Forestry for Development - Proceedings of the Annual Forestry Symposium 1995, Sri Lanka,15-16 December 1995. (Eds. Amarasekera, H S and Banyard, S G). Published by Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka (1996)

LAND USE CHANGE AND NATURAL AREA CONSERVATION IN THE SOUTH EAST DRY ZONE OF SRI LANKA

M. D. C. Abhayaratna
Department of Geography
University of Sri Jayewardenepura

ABSTRACT

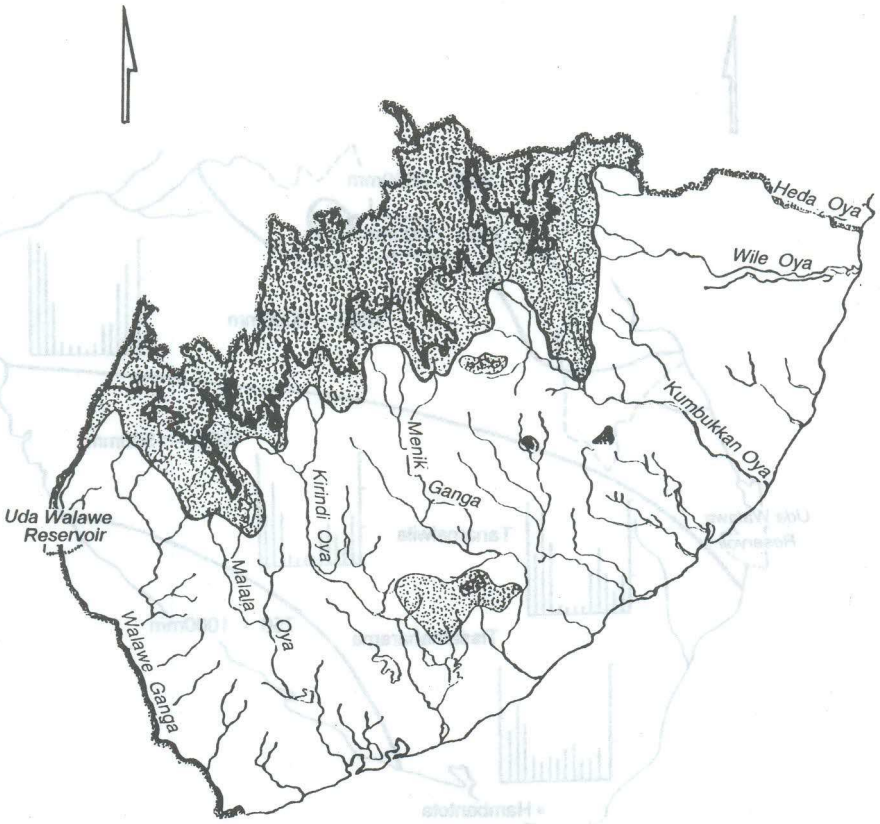
The South East Dry Zone (SEDZ), which is one of the least developed regions of southern Sri Lanka, has experienced considerable change in land use over the last few decades. A rising population has exerted increasing pressure on land while reducing the land/man ratio. Competition for land has become very acute and encroachment upon state land is commonplace in the area. Natural Areas and reservations controlled by various agencies of the Government are the most prone to encroachment, thus causing severe strains on forest lands.

In the SEDZ, approximately 35 percent of the land area remains as Protected Areas of the Department of Wildlife Conservation (DWLC) and Forest Department (FD). With the development thrust of the region, there is a tremendous competition for land by the different users and changes in land use are taking place at a rapid rate posing a severe threat to the natural areas of the SEDZ. Hence, there is an urgent need to understand the pattern of change in land use in order to arrest the undesirable consequences.

In view of this situation, the present paper analyses the existing land uses with due emphasis on the pattern and process of change. It also focuses attention on rationalization of land use from the perspective of future demand for land and Natural Area conservation.

INTRODUCTION

The South East Dry Zone (SEDZ) is one of the least developed areas of Southern Sri Lanka. The region is not well endowed with natural resources - but its land, fauna and flora have great potential for eco-tourism. The rapidly increasing population of the area, largely due to the in-migration into the region during the last few decades, has caused severe strains on the land resource. An increasing demand for land and a frequent change in land use, has been commonplace in the SEDZ. The present paper analyses the pattern and process of this change and its impact on natural area conservation. It also focuses attention on rationalizing land use from the perspective of the probable future demand for land.



