound the landscape of these areas. Vegetation of the surrounding undulating terrain is scrub and degraded open forest. Habitat of the Park does not provide sufficient fodder and shade for elephants. Unlike in Yala, human activities exist in the Bundala National Park. Use of the park for livestock grazing, fuelwood collection and salt production continues, although the law prohibits these activities in a national park.

3) Uda Walawe National Park

The Park was gazetted in 1972 with the objectives to protect the catchment of the Uda Walawe reservoir and to conserve elephant habitats. They are attracted to the grasslands, which are a prominent vegetation type in the Park. Few forest lands of the dry monsoon type comprising 18 % of the Park is confined to northern and northeastern sectors. Scrublands abound in the western sector. Illegal entrants to the Park set fire to the grass during the dry season in order to hunt the fleeing animals. This activity retards the forest regeneration on the one hand but promotes succulent growth of grasses subsequently. At the declaration of the Park, forest plantations of teak and eucalyptus belonging to FD were included within the Park boundaries. It is observed that there are no acute deficiencies of

water for the fauna. In addition to the major reservoir there are a number of small tanks within the Park. The western sector of the Park, the area west of Walawe Ganga, has not been under management of DWLC as a result of the problems of boundary demarcation. About 300 elephants live in the Park.

4) Lunugamwehera National Park

The Park, established in January 1996, covers 17,100 ha and is linked with Block V of Yala National Park. The main objective of creating this park was to protect the catchment of the Lunugamwehera reservoir and to conserve the elephant habitats. Except for a few fragmented open forest patches in the southeastern parts of the Park, forested areas are rare. Area demarcated for the Park has no dense forest. More than 75% of the area is occupied by scrublands which is the outcome of continued chena cultivation by the settlers of the area.

1.3.5 Forest links and buffer zones

(1) Forest links (jungle corridors)

Migratory routs of elephants living in the Uda Walawe, the Lunugamwehera and the Yala National Parks are relatively well established. The proposed development activities in Southern Area may cut across them. Therefore, it is highly recommended to leave inviolate the existing elephant migratory paths in order to safeguard the free passage of an adequate space for elephants. Forest links maintain genetic viability of the elephant population. The important thing to remember is that these corridors should be zoned in areas where elephants actually use them and are in need of them. Shifting of corridors according to the wishes of people does not serve the purpose and may end up with human-elephant conflicts.

In Southern Area several corridors and extensions to the National Parks have been proposed. Among these are:

- Uda Walawe - Lunugamwehera; the failure to implement this corridor proposal so far can be attributed partly to the intransigence resulting from lack of political commitment to conservation issue; at present 200 or so families encroached on land earmarked for it;
- Lunugamwehera - Yala Block V (encompassing the Wandama forest reserve);
- Northwest extension to Uda Walawe (Kaltota area); and

- North extension to Yala Block IV: to provide additional habitat to the elephants that will in future be driven to the Yala from Handapanagala. The temporary corridor (20 km long, 2 km wide) cutting across land of Pelwatte Sugar Plantation is under consideration.

Settlers and encroachers should be evacuated in some areas of the "corridors" to provide adequate protection. Zoning to particular categories should be done carefully considering the needs of the local people. Length, breadth, shape and resources of corridors as well as land use pattern of either side of it and present usage of the corridors by the elephants are main components of jungle corridor development project.

(2) Buffer zones (transition areas)

The setting up buffer zones has been included in protected area legislation by the Fauna and Flora Act No. 49 of 1993. Nevertheless, DWLC has not taken any action so far to declare the buffer zones, i.e. a one mile (1.6 km) wide belt surrounding protected areas. Buffer zones would serve the dual purpose of reducing dependence of local communities on protected areas and minimizing animal predation on nearby farmlands. Land uses within the buffer zones can be controlled for the benefit of protected areas. At present, only the northern boundary of Yala has continuos forest stretches in the buffer zone. The Kataragama and the Kataganuwa sanctuaries on the western boundary also serve as buffer zones to the Park. In the case of Bundala National Park the northern part of the Park boundary is intensively used for irrigated paddy. In certain strips along this boundary establishment of buffer zones will not be possible. At Uda Walawe land lying south and east of the Park is devoted to sugarcane while the other areas are given to land uses such as chena cultivation and paddy. A similar situation with intensive land use is found in the proposed buffer zones of the Lunugamwehera National Park. In view of the prevailing pressure on land, local communities are bound to resist any change in land use which will have adverse effect on their livelihood. Hence, it is important that any step toward buffer zone management should involve the active participation of the local communities through intensive awareness programmes and extension of benefit from protected areas to the people living in the vicinity. For instance, the regulated buffer zone which provides certain type of uses such as collection of medical herbs, fallen fuelwood and woodapple fruits is recommended.

1.3.6 Production forest reserves

Of 53 forest reserves in Southern Area (total extent 100,914 ha), 41 forest reserves (78,745 ha) are considered as production forests. Conservation forests in the dry zone are planned to be identified. It should be noticed that the Habarakada, Masmullakele, Mulatiyana forest reserves were not identified as conservation forests though they are man and biosphere reserves.

