

The Human Influences on The Natural Vegetation of The Sri Lanka Highlands

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The Central Highlands rises in a series of tiers or ramparts from a low, flat plain surrounding it on all sides and extending to the sea. There are three well marked plains of erosion (or peneplains) cut in the rocky framework of the island. The lowest peneplain has an average height of less than 100 feet but rises inland to 300 or 400 feet. Rising from this inner edge in a steep step of about 1,000 feet is the middle peneplain with a maximum elevation of 2,500 feet above sea level, best seen in the south and east of the island. Within it and rising from it, in another steep step of 3,000 to 4,000 feet is the highest peneplain, at a general level of 5,000 to 6,000 feet, but rising in places to 7,000, or 8,000 feet.

As indicated on the map, the natural vegetation of the Highlands consists of forests, grasslands and savanna. On the basis of climate the major portion of the area should be forest clad, except in small areas of edaphically controlled grassland. But strangely enough, much of the forest has been replaced by grassland and savanna. The grasslands have been recognised as belonging to three different plant communities, named the montane, intermediate and sub montane grasslands. By far the largest extent of grassland is the sub montane type dominated by *Cymbopogon confertiflorus*. The origin of the sub montane grasslands has been attributed by de Rosayro (1945-46)¹ to the peculiar physical environmental factors found in the Uva area. Others however, notably Pearson (1899)² and Holmes (1951)³ held that this vegetation has resulted from human activity; while Perera (1969)⁴ has shown that this major grass community is not confined to a particular climatic region but is found in all climatic regions which extend between 1,000 and 3,500 feet, where erosion has so degraded the soil that indigenous tree species do not colonise. Their preclusion is aided by frequent firing and clearing and the severe soil erosion.

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1. de Rosayro, R. A.—The Montane Grasslands of Ceylon, *Tropical Agriculturist*, Vol. 101 No. 4 and Vol. 102, Vol. 1, 2, 3, 1945-46.
 2. Pearson, H. W.—The Botany of the Ceylon Patanas *Journal of the Linean Society* Vol. 34 pp. 300 - 325 and Vol. 35 1899. pp. 430 - 462 1903.
 3. Holmes, C. H.—*The Grass Fern and Sarvana Lands of Ceylon*, their nature and ecological significance Paper No. 28. Forestry Institute, Oxford, 1951.
 4. Perera, N. P.—The Ecological status of the Montane Grasslands of Ceylon. *Ceylon Forester*, Vol. IX, Jan.- Dec. pp. 27-52, 1969.

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The present state of the vegetation, as it emerges from its evolution over geologic time, is controlled by three groups of factors: climatic, edaphic and biotic. The powerful influence of man has for millenia changed the face of Sri Lanka as in other parts of the world. Climate and soils which to a large extent alone determined the plant communities before the advent of man, now only control and limit the nature and extent of human intervention. The aim of this study is to trace the saga of human activities involved in this landscape segment of Sri Lanka, and thereby show how the hand of man purposely or unconsciously, facilitated the invasion of plants of earlier stages of succession into the forest ecosystem, which would have been the major plant community in this part of the country. The picture today is different, with the uncultivated land mostly occupied by grassland and savanna while the forests mainly confined to reservations and riparian tracts.

The anthropogenous character of vegetation landscapes can be demonstrated by floristic studies and from historical records of land use etc. In the area under study there is a wealth of knowledge dating back to the neolithic period. Some of the plants that now grow wild have been mostly introduced into the island by man. These plants may be called the naturalized aliens to distinguish them from the truly native plants or indigenous species, which have either originated here or have migrated to Sri Lanka by natural methods. Although a very sharp distinction cannot be drawn between these two groups, it has been estimated that the montane zone has about 72 naturalized plants out of a total of about 210 naturalized alien species for the whole island. Of this 25 species are from the North Temperate Old World, 20 from the Euro-Mediterranean area, 12 American, 2 each with Asian, African and Australian origins, 1 each from Peninsular India and the Malaysian - Pacific region, 2 are of doubtful origin while 5 are wides (Abeywickrema 1956).⁵ The geographical range and early records of individual species support the idea that most of the naturalised alien plants were introduced during the last 200-300 years. This would indicate that nearly 86% of such species were introduced when the island came under the influence of European powers beginning with the Portugese in 1505, later to be followed by the Dutch and British. As the Portugese and the Dutch were able to control only parts of the maritime districts their impact on the montane zone was minimal.

The Pre-Historic Period

The first account of the Stone Age of Sri Lanka was published by F. and P. Sarasin in 1908.⁶ Since then there have been an increasing number of papers

5. Abeywickrema, B. A.—“The origins and affinities of the Flora of Ceylon, *Proceedings of the Ceylon Association for the Advancement of Science* Part 2 pp. 91-121, 1956.