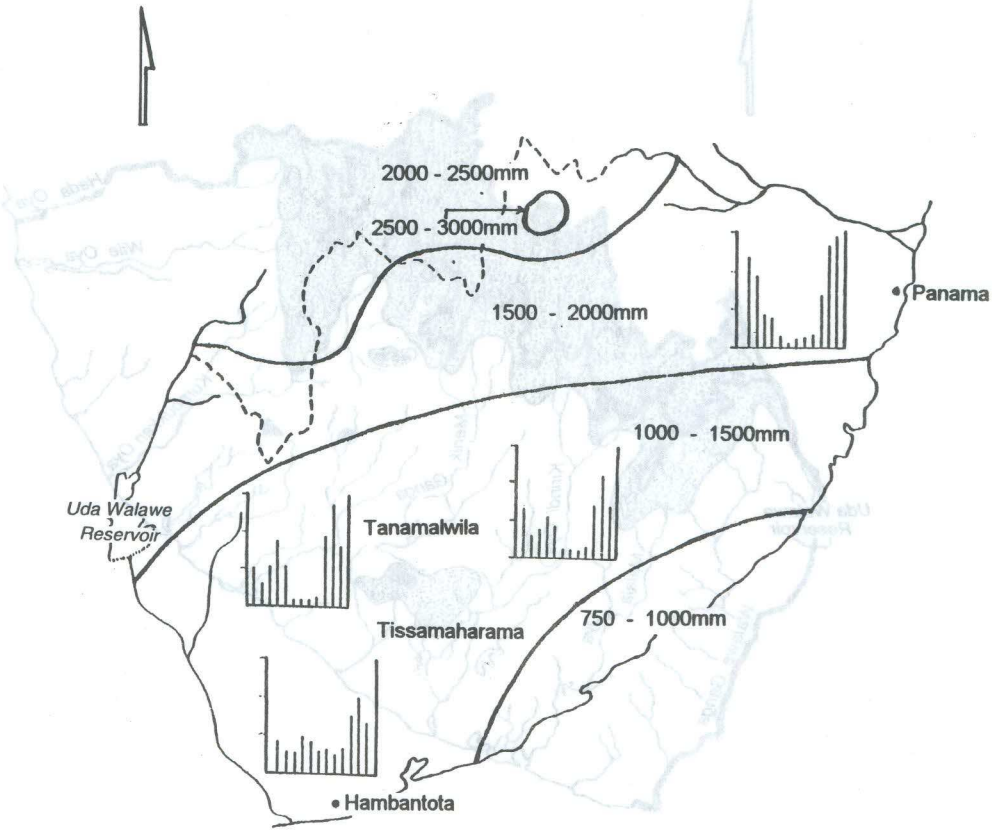
0 14km.

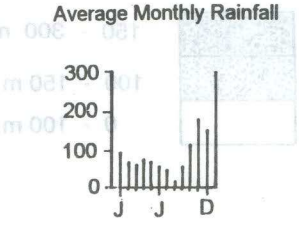
Altitude in Meters

150 - 300 m

100 - 150 m

0 - 100 m


2000 - 2500mm
2500 - 3000mm
1500 - 2000mm
Panama
1000 - 1500mm
Uda Walawe Reservoir
Tanamalwila
Tissamaharama
750 - 1000mm
Hambantota
0 10 km


Average Monthly Rainfall
300
200
100
0
J J D

THE SETTING

For the purpose of this study, the SEDZ of Sri Lanka is considered to be the area lying between Walawe Ganga in the west, the 1000 ft contour and Heda Oya in the north (Figure 1). The area is bounded by a lagoon-fringed coastline in the south and southeast. The SEDZ constitutes a denuded peneplain about 90 percent of which lies below 150 m. It is characterized by a number of erosion derived remnants such as the Kataragama Peak, Sitarama and Binkemahela. The area is traversed by four major rivers - Walawe Ganga, Kirindi Oya, Menik Ganga and Kumbukkan Oya and numerous small streams all taking south-easterly courses to the sea (Figure 1). One of the characteristic features of these streams is their irregular flow patterns governed by the rainfall rhythm.

The rainfall of the SEDZ ranges from 700 mm in the coastal lowlands of the south-east increasing with elevation to 2500 mm towards the north. The temporal distribution of rainfall, which is marked for its seasonality, has been more significant in influencing human activities in the region. Between 50 to 60 percent of the rainfall in stations such as Hambantota, Tissamaharama and Thanamalwila, is received during the four months beginning in October while the dry period of the SEDZ extends from May to September (Figure 2). During the latter period most of the small streams and minor tanks run dry. Grasslands become parched and fodder for animals becomes scarce. A large portion of the SEDZ is covered by two major agro-ecological regions DL_1 and DL_5 as defined by the Department of Agriculture. However, smaller areas in the northern part of the SEDZ fall within other rainfall regimes such as IM_2, IL_1 and IL_2.