Of total extent of forest reserves in Southern Area 44.4% is in Ampara district, while 19.1% in Galle, 11.2% in Matara, 17.6% in Hambantota, 4.1% in Moneragala, and 3.7% in Ratnapura districts. The large contribution in Ampara district is from the Kumbukkana and Panama forest reserves. Sustainable wood production from these forests is expected to start in the future based on proper management and planning.

Forest status of production forest reserves in each district is indicated in Table 1.7. In Southern Area, 33.7% of productive forest reserves is not covered by natural forest. The poor forest status is observed in Galle (51.9% of non forest cover) and Hambantota (68.3%) districts and more seriously in Ratnapura (83.6%) district. These areas are mainly considered to be encroached, abandoned chena or unsuccessful plantations. On the other hand, high dense forest cover is recognized in Ampara district (86.7%). It should be noticed that the dense forest cover of production forest reserves in Ampara comprises 67.5% in the entire Southern Area. Large sparse open forest is available in Hambantota and Moneragala districts.

Table 1. 7 Forest Status in Production Forest Reserves in Each District

(Unit %)

District	NDF	SOF	NOF	Conifers	Teak	Eucalyptus	Total
Galle	41.6	5.9	51.9	0.5	0	0	100
Matara	64.4	5.8	25.5	4.3	0	0	100
Hambantota	10.4	16.0	68.3	1.6	3.1	0.7	100
Moneragala	36.6	12.4	25.5	0	25.5	0	100
Ampara	86.7	0.7	10.9	0	1.7	0	100
Ratnapura	1.7	0	83.6	0	14.7	0	100
Southern Area	57.0	5.4	33.7	0.9	2.9	0.1	100

Source: JICA Study Team based on National Forest Geographical Information System

NDF: Natural Dense Forest Cover, SOF: Sparse Open Forest, NOF: Non Forest.

1.3.7 Forest plantations/reforestation

Intensively managed forest plantations can play an important role in meeting increasing demand for industrial roundwood. In 1992 the area under forest plantations was 89,000 ha of which 84,000 ha belong to FD. Many plantations, however, are overcrowded or poorly stocked, and some are in a poor condition to produce wood economically. The industrial forest plantations could be self-sustaining, but at present expenditure on them greatly exceeds revenue.

Forest plantations in Southern Area are established more in the dry and the intermediate zones where larger area is available. Plantation record by district in 1994 is 2,441 ha, 2,624.6 ha, 6156.6 ha and 7455 ha in Galle, Matara, Hambantota and Moneragala districts respectively (Table 1.8). The principal species planted are teak (30.4%), eucalyptus spp. (19.3%), pinus (19.3%), and margosa (9.4%). Teak trees are planted mainly in Hambantota and Moneragala districts, while eucalyptus, pinus and mahogany are mainly planted in Galle and Matara districts. Mixed species plantation is increasing.

The survival rate of seedlings is low in the dry zone. Seedlings in dry zone are mainly damaged by animals (elephants, deer, buffalo and cattle) and dry climatic conditions. Plantation establishment in Hambantota has been reduced significantly since 1995 due to the extremely low survival rate. The new establishment to provide land lease and tree tenure to farmers who make agreement with FD (so-called farmer's woodlots or protective woodlots) has started under the Participatory Forest Project. Kasa (Causurina equivesitafolia) has been annually planted on sand dune along the Hambantota coast.

Table 1. 8 Plantation Record by District in 1994

(Unit : ha)

	Galle	Matara	Hambantota	Moneragala	Total	%
Teak	0	0	1,269.7	4,409.2	5,678.9	30.4
Mahogany	857.4	85.7	29	20	992.1	5.3
Margosa	0	0	1271	488	1759	9.4
Eucalyptus spp.	99.7	117.3	1,872.5	1517.2	3,606.7	19.3
Pinus caribaea	778.5	1,526.1	542.2	0	2,846.8	15.2
Mixed species	433	310.2	844.7	629.1	2217	11.9
Indigenous species	10.8	19.4	259.8	0	290	1.6
Albizia	0	173.2	0	0	173.2	0.9
Bamboo	15	0	0	0	15	0.1
Others	246.7	392.7	67.9	391.5	1098.8	5.9
Total	2,441.1	2,624.6	6,156.6	7,455	18,677.5	100.0

Source: Forest Department

Land appears to be available in the dry zone for plantation establishment as there are vast degraded areas with little use. About 8,070 ha in Moneragala and 3,850 ha in Hambantota districts are estimated to have potential for plantation establishment (Table 1.9).

Table 1.9 An Estimate of Potential Reforestation Areas in the Dry Zone

(Unit: ha)

District	< 50 ha	50-99 ha	100-199 ha	200-299 ha	> 300 ha	Total
Moneragala	250	1320	2625	2075	1760	8070
Hambantota	120	280	450	1350	1650	3850
Total	370	1600	3185	3425	3410	11920

Source: Forestry Sector Master Plan, 1995.