6. Sarasin F. P.—*Unsere vierte Forschungsreise nach Ceylon und die Steinzeit der Vaddas*. Reprinted in *Le Globe*, Vol. 47, Geneva 1908.



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and books on the study of various aspects of the pre-history and of the primitive-aboriginal folk known as the *Veddha*. In this account an attempt is made to summarize the available evidence, to assess the salient facts which emerge, and to relate them to other pre-historic cultures and to the lives of primitive people which have survived almost to recent times. The ultimate aim is to present by such means as coherent a picture as possible of the lives of the users of these implements, with special reference to sites in and around the area of the Sri Lanka Highlands. The extent to which the hand of these pre-historic people or peoples may have been responsible in changing their environment by clearing the forests will be considered.

The most important and largest collection of stone implements from the Highland area are those collected from open sites on the tops of the knolls and hills around Bandarawela by N. A. and H. V. V. Noone in 1940⁷ and 1945.⁸ although their existence was shown by Wayland in 1917.⁹ The other major sites occur just outside, on the flanks of the Highlands at Ratnapura, Balangoda, Bellanbendipalessa and Nilgala. According to the nature of the area in which they were found, the Sri Lanka stone implements were divided into two groups by Wayland (1917).¹⁰ The first group of tools were found in caves and hill top sites in upland regions, as for example, the hills around Bandarawela. These included a number of geometric forms like lunate, triange and trapeze together with transverse arrowheads. They are made almost exclusively from quartz and quartz crystals. The second group of tools are generally larger than the first group and frequently made of chert. To this group also belong artifacts fashioned out of water-worn pebbles of granite, quartz and quartzite. This second group of tools are generally found in lowland areas where they occur in or on the surface of detrital material. This classification of pre-historic implements was adopted later by Deraniyagala (1943,¹¹ 1953,¹² and 1958).¹³

Deraniyagala regarded the detrital tools as the remains of the older "Ratnapura Culture" phase and those of the 'open sites' the younger "Balangoda Culture". The Noones however think that both these groups of tools belong to one culture phase which they designate the "Bandarawellian". This view

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7. Noone N. A. & H. V. V.—Stone Implements of Bandarawela *Ceylon Journal of Science* Vol. 3 part I, pp. 11-24 1940.
 8. Noone, N. A. & H. V. V.—Stone Age Relics at Bandarawela. *Loris* Vol. 4. No. 1. pp. 263-267 1945.
 9. Wayland E. J.—Outlines of the Stone Age of Ceylon. *Spolia-Zeylanica*, Vol. 11 p. 96. 1917
 10. Waland, E. J. opp. lit 9.
 11. Deraniyagala, P. E. P.—Some Aspects of the Pre-Hirtory of Ceylon. *Spolia Zeylanica*, Vol. 23 pp. 9 -142, 1943.
 12. Deraniyagala, P. E. P.—The Stone Age of Ceylon. *Journal of the Ceylon Asiatic Society*. (C.B.) Vol. 3, Part 2. pp. 113-124, 1953.
 13. Deraniyagala, P. E. P.—*The Pleistocene of Ceylon* Ceylon, Government Press, 1958.

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of the Noones (1940)¹⁴ has been accepted by Allchin (1958)¹⁵ but Deraniyagala (1960)¹⁶ regards "Balangoda" and "Bandarawela" culture phases as synonymous. The Noones and Allchin tend to believe that the makers of these smaller tools or the "Bandarawellian" had a rather organised pattern of life, throughout a considerable area in the Uva region of the Highlands, and perhaps also through a considerable period of time. This may throw some light on the nature of the human influences on these parts of the Uva Highlands where their tools were found. In this context it is important and appropriate to find out who the *Veddhas* were, because in that case it would be possible to predict to some extent the relationship of these former people to their environment, from what is known of the *Veddhas*. However, insights into the problem may also be gleaned from the living patterns of other primitive peoples on the Indian subcontinent and other parts of the Tropics.

In the 1871 census the *Veddhas* were enumerated as totalling 2,000; 1901, 4,000; 1946, 2,400; 1953, 800; 1963, 400; and in 1971 were included with "Other Races".¹⁷ Many believe that no true *Veddha* exist today as they have been assimilated both by the Sinhalese and the Tamils, (Wickremasinghe, 1963)¹⁸. The Sarasins (1908)¹⁹ thought that the ancestors of the modern *Veddhas* were responsible for the stone artifacts in the caves and hills around Bandarawela. Seligman (1908²⁰ and 1911)²¹ supported this view on the evidence that the *Veddhas* are different from either the Sinhalese or the Tamils both physically and in basic social customs like being strictly monogamous. Wayland (1917)²² was supported later by Deraniyagala (1943)²³ in the view that the *Veddhas* had attained a high level of culture including agricultural practice, but later were forced to lead a hunting life.