Reddish Brown Earths (RBE) constitute the most prevalent soil type in the SEDZ. They are deeper and more productive than RBEs in the North Central Province (Panabokke, 1993). This soil type has been widely used for both rainfed and irrigated agriculture in the area. Low Humic Glay (LHG) soils are found in association with lower topographical positions with alluvial soils while Solodized Solonetz occur in depressional sites in valley bottoms (Dimantha, 1992).

The natural vegetation of the area has been largely cleared over the last few decades and is now restricted to the Protected Areas of the SEDZ. The major forest type of the region is dry monsoon or mixed evergreen. However, these types change to intermediate evergreen forests towards the north and this is represented by the Daragoda Forest Reserve in the Moneragala District. In the south-eastern portion of the SEDZ, where the rainfall is less than 1000 mm, the vegetation assumes xerophytic characteristics owing to excessive evaporation and prolonged drought conditions.

Table 1 :
Land Use in Selected D.S. Division of the SEDZ - 1992 (Figures represent percentages)

Land Use Type	Monera-gala	Buttala	Siyamba-lawa	Katara-gama	Amb'tota	Ham'tota	Suri'wewa	Tissa' rama	Lunu' vehera
Built-up-lands	0.68	0.23	0.06	0.21	0.86	6.50	0.06	0.08	-
Home Gardens	26.43	16.40	17.24	2.56	14.28	9.24	22.74	2.75	15.94
Coconut	1.58	0.04	-	-	1.66	1.01	0.13	0.49	-
Rubber	3.20	1.12	-	-	-	-	-	-	-
Paddy	6.28	4.24	3.53	0.80	25.44	8.07	15.46	3.07	20.36
Sugarcane	8.91	13.94	2.49	-	-	-	-	-	-
Oth tree crops	1.50	0.54	0.15	-	14.42	0.71	0.87	0.10	-
Chenas	4.82	4.61	7.94	6.22	11.18	10.59	20.34	17.55	31.28
Dense forest	6.95	41.50	40.00	64.85	0.23	0.25	-	54.16	0.66
Open forest	11.31	12.10	28.82	13.52	0.34	23.51	15.15	5.64	6.04
Scrublands	16.09	3.52	17.12	9.75	12.64	20.89	15.53	9.58	18.83
Grasslands	7.87	0.57	0.34	0.66	0.15	1.43	5.83	1.16	-
F. Plantations	0.47	0.28	0.04	0.37	-	9.30	-	0.30	1.34
Rocky lands	1.65	0.04	1.49	-	1.28	1.89	-	1.72	0.05
Barren Lands	1.76	0.16	-	0.02	1.63	3.09	1.26	0.20	0.14
Water bodies	1.05	1.17	0.78	1.04	13.79	1.43	2.63	3.20	4.01
Marsh	-	0.55	-	-	2.09	0.05	-	-	1.35
Salterns	-	-	-	-	-	2.33	-	-	-
Total(ha.)	26,642	68,520	63,277	58,685	12,775	31,706	17,214	83,935	27,864

tes : 1) Figures given for Siyambalanduwa and Ambalantota include only the area falling under the SEDZ.
2) Sparcely used croplands are also included under Chenas.