However, most areas are used by the local people for cattle grazing, hunting and chena cultivation though these activities are in many cases illegal. Furthermore, finding large area of suitable land is difficult because conditions are site specific. Cooperative planting schemes (e.g. Taungya or farmer's woodlots) are likely to offer more economically and socially acceptable ways to establish plantations in the dry zone if the sites are reasonably good. Presently Taungya is under operation mainly in Moneragala district and farmer's woodlots are under operation in Ratnapura and Hambantota districts.

1.3.8 Timber extraction and wood products

Sri Lanka is almost self-sufficient in sawnwood supply. In 1993 total sawnwood consumption was estimated to be 544,000 m^3, of which imports were only 29,000 m^3 (5%). Home gardens, rubber plantations, coconuts plantations, forest plantations were the most important sources of sawlogs, although some derived from felling in natural forests. In 1993, share of sawlog supply from home gardens, natural forest, rubber plantations coconut plantations and forest plantations were 41%, 22%, 18%, 11% and 4% respectively. It is anticipated that wood import increases by nine times by 2020 as consumption increases.

In order to survey biodiversity, the moratorium on logging of state-owned natural forests has been operative since 1988. Based on the results of Conservation Reviews, forest reserves are divided into conservation forests and production forests. Management plans for production forests need to be formulated to lift up the moratorium and start harvest from state-owned natural forests. Since the moratorium is operative, wood is presently harvested only from private lands and plantations.

STC planned to harvest in 1996 from 20.4 ha in Galle and Matara districts, 100 ha in Hambantota and 15 ha in Moneragala district. Harvest in 1995 was only from Hambantota (45 ha) in Southern Area. Timber production planned by STC in 1996 is 2,100 m^3 from Matara, and 3,080 m^3 from Moneragala district (Table 1.10). Detail projection of production and consumption are shown in Table 1.11.

Table 1. 10 Timber Production Plan for 1996

(Unit: m^3)

	Matara	Moneragala
Super Luxury	400	1,330
Luxury	50	190
Sp. Upper		550
Special		300
Class I		230
Class II	550	30
Class III	360	50
Total	2,100	3,080

Source: State Timber Corporation

In 1993 consumption of plywood in the Country was about 28,000 m^3, of which about 5,000 (18%) were produced domestically and the rest 23,000 m^3 (82%) imported. The plywood industry relied almost entirely on rubber wood for raw material. It is anticipated that plywood import increases significantly as the demand increases.

Table 1. 11 Sawnwood and Plywood Consumption, Production, and Import under Current Trends

(Unit :1000 m^3)

Year	1995	2000	2005	2010	2015	2020
Sawnwood						
Consumption	567	626	688	753	820	885
Production	539	563	585	640	646	646
Imports	28	63	103	113	174	239
Plywood and other wood-based panels						
Consumption	35	41	49	58	70	82
Production	5	5	5	5	5	5
Imports	30	36	44	53	65	77

Source: Forest Sector Master Plan, 1995

1.3.9 Non-wood forest products (NWFPs)

Since conservation effort restricts local people to use forest resources, non-wood forest products (NWFPs) have been focused as a way to provide benefit to rural society. Collection of NWFPs is allowed in conservation forests. The most important NWFPs are medical plants, kitul palm (Caryota urens), rattan, bamboo, etc. NWFPs help provide subsistence needs for rural people, raw materials for small industries as well as medicines made of medical plants.

(1) Medical plants

More than 1000 species are used in traditional Ayurveda by more than 50% of the Country's population. Recent import and export statistics show increasing market demand for medical plants (Table 1.12). Collection of medical plants from conservation forests are allowed; however, export of endangered medical plants should be controlled more efficiently. Production of medical plants can be promoted on commercial basis and also using homestead.

Table 1. 12 Import and Export of Medical Plants

(Unit: Million Rs.)

Year	Import	Export
1990	0.76	7.87
1991	0.20	6.29
1992	34.83	32.11
1993	42.31	101.31

Source: Custom Statistics

(2) Kitul

Kitul (Caryota urens) is a multiple-use tree species which yields sap for treacle and jaggery and pith for food and medicine as well as fodder and wood. Kitul treacle and jaggery especially have market value since they are popular among Sri Lankan people. Promotion of Kitul industry is one of the important policies by FD.

(3) Rattan

Rattan (Calamoideae) provides valuable raw materials for rural industries including furniture and ornaments, housing, construction and kitchen utensil as well as binding material. Prices of rattan have increased significantly due to the shortage of supply caused by depletion of natural forests especially in the south-west wet zone. Eight of ten

indigenous species are endemic to Sri Lanka. Controlled collection of rattan from remaining forests is needed as well as promotion of production on commercial basis and in home gardens.

(4) Bamboo

Bamboos are used in cottage industry, housing and construction. Galle and Matara districts are one of traditional bamboo industries concentrated areas of the Country. The supply of bamboo comes from natural forests. Increased prices caused by the depletion of resource also encourage illicit felling from conservation forests. Appropriate control on excessive exploitation from natural forests and cultivation in feasible areas should be promoted.