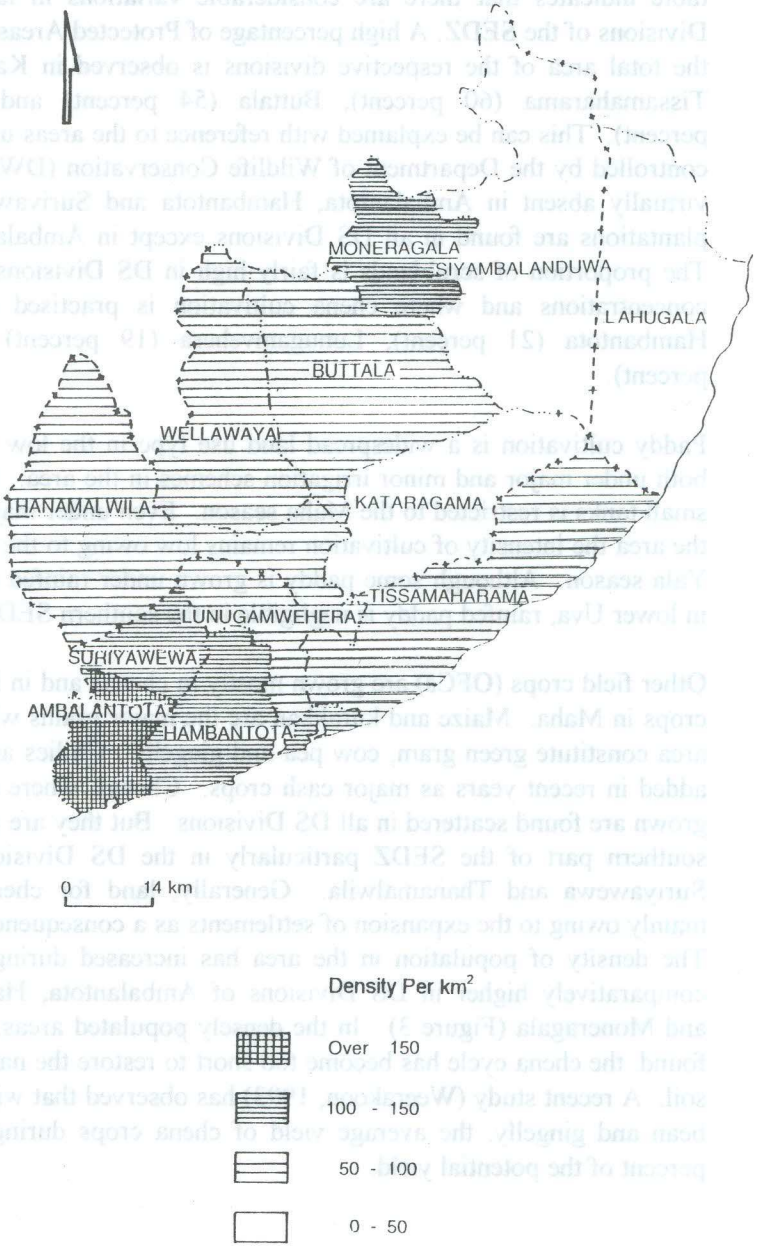
urces: Dimantha (1992); Land Use Planning Divisions, Kachcheri, Moneragala and Kachcheri, Hambantota.