(5) Pine resin

Pinus caribaea plantations released by FD are commercially tapped for resin production. Pine resin can be used in paper making, polishes, paints, inks, soap making, tire industries etc. Most of resin is exported, while turpentine and rosin are imported. Pine resin tapping has considerable potential for import substitution. Pine resin tapping and sawlog production can theoretically increase benefit from the plantations. Participatory forest management with local communities will be introduced in conservation forests which have attached pine plantations. Local community management should be introduced to control excessive tapping to destroy plantations and to ensure the sustainable benefit from resin tapping as well as from wood.

1.3.10 Fuelwood consumption

The energy sector in Sri Lanka is dominated by bio-energy, especially by fuelwood. The share of bio-energy in the total energy consumption was 66 % in 1992. Biomass fuels are of crucial importance not only for rural people who do not have other energy sources but also for many industries whose main thermal energy source comes from fuelwood. It is anticipated that no serious crisis is likely to emerge in the future; however fuelwood shortage may cause some environmental degradation in several localities (Table 1.13).

Table 1. 13 Estimated Sources of Bio-energy Supply in 1993 and 2020

(Unit: %)

	1993	2020
Natural Forest	7	5
Processing residue	3	6
Home Gardens	26	33
Coconut	19	15
Rubber wood	7	6
Cropland	19	18
Forest Plantation	4	4
Others	14	13
Total	100	100

Source: Forest Sector Master Plan, 1995

Bio-energy will be sustainably available as both wood and crop residues from home gardens, coconut and rubber plantations and other agricultural lands. However, supplies from rubber plantations may decline in the long run because of conversion into other land use. Therefore, importance of home gardens as a source of fuelwood will increase. Fuelwood will not face shortage nationwide by 2020; in Southern Area, however, Galle and Matara districts are presently facing the shortage (Table 1.14).

Table 1. 14 Current Trends of Demand and Supply and Projections for Biomass Energy at District Level

(Unit: 1,000 tones)

	1995			2020		
District	Demand	Supply	Balance	Demand	Supply	Balance
Galle	491	452	-39	512	467	-45
Matara	434	392	-42	460	415	-45
Hambantota	253	421	169	268	432	164
Moneragala	184	399	215	196	413	217
National Total	9,260	9,872	612	9,709	10,109	401

Source: Forest Sector Master Plan, 1995.

1.4 Environmental/Social Problems Related to Forest and Protected Area Management in Southern Area

Excessive use of natural resources and conflicting interest of the authorities and the local communities cause environmental and social problems. The most serious problems in Southern Area for forest and protected area management are encroachment and grazing on forest and protected areas and human-elephant conflict. These problems are interrelated.

1.4.1 Encroachment on forest and protected areas

Commitment of a large proportion of land to protected areas has caused intense pressure on available land and encroachment upon these reserves whenever possible. Encroached land constitutes forest reserves, proposed forest reserves, sanctuaries and reserves of the irrigation tanks, rivers and roads. National Parks are not usually encroached upon except on some occasions for gem mining, illicit cultivation of ganja or timber felling. However, the western sector of Uda Walawe National Park is encroached upon as the boundaries are not firmly established. Similarly absence of clear boundary in the case of many forest reserves and proposed forest reserves make them vulnerable to encroachment. Owing to the weakness of preventive actions and lack of political commitment to conservation, a progressive reduction of proposed forest reserves and other state forests has occurred to date. The liberal policy toward encroachers often resulted in regularizing them after some time. No instances were recorded where encroachers were evicted without providing them with alternative land. However, eviction has become such a sensitive issue that it is expected to exclude the settled area and redemarcate the boundaries of National Parks.

1.4.2 Grazing on protected areas

Declaration of protected areas in recent years has largely restricted the traditional land use practices of the people such as chena cultivation and livestock grazing. Protected areas in close proximity to settlements are still used for cattle grazing. Although the wildlife regulation prohibits this type of activities, it continues unabated in the Uda Walawe and the Bundala National Parks as well as the Lunuganchera National Park which was among the major grazing grounds lost to herdsmen. Grazing has assumed uncontrollable proportion at Bundala causing tremendous strains to the park resources. Large cattle herds compete directly with the elephant and spotted deer populations for food and herdsmen drive wild animals (particularly the spotted deer) away from the preferred location, the open plains. This causes disruption to breeding behaviors of some wild species and destruction of nests of ground-nesting birds.

1.4.3 Human-elephant conflicts

During the past few decades agricultural development of the southern dry zone area, without much respect for the conservation of natural areas, removed a significant portion of forest - traditional elephant habitat. At the same time, the existing protected area system in Southern Area cannot harbor the elephant population throughout the year, owing to limited fodder and water resources during dry weather seasons. Eventually majority of elephant herds are today free-ranging in developed areas outside national reserves. In some areas whole herds have got trapped or isolated in small scrub forest patches surrounded by cultivations and habitations - phenomenon known as "pocketed herds". They have become one of the major problem species to farmers.