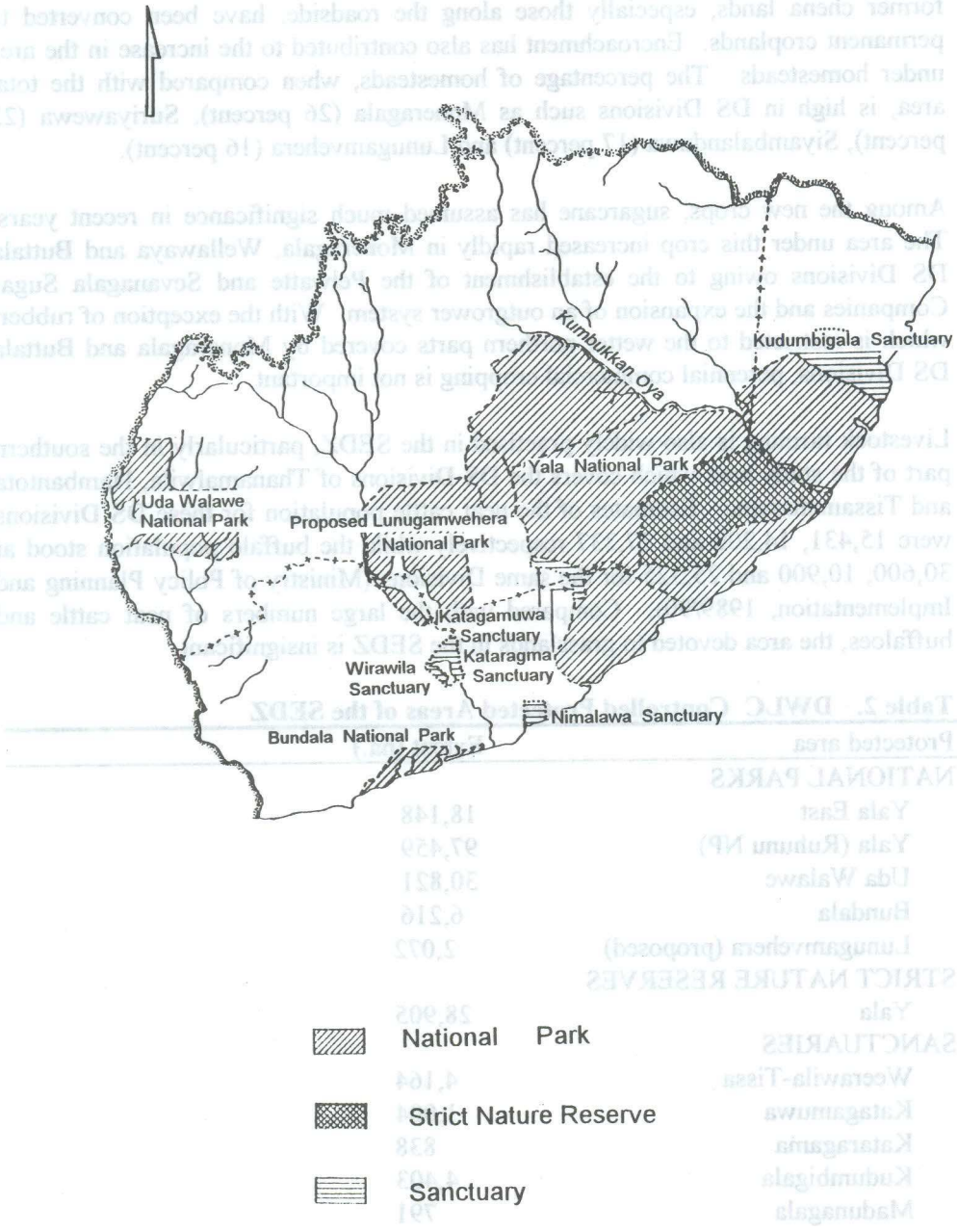
PRESENT LAND USE

Land use is a combined function of a multiplicity of factors relating to physical, social and historical phenomena. Present land use data are not available for all 12 Divisional Secretary (DS) Divisions of the SEDZ. However, the areas covered by each land use type (in percentages) for 9 DS Divisions are given in Table 1. The table indicates that there are considerable variations in land use among the DS Divisions of the SEDZ. A high percentage of Protected Areas (PAs) with reference to the total area of the respective divisions is observed in Kataragama (78 percent), Tissamaharama (60 percent), Buttala (54 percent) and Siyambalanduwa (49 percent). This can be explained with reference to the areas under protection - mainly controlled by the Department of Wildlife Conservation (DWLC). Dense forests are virtually absent in Ambalantota, Hambantota and Suriyawewa. However, forest plantations are found in all DS Divisions except in Ambalantota and Suriyawewa. The proportion of scrublands is fairly high in DS Divisions with heavy population concentrations and where chena cultivation is practised on a large scale e.g., Hambantota (21 percent), Lunugamvehera (19 percent) and Suriyawewa (16 percent).

Paddy cultivation is a widespread land use type in the low lands. Paddy is grown both under major and minor irrigation schemes in the area. Paddy cultivation under small tanks is restricted to the Maha season. Even under major irrigation schemes in the area the intensity of cultivation remains low owing to the shortage of water in the Yala season. Although some paddy is grown under rainfed conditions during Maha in lower Uva, rainfed paddy is negligible in the southern SEDZ.

Other field crops (OFCs) are grown mostly in chenas and in home gardens as rainfed crops in Maha. Maize and kurakkan are the major grains while pulses grown in the area constitute green gram, cow pea and gingelly. Chilies and groundnut have been added in recent years as major cash crops. Chenas, where most of these crops are grown are found scattered in all DS Divisions. But they are more conspicuous in the southern part of the SEDZ particularly in the DS Divisions of Lunugamvehera, Suriyawewa and Thanamalwila. Generally, land for chenas has become scarce mainly owing to the expansion of settlements as a consequence of population growth. The density of population in the area has increased during recent years and it is comparatively higher in DS Divisions of Ambalantota, Hambantota, Suriyawewa and Moneragala (Figure 3). In the densely populated areas, even where chenas are found, the chena cycle has become too short to restore the natural regeneration of the soil. A recent study (Weerakoon, 1993) has observed that with the exception of soya bean and gingelly, the average yield of chena crops during Maha is less than 50 percent of the potential yield.


MONERAGALA
SIYAMBALANDUWA
LAHUGALA
BUTTALA
WELLAWAYA
THANAMALWILA
KATARAGAMA
TISSAMAHARAMA
LUNUGAMWEHERA
SURIYAWEWA
AMBALANTOTA
HAMBANTOTA
0
14 km
Density Per km²
Over 150
100 - 150
50 - 100
0 - 50


Kumbukkan Oya
Kudumbigala Sanctuary
Yala National Park
Uda Walawe
National Park
Proposed Lunugamwehera
National Park
Katagamuwa
Sanctuary
Kataragma
Sanctuary
Wirawila
Sanctuary
Nimalawa Sanctuary
Bundala National Park
National Park
Strict Nature Reserve
Sanctuary

These crops are also grown in home gardens during the Maha season. Some of the former chena lands, especially those along the roadside, have been converted to permanent croplands. Encroachment has also contributed to the increase in the area under homesteads. The percentage of homesteads, when compared with the total area, is high in DS Divisions such as Moneragala (26 percent), Suriyawewa (23 percent), Siyambalanduwa (17 percent) and Lunugamvehera (16 percent).

Among the new crops, sugarcane has assumed much significance in recent years. The area under this crop increased rapidly in Moneragala, Wellawaya and Buttala DS Divisions owing to the establishment of the Pelwatte and Sevanagala Sugar Companies and the expansion of an outgrower system. With the exception of rubber, which is restricted to the wetter northern parts covered by Moneragala and Buttala DS Divisions, perennial commercial cropping is not important.

Livestock farming is also widely practised in the SEDZ, particularly in the southern part of the study area which covers the DS Divisions of Thanamalwila, Hambantota and Tissamaharama. Estimates of the neat cattle population for these DS Divisions were 15,431, 14,200 and 27,337 respectively while the buffalo population stood at 30,600, 10,900 and 25,325 for the same Divisions (Ministry of Policy Planning and Implementation, 1989/90). Compared with the large numbers of neat cattle and buffaloes, the area devoted to grasslands in the SEDZ is insignificant.

Table 2. DWLC Controlled Protected Areas of the SEDZ

Protected area	Extent (ha.)
NATIONAL PARKS	
Yala East	18,148
Yala (Ruhunu NP)	97,459
Uda Walawe	30,821
Bundala	6,216
Lunugamvehera (proposed)	2,072
STRICT NATURE RESERVES	
Yala	28,905
SANCTUARIES	
Weerawila-Tissa	4,164
Katagamuwa	1,004
Kataragama	838
Kudumbigala	4,403
Madunagala	791
Nimalawa	1,066
Total extent in SEDZ	195,887

Source: Sri Lanka Forestry Sector Master Plan, 1995

A noteworthy feature of the land utilization pattern of the SEDZ is the vast extent of land under Protected Areas (Figure 4). Of the 12 National Parks (NPs) of the

country, covering a total land area of 462,448 ha, five (including the proposed Lunugamvehera NP) lie within the region (See Table 2). Similarly, of the three Strict Nature Reserves (SNRs) of Sri Lanka, the largest - Yala SNR (covering 92 percent of the total area under SNRs of the country) - lies within the SEDZ. Including the six sanctuaries shown in Table 2, the total extent of Protected Areas (PAs) controlled by the Department of Wildlife Conservation in the SEDZ stands at 195,887 ha representing 33 percent of the total land area of the region.

The PAs of the Forest Department (FD) constitute forest reserves (FRs), proposed forest reserves (PFRs) and forest plantations. The PFRs are still not surveyed and gazetted. Hence, their boundaries are not clearly demarcated which makes them vulnerable to encroachment. Among the FRs of the area are Daragoda, Namandiya, Madunagala and Wedasitikanda. Parts of Daragoda and Wedasitikanda have been declared as Man and Biosphere Reserves. Forest plantations of the SEDZ are found scattered in all DS Divisions except in Ambalantota and Suriyawewa. Teak and eucalyptus are the most dominant species in forest plantations.

PATTERNS OF LAND USE CHANGE

Land use change in the SEDZ since 1956 can be studied with reference to existing land use maps. In the SEDZ, covering approximately 6,000 km^2, 77 percent was under forest in the mid-1950s, while another 15 percent was chena under different stages of fallow (Table 3). By 1984 the forest cover was reduced to 43 percent of the SEDZ while the extent under chena increased to 31 percent. The area under scrublands also increased from 4 to 10 percent between 1956 and 1984. Reduction of the forest cover and the increase of the scrublands indicates the clearance of forests for chenas. Forest cover has also been reduced by encroachment upon forest lands for cultivation and settlement purposes.

The increase of the area covered by the water bodies reflects the restoration of the ancient irrigation works and the commissioning of new reservoirs thus increasing the area under paddy cultivation from one to four percent. Similarly, the extent under homesteads increased from 0.6 percent (1956) to 5 percent (1984). This change can be attributed to the expansion of settlements during the period.

The area devoted to conservation increased appreciably between 1956 and 1984. Yala Blocks III, IV and V, Yala East and Uda Walawe National Park and three sanctuaries viz. Bundala, Kudumbigala and Madunagala were added to the Protected Area network during this period, increasing the PAs controlled by the DWLC to 32 percent of the SEDZ (Karunanayake, *et.al.*, 1995).