Pocketed elephant herds move out of the forest in search for food and water. They are naturally attracted to cereal and millet crops grown seasonally, such as paddy, sorghum, maize and kurakkan. Elephants venture into cultivation at night, though adult lone males (which are more habitual crop raiders) often raid crops even during the day. Within the damage area only about 60 % of the plants are consumed, the rest being merely trampled. The average solitary bull elephant not disturbed in the field can consume around 250 kg of the crop in one night. Damage to the cultivator is enormous. Raiding of crops, occasionally house and property damage and even man killing are major forms of human elephant conflicts. Owing to frequent confrontation elephants themselves have become less scared of human.

Based on the complaints received by DWLC, Moneragala and Hambantota districts are among most critical areas in Sri Lanka subjected to human elephant conflicts. The particular areas are the following.

1) Handapanagala - at Pelwatte where 28,000 acres located on the western boundary of Yala National Park Blocks III, IV and V have been cultivated with sugarcane. Around 50 resident elephants and some 100 migrant ones were permanently concentrating and pose a serious threat to the cultivation and villagers. In August 1996 DWLC undertook elephant drive action from Handapangala to Yala Block V.

2) Uda Walawe - At Sevanagala, Sri Lanka State Sugar Corporation has cultivated some 30,000 acres of sugarcane on the southern boundary of the Uda Walawe National Park. Some 150 elephants from the Park are daily making raids and destroying sugar cane field causing enormous loss to the corporation.

3) Hambantota - Some 160 elephants in several herds are completely pocketed in scrub forest patches between Walawe Ganga and Krindi Oya. They live among village settlements completely surrounded in the northeast and the west by the Walawe and Krindi Oya Irrigation Settlement Schemes and in the south by the ocean. They cause serious crop damage and even attack people and destroy houses.

1.5 Ongoing Projects in Forest and Protected Area Management in Southern Area

1.5.1 Participatory Forestry Project (PFP)

The Participatory Forestry Project (PFP) funded by ADB was started in 1994. The following five schemes have been implemented in the project.

Homestead development

Traditional tree planting in homestead gardens ranging from 0.1 ha to 0.8 ha (on leasehold or privately owned lands) is promoted through training, extension services and provision of seedlings. Farmers are allowed to choose the species composition.

Farmer's woodlots

Farmers are given a block of state lands 0.2 to 0.5 ha in extent, for a period of 25 years under a lease agreement. Lease holders are responsible for land preparation, planting and subsequent maintenance activities supported by technical assistance of FD.

Protective woodlots

The main objective of this scheme is to develop a forest cover in environmentally sensitive areas. Farmer organizations or individual farmers are given a block of state land in which trees are planted by them, but they are not allowed to clear trees. Participatory management is introduced in this areas.

Miscellaneous planting

Tree planting in public lands and office premises are encouraged.

Seedling production

Private nurseries, school nurseries and nurseries by farmer organizations are encouraged to produce seedlings.

In 1995, the PFP was implemented in Southern Area as summarized in Table 1.15.

Table 1. 15 Performance of PFP in 1995

(Unit: ha)

District	Homestead	Farmers WL	Protect WL	Miscraneous WL
Galle	300	30	20	30
Matara	350	30	20	20
Hambantota	250	40	30	20
Moneragala	300	50	30	30

Source: Forest Department. WL: Woodlots

1.5.2 Wildlife conservation and protected area management

The Wildlife Conservation and Protected Area Management Project has been implemented by DWLC under cooperation with IUCN and FAO. The project started in 1992 with five years duration. The objectives of the project are to raise scientific and technical capacity of DWLC and to introduce systematic assessment and management of human/elephant conflicts. Staff of DWLC are trained and management plans for protected areas will be formulated. The way to mitigate human/elephant conflicts will be presented in selected conflict sites with introduction of integrated in situ and ex situ measures. Management plans for Yala, Uda Walawe and Bundala National Parks will be completed by the end of 1996.

1.5.3 Shared Control of Natural Resources (SCOR) project

The Shared Control of Natural Resources (SCOR) project has been implemented since 1993 by the International Irrigation Management Institute (IIMI) with support of USAID. The SCOR is a participatory action-research project to assist the Government to identify, develop and test field models for increasing the sustainable productivity of natural resources, mainly water and land, in a watershed context. A balance between production and protection is pursued with local participation. Several effective and interdisciplinary approaches have been attempted, including participatory mapping of land use patterns, establishment of tenurial and usufructuary rights, development of agro-based enterprises with formal links with farmer organizations and the private sector, and micro-hydropower generation coupled with catchment conservation. The project is primarily responsibility of the Ministry of Irrigation, Power and Energy (MIP&E); however, it has a strong link shared with MALF. The SCOR project is being implemented in Huruluwewa in the North Central Province and Nilwala in Southern Area.