Table 3. Land Use Change in the SEDZ 1956 - 1984

Land use type	1956	1984
Built-up-land	0.04	0.41
Home garden	0.62	4.56
Coconut	0.03	0.10
Rubber	0.35	0.31
Paddy	1.30	3.84
Sugarcane	--	0.77
Other tree crops	0.25	0.09
Chenas	14.59	30.63
Dense/open forest	76.99	43.02
Scrubland	3.64	10.34
Grassland	0.09	0.46
Forest plantation	--	1.17
Rocky/barren land	1.11	1.23
Water bodies	0.93	2.78
Marsh	0.04	0.29
Saltern	0. 6	n.a.
Total in hectares	559 560	559,560

Note : Values, other than totals, are in percent.

Source : Karunanayake, *et.al.*, (1995), Natural Area Conservation of the South East Dry Zone of Sri Lanka.

A comparison of the current situation in the 9 DS Divisions with the data for 1984 suggests that the extent under homesteads, as well as paddy lands, continued to increase up to the present day (Karunanayake *et.al.*, 1995). Extension of irrigation facilities led to the expansion of paddy cultivation while Government-sponsored land settlement schemes, together with encroachment upon State lands, increased the area under homesteads.

Chena cultivation has been declining during recent years owing to the non-availability of land as evident from shorter fallow periods, conversion of chenas into permanent croplands and legal restrictions on the clearance of forests. This trend has been particularly noted in DS Divisions such as Moneragala, Buttala and Ambalantota.

Shrinkage of the area under chenas has not contributed to the stabilization of the forest cover. Instead, the extent under forest has shown a progressive decline. Release of land on a large scale to Pelwatte and Sevanagala Sugar Companies, encroachment upon State land for the cultivation of sugarcane owing to the demand created by the outgrower system in lower Uva and the expansion of agricultural settlements in the southern SEDZ, particularly at Lunugamvehera, are the major contributory factors for this change.

NATURAL AREA CONSERVATION IN THE CONTEXT OF CHANGING LAND USE

Escalating competition for land, created by the requirements of a rapidly increasing population and demand for land emanating from numerous land-based development activities, has caused unprecedented threats to the natural areas of the region. However, there has been an increasing emphasis on conservation at national level as manifested by various measures such as the National Conservation Strategy of Sri Lanka as approved by the Parliament in 1988, the National Environmental Action Plan (1991), the Fauna and Flora (Amendment) Act No. 49 of 1993 and the Forestry Sector Master Plan (1995).

Most of the natural areas of Sri Lanka are gazetted as PAs under three important pieces of legislation and subsequent amendments:

1) Fauna and Flora Protection Ordinance No. 2 of 1937 and subsequent amendments of 1970 and 1993
2) Forest ordinance No. 16 of 1907 as amended by Act No. 13 of 1966 and subsequent amendments
3) National Heritage and Wilderness Areas Act No. 3 of 1988.

PAs declared under the first Ordinance come within the purview of the DWLC while those gazetted under the second and third Ordinances come under the FD. There are still other patches of forest of less than 200 ha in the Dry Zone and 20 ha in the Wet Zone which come under the administration of the Divisional Secretaries. Field evidence indicates that the last category of forests in many locations have almost disappeared while even FRs are encroached upon. Absence of clearly marked boundaries in the PAs such as FRs and PFRs controlled by the FD has increased the vulnerability of these areas to encroachment (Gunatillake 1983, Karunanayake 1994). Weakness of preventive action and lack of political commitment to conservation have also contributed to this decline.

Even the boundary-demarcated PAs of the DWLC have been threatened in recent years. Although direct encroachment of these areas is limited, many activities prohibited by wildlife regulations continue to exist in the NPs. Cattle grazing is common in Uda Walawe and Bundala NPs. As a recent study (CEA/Euroconsult, 1993) has observed, large herds of cattle compete directly with the elephant and spotted deer populations for food. The carrying capacity for cattle has been exceeded in most of the areas of the Bundala NP leading to a serious over-grazing problem. There are many instances where illegal activities have been reported in the National Parks of the SEDZ. For instance, gemming, illicit felling of timber and poaching have been reported in the NPs of the area (DEA Moneragala, 1990; Stuwe, 1992; Laurie and Miththapala, 1994; CEA/Euroconsult, 1995).

With the development thrust of the Southern Region of Sri Lanka, pressure on natural areas is bound to increase as activities such as seasonal and perennial cropping, animal husbandry, infrastructure development, industry and tourism, will compete for land. Hence, there is a dire necessity to rationalize the land use with due

emphasis on conservation. It is pertinent to note that conservation can be promoted only if the related actions do not jeopardize the interests of the local communities. Therefore, people-centred development strategies, such as the promotion of multiple uses with zoning of PAs and encouragement of eco-tourism with extended income benefits to the people living around PAs, should receive adequate attention.

POLICY IMPLICATIONS

In the SEDZ, demand for land and competition from various uses have escalated rapidly during recent years. Demand for non-agricultural uses of land, particularly for salterns, hotels and industrial development, have become very significant in the Hambantota DS Division. The impact of the proposed projects on the natural areas should be studied very carefully before firm commitments are made to such ventures.

Recent irrigation development of the area based on large irrigation schemes, has not been able to make an appreciable increase in the intensity of cultivation relating to paddy farming - mainly because of the scarcity of water during the Yala (dry) season. Hence, future expansion of irrigation facilities by way of massive investment should be viewed with much caution since, as has been already suggested by Panabokke (1993), renovation of selected small tanks for domestic water supply and promotion of dry farming seems to be the most plausible alternative.

With reference to the PAs, people's participation has not been sought - neither at the stage of declaration nor in their management. The policy of expanding the PAs of the DWLC in particular, has been to make space for the protection of fauna without proper habitat enrichment or considering other aspects of park management. Multiple use of PAs and promotion of the participation of local communities, still remain to be accepted concepts, the application of which has not received adequate attention - despite the recently pronounced National Wildlife Policy. Further, the immense potential for eco-tourism in the SEDZ remains largely untapped.

It is imperative that there should be clear policy directives to check the activities causing stress on the resources of the NPs. Entry of people into the NPs for illegal activities is commonplace in the SEDZ. Existing control measures have proven to be ineffective and firm policy directives are required to evolve new strategies which seek the participation of the local communities.

ACKNOWLEDGEMENTS

Data gathered for the study on "Natural Area Conservation in the South East Dry Zone of Sri Lanka" for which the author contributed as the land use consultant, have been used in the preparation of this paper. This study was sponsored by the Regional Development Division of the Ministry of Finance, Planning, Ethnic Affairs and National Integration. The author also wishes to thank Mr.G.F.de Alwis, Staff Cartographer, Department of Geography, University of Sri Jayewardenepura, for

REFERENCES

CEA, (1988). Sri Lanka National Conservation Strategy, Colombo.

CEA/Euroconsult, (1993). Wetland Site Report and Conservation Management Plan, Bundala National Park, Colombo.

DEA, Moneragala, (1990). Ruhuna National Park Block IV Development Project, Kachcheri, Moneragala.

Dimantha, S. (1992). Land Suitability Evaluation and Land Use Study of the Hambantota District, Land Use Division, Irrigation Department, Colombo.

Gunatillake, I.A.U.N. and Gunatillake, C.V.S. (1983). Conservation of Natural Forests in Sri Lanka, The Sri Lanka Forester, **16** (1/2) (New Series) 39-56.

Karunanayake, M.M. (1994). Kanneliya-Dediyagala-Nakiyadeniya (KDN) Forest Complex: Socio-Economic Survey, IUCN

Karunanayake, M.M., Abhayaratna, M.D.C., Dayaratne, M.H.S., Padmalal, U.K.G.K. and Tantrigama, G. (1995). Natural Area Conservation of the South East Dry Zone of Sri Lanka, Report submitted to the Regional Development Division, Ministry of Finance, Planning, Ethnic Affairs and National Integration.

Laurie, A. and Miththapala, S. (1994). Issues Affecting Protected Area Management in the Southern Administrative Region of the Department of Wildlife Conservation of Sri Lanka, GEF Project.

Ministry of Agriculture, Lands and Forestry, (1995). Sri Lanka Forestry Sector Master Plan, Forestry Planning Unit, Battaramulla.

Ministry of Policy Planning and Implementation, (1989/90). Resource Profiles of Thanamalwila, Hambantota and Tissamaharama.

Panabokke, C.R. (1993). A Rational Approach to the Use of Land in the South East Dry Zone, In South East Dry Zone of Sri Lanka, Documentation Series No. 13, ARTI, Colombo.

Stuwe, M., Worah, S. and Runde, D.E. (1992). Proceedings of Workshop of Protected area Survey Techniques, DWLC/US Fish and Wildlife Service Collaborative Project, Sri Lanka.

Weerakoon, W.L. (1993). Management of Rainfed Upland Agriculture in the Dry Zone, In South East Dry Zone of Sri Lanka, Documentation Series No. 13, ARTI, Colombo.