CHAPTER 2 CONSTRAINTS AND POTENTIALS

2.1 Constraints

Insufficient capacity and institutional coordination of government agencies

Although protected areas under DWLC and forest reserves under FD comprise 20% and 10% of Southern Area, respectively, the most serious problem of forest and protected area management is depletion of biodiversity and forest resources. Lowland rainforest which contains most of biodiversity has been shrunk by 40% since the beginning of this century. Sawnwood supply, presently almost self-sufficient, is predicted to face shortages. High prices of imported wood encourage illicit timber felling.

Although relatively large area is designated to National Parks, there are pocketed elephant herds in forest patches outside National Parks. They move out of the forest in search for food and water resulting in human-elephant conflict - raiding crops, damaging house and property and even killing men.

Obviously the Government does not have sufficient capacity (personnel and fund) to protect forests efficiently and to control forest resources and wildlife. The Forest Sector Master Plan emphasizing local participation was completed in 1995. DWLC will complete the management plans for National Parks by the end of 1996. In both development and conservation, the Government needs to establish appropriate partnership with local communities, villagers, farmers, companies and NGOs.

Encroachment/grazing problems in forest and protected areas

Large area is encroached in forest reserves. Over-grazing by cattle and buffalo causes serious habitat degradation in National Parks. The encroachment/over-grazing on protected areas is caused by unclear political commitment to land management as well as socio-economic needs for local farmers to generate income by illegal exploitation of natural resources. Political commitment with alternative income generation schemes should be presented and promoted in order to prevent further encroachment.

Large area in the dry zone is used by chena, which causes deforestation and soil erosion. Although the problem is closely related to water shortage, reforestation on catchment area with stabilization of chena farmers is essential to protect natural forests as well as water bodies by improving water retention capacity and reducing sedimentation.

Human-elephant conflicts

Human-elephant conflicts are the most acute problem in the SEDZ. Shrinking of forest areas by expanding irrigation agriculture and degradation of feeding environment of elephants have caused increased movement of elephants in settled areas. These elephants cause much destruction to crops and property. Particularly disturbed by elephants are encroachers where encroached land lies close to their migratory routes. The Elephant Unit has been established and the Five Year Investment Program 1991-95 of DWLC had the major concern of mitigating conflicts. The attitude of DWLC has been mainly directed at preventing damages to human settlements by driving away elephant herds or translocating elephants. The major issue, habitat enrichment in National Parks, can be achieved only by preventing further encroachment into protected areas and reducing pressure from overgrazing by buffaloes and cattle. Therefore, alternative measures to generate livelihoods of people settled in the vicinity of protected areas need to be introduced in the first place. Land uses in the surrounding area should adopt cropping patterns that would not attract elephants. Setting up physical barriers such as electric fences and trenches would further strengthen protection of farmlands. Local community participation in management of protected areas is pointed out in the Forest Sector Master Plan as well as the National Wildlife Policy.

2.2 Potentials

Forest potentials for wood production

In Southern Area approximately 270,000 ha are under dense forest cover. Protected areas comprise 47 % of natural dense forests, while 16 % is in productive forest reserves and 37 % in other areas. At present 143,000 ha of natural dense forests are not in protected areas which are considered to have potential for sustainable wood production. However, approximately 100,000 ha of the natural dense forests are not in forest reserves (75 % in Moneragala and 12 % in Ampara districts). Management policy on these remaining natural forests outside the protected areas and forest reserves needs to be clarified.

In the wet zone, approximately 11,000 ha of forest reserves are recognized as multiple-use forests. Sustainable wood supply from these forests can be started based on proper management and planning. Inventory surveys to formulate management plans is in urgent need.

Potentials of protected areas under DWLC

National Parks and sanctuaries represent the great potential for offering high quality tourism products in the context of natural area conservation and management.

Development of tourism industry is a means of generating economic returns by which the people of local areas can be benefited while the natural areas and wildlife conservation effort are enhanced. At present, tourism in the area has been developed in an ad hoc manner with only minor input to the local economies. Planned tourism activities would generate economic benefits to local people out of which a certain share can be invested in conservation effort. At the same time balance between tourism development and conservation of protected areas should be carefully maintained .

Income generation based on forest resources in the wet zone

In the wet zone, conservation forests have been already identified to protect vulnerable, high biodiversity. Management plans for 11 conservation forests and Sinharaja National Heritage Wilderness Area were completed by 1995. Eco-tourism and NWFPs have a potential for income generation for local villagers. Although Sinharaja is regarded as Class I forest only for strict protection and research, other conservation forests have potential for economic activities. Of all conservation forests in the wet zone, Kanneliya-Dediyagala-Nakiyadeniya (KDN) Forest Complex which is the largest natural forests in Southern Area has considerable potential for eco-tourism.

CHAPTER 3 OBJECTIVES AND STRATEGY

3.1 Objectives

Forest and protected area management in line with environmental development aims to utilize resource potential in a sustainable way and to solve environmental problems caused by insufficient resource management. The objectives are presented as follows:

(1) To conserve biodiversity (fauna and flora) with sustainable wood production;

(2) To create systems to provide sustainable income to local people through proper natural resource management; and

(3) To mitigate human elephant conflicts.

3.2 Strategy

Sustainable forest management can be achieved by 1) forest resource harvest within environmental capacity, 2) efficient use of forest resources including wood and NWFPs, and 3) income generation of local communities adjacent to forests to halt further encroachment. While sustainable wood production needs to be pursued based on proper management and planning for production forests, non-consumptive economic value of forest like nature-based tourism and environmental value of forest in biodiversity, soil conservation and water resource enhancement needs to be emphasized in future development. The activities to pursue these objectives are sustainable wood production from natural forests and plantations with proper management and planning, income generation in buffer zones surrounding protected areas by non-consumptive resource use like eco-tourism, and watershed management by reforestation of catchment areas in each river basin. In all cases, since these activities are multi-sectoral, inter-agencies coordination is essential. The strategy by phase is summarized in Table 3.1. Explanations follow.

(1) Integrated natural resource management for forest and wildlife conservation

Although the forest sector should challenge to work with the private sector for efficient management, the first priority should be given to capacity building of the Government by reforming institutional framework and strengthening implementing agencies.

Table 3.1 Strategy for Forest and Protected Area Management in Southern Area toward 2020

	Phase I 1996 - 2000	Phase II 2000 - 2010	Phase III 2010 -
1. Conservation Forests in Wet Zone	Eco-tourism Development Pilot Implementation for NWFP Production with Community Participation	Expansion of Community Resource Management	**Biodiversity Conservation based on Community Resource Management**
2. Multiple-use Forest 1) Wood Production 2) Non-wood Forest Products (NWFPs)	Inventory Survey and Formulation of Management Plan Pilot Implementation with Community Participation	Sustainable Wood Production Expansion and Improvement of Productivity	**Sustainable Wood Production** **Sustainable Income for Local People**
3. Forest Plantations	Expansion of Farmer's woodlots Revised Taungya Introduction of Commercial plantations	Expansion of the Taungya Expansion of Commercial plantations	Establishment of Large Forest Plantations with Low Cost
4. Wood based Industry	Creation of economic incentives through institutional reform	Improvement of productivity and quality	Significant Contribution to National Demand
5. Protected Area Management under DWLC	Capacity Building for DWLC and Local Communities Redemarcation of Boundaries Habitat Enrichment & Infrastructure Improvement with Local Participation Introduction of Fodder Farms and Better Breed forCattle/Buffalo	Further Habitat Enrichment and Tourism Development with Local Participation Control on Limited Cattle/Buffalo Grazing	**Sufficient Carrying Capacity for Elephants in Protected Areas**
6. Buffer Zones around National Parks	Income generation and awareness programs for local communities Elephant Drive from conflict areas to National Parks	Promotion of enterprise development for further income generation Elephant Drive to National Parks	**No Elephant outside the Protected Areas**

Presently the protected area management is conducted by both FD and DWLC. FD has committed their activities toward conservation as well as timber production, as the National Forest Policy in 1995 indicates. The functioning and the problems of DWLC have undergone several critical reviews during the last five years. Their goals to protect land against soil erosion and to conserve biodiversity conservation are similar. Coordination of these agencies help promote efficient management of forest and wildlife conservation, e.g. FD specialists performing floral inventory and plant community survey in National Parks. FD has more experience in consumptive multiple-use in forest reserves, while DWLC has more experience in wildlife protection and tourism. Area-oriented horizontal approach with local villagers and CBOs should be introduced based on coordination of these agencies. The Southern Development Authority can facilitate coordination between government agencies and local bodies toward sustainable resource use.

(2) Conservation based development in conservation forests in the wet zone

Sri Lanka has the highest biodiversity per area in Asia. Biodiversity conservation is particularly important not only for the national interest but also as an international issue. A half of 32 conservation forests are located in Southern Area. Since local villagers utilize these forests (except for Sinharaja which is only for research purpose), nature-based tourism and production of NWFPs should be promoted with local participation to create better income opportunities for villagers.

It is important for local villagers to be involved in management of conservation forests. Reliable CBOs need to be established or identified for co-management with government agencies. This process will be time consuming; however, provision of incentives for income generation and training on both FD officers and villagers through the planning process of conservation forest management will enable local villagers to maintain forests for their own benefit.

(3) Sustainable wood harvest from multiple-use forests under FD

Multiple-use forests are primarily to produce wood on sustainable basis as well as NWFPs. In order to harvest wood from natural forest on sustainable basis, a management plan needs to be formulated based on accurate inventory data. At present the only available inventory data of natural forests is from 1983. A forest inventory survey in natural forest needs to be conducted for formulation of the management plan before lifting up the logging moratorium. Also NWFPs need to be efficiently produced to generate income for

villagers who live in the forest vicinity. It is also important for local villagers to be involved in management of multiple-use forests as planned in conservation forests.

(4) Infrastructure/habitat improvement of protected areas under DWLC

In order to improve protected area management, infrastructure should be improved to strengthen protection, promote tourism and enrich habitat inside protected areas. Visible ground demarcation is needed around protected areas to show boundaries to local people. Roads, trails, check points, and observation towers should be renovated/constructed at right places for tourism promotion as well as wildlife research.

Since there is no possibility to increase the extent of protected areas in Southern Area, it is imperative that the carrying capacity of the Parks should be improved to contain animals, particularly elephants, without trespassing on croplands. This includes the rehabilitation, restoration and construction of tanks and water holes with a fair spread throughout the Parks. Such a program launched in Yala is already yielding some results. Introduction of beru and bracheria grasses to suitable tank environments will enrich the habitats. These developments should take high priority in those parts of the parks adjoining the areas with acute human/elephant conflicts.

In addition, introduction of ex-situ conservation including domestication of elephants should be considered in long term elephant management. Elephant orphanage and elephant training for logging operation can be considered.

(5) Multiple-use of protected areas and buffer zone management

As mentioned in the National Wildlife Policy, multiple use of protected areas should be promoted with limited resource consumption on a sustainable basis as a society cannot afford so much of land devoted to a single use from which local communities do not derive any benefit. Multiple-use includes controlled cattle/buffalo grazing, fuelwood collection, and eco-tourism.

Introduction of multiple-use to protected areas is a very sensitive as well as politically and technically complicated issue. Due to the limitation of jurisdiction and technical knowledge/experience, DWLC alone cannot undertake it. DWLC should work with the Ministry of Livestock Development and Rural Industries, Agriculture Department, and FD as well as local NGOs and CBOs to establish appropriate mechanism to achieve the goal. It is important to recognize that buffer zones will have to be sustainably developed for the protection of the Parks. Agroforestry, tree planting, natural forest management and other

land use practices that would maintain low human density are the most desirable long term strategy for buffer zones. Certain type of uses such as collection of medical herbs, fallen fuelwood and fruits (e.g. woodapple) from which local people would derive some benefits, are recommended. Promotion of trained local people to guide tourists can be introduced at some feasible areas. In order to mitigate pressure from cattle overgrazing in protected areas, introduction of better breed cattle and new type of fodder farm should be promoted to reduce number of cattle, improve productivity and provide alternative fodder.

(6) Reforestation with private sector participation

Forest plantations need to be established continuously to protect soil cover and water resources as well as sustaining age structure of stems. High cost of establishing forest plantations is heavy burden for the Government. Therefore, it is important that the private sector including local farmers, local communities and private companies are involved in the plantation establishment with proper economic incentives.

Tree planting with land lease

Farmer's woodlots to provide land and tree tenure to farmers have been attempted in the Participatory Forest Project (PFP). This scheme creates incentives to maintain seedlings. Tree planting with land lease in the dry zone where large land is available can raise survival rate of seedlings. Moreover, this scheme can also give incentives to maintain soil to farmers by securing the land tenure in the wet and the intermediate zones. FD can provide technical assistance to protect soil erosion. The on-going PFP does not cover watershed management in a well organized manner. Tree planting with land lease should be organized with long term land use strategy in the context of water resource management.

Homestead development

Sri Lanka is a nation of smallholders. Home gardens produce 40 % of wood and 80 % of fuelwood. Homestead development promotion is important to encourage tree planting in home gardens. It does not need land tenure and labor. Homestead development especially in Moneragala where larger areas and rainfall are available should be more promoted. Nurseries presently produced mainly by FD can be carried out in home gardens. FD can provide technical assistance to private nursery production.

Reforestation with temporal agriculture (Taungya)

A reforestation scheme called Taungya which combines agricultural activities on plantation site until canopy covers the site has been operative in Moneragala and Hambantota

districts. Taungya did not work very well in Hambantota due to the low survival rate of seedlings. However, in Moneragala this scheme is still operative.

Taungya is effective for poverty alleviation by offering new land and income for tree planting and maintenance to poor landless farmers. Taungya can reforest land with relatively low cost. Although Taungya provides only short-term income for farmers, it is useful to reduce pressure from chena cultivation and reforest the land especially after land release for wood harvest.

Commercial plantations

In order to improve efficiency in forestry practices, industrial forest plantations by the private sector should be promoted. There are more potentials in Moneragala for commercial plantations where larger area is available. Commercial plantations can be started on a pilot basis.

(7) Wood based industry development

Approximately 80 % of plywood, paper and paperboard is imported by Sri Lanka. This figure is unnecessarily high considering self-sustaining level of sawnwood production. In order to keep lower prices of wood products, productivity of wood based industries needs to be improved. The potential of sustainable harvest from forest plantations with fast-growing species such as pine and eucalyptus has not been fully utilized. Moreover, development of wood based industries creates additional market for varied species and encourages people to plant more trees in their home gardens. Some indigenous species have potential for plywood material. The research on lesser known indigenous species can be conducted by FD in cooperation with the private sector.