The study of artifacts, skeletons and blood groups show that apart from the *Veddhas*, the lower slopes of the Highlands particularly those of the Uva Basin together with the South West and South of the island, were peopled by different groups of primitive peoples from Paleolithic times and that some of them at least existed till historic times. It is useful to infer the life led by these people on the basis of their tools, pottery and food habits. To what extent were they capable of altering their

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14. Noone N. A. & H.V.V.—opp. cit. 7, 1940.
 15. Allchin, B.—The Late Stone Age of Ceylon. *Journal of the Royal Anthropological Institute*, Vol. 99, pp. 171-201, 1958.
 16. Deraniyagala, P. E. P.—Open Air Habitation, Sites of *Homo Sapiens* var *Balangodensis*. *Spolia Zeylanica* Vol. 30, pp. 86-110, 1963.
 17. *Statistical Abstracts 1970-71* Ceylon Government Press, 1974.
 18. Wickremasinghe, R. L.—The blood groups and haemoglobins of the *Veddhas* of Ceylon. *Journal of the Anthropological Institute*, Vol. 93, pp. 117-125, 1963.
 19. Sarasin, F. & I.—opp. cit. 6.
 20. Seligman, C. G. and B. Z. Quartz Implements of Ceylon, *Man*, p. 63, 1908.
 21. Seligman, C. G. and B. Z.—*The Veddhas*, Cambridge, 1911.
 22. Wayland, E. J. opp. cit. 9.
 23. Deraniyagala P. E. P.,—opp. cit. 11

environment? This can be compared with the habits of people with a similar level of culture who have persisted in this state practically to the present day, using identical or similar weapons or tools.

Krishnaswami (1960)²⁴ lists different traits by which Neolithic culture could be distinguished. Among these are the use of pottery and smooth stone tools, food production by subsistence methods and the absence of metal tools. The Noones (1940)²⁵, 1945)²⁶ showed that the Bandarawela culture people had a bone and shell industry and that they used pottery. Pottery was also found with the remains of *Homo sapiens var Balangodensis* at Bellanbandipalassa (Deraniyagala, 1960)²⁷. Allchin (1963)²⁸ describes quoting from an article in *Man* (1883) how people of the same culture phase living at that time in the Andaman Islands fracture quartz to make tools similar to those of the Bandarawela culture. This was done by placing the pieces of quartz in a fire until they were red hot, removing them and then striking them immediately with another stone. In this way the quartz could be scattered into numerous sharp fragments, which the Andamanese used without further preparation, as knives, scrapers and even as razors. Quartz was almost exclusively used in Sri Lanka and tools of this industry are plentiful not only in the cave deposits but also at open sites in the hills around Bandarawela. These rival the largest finds at Central Indian sites. Charcoal and hearths found at the Bandarawela site when it was excavated support the theory that the quartz was broken by the Andamanese method. In many cases there are debris of hearths and charcoal, fragments of tools and tools made of bone and antler, stone hammers and pounders which include bark cloth beaters. There are shells of snails turned into planing tools by boring a hole on one side for planing fruit and vegetables. Some of these which had gone into European collections still contain traces of wood shavings.

Such evidence indicates that the users of the "open site" implements who inhabited the Bandarawela region as well as others as at Bellanbandipalassa led a life akin to Neolithic habits. They knew the use of fire and even engaged in a form of *shifting cultivation*. Even if these people did not engage in some form of *shifting cultivation*, still they would have used fire to a large extent to clear the hill tops and slopes for their homesteads, to deprive cover and drive away from cover in hunting, to kill or drive away predatory animals, ticks, mosquitoes and other pests; and to repel the attacks of their enemies and burn them out of their refuges.

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24. Krishnaswami, V. S.—The Neolithic Pattern of India, *Ancient India*, No. 16, pp. 25-64 1960.
 25. Noone, N. A. & H. V. V.—opp. cit. 7.
 26. Noone, N. A. & H. V. V.—opp. cit. 8.
 27. Deraniyagala, P. E. P.—opp. cit. 8.
 28. Allchin, B.—The Indian Age Sequence. *Journal of the Royal Anthropological Institute*, Vol. 93, pp. 210-234, 1963.

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The tools and camp sites of these Bandarawellian people were found only on the hill tops and slopes and not in the valley bottoms. This is similar to the findings in South India, where they are confined to the plateaux and very rarely to the alluvial flats (Krishnaswami, 1960).²⁹ Even most of the English neolithic sites are on the tops of hills (Tansley, 1947).³⁰ The present state of prehistoric investigation in Sri Lanka does not permit with any degree of accuracy to estimate the period when neolithic man entered the country. On a comparison with Indian evidence, Senaratne (1968)³¹ thinks that it must be some time after 1,000 B.C.

As a comparison to neolithic life as it may have occurred at that time, the behaviour of a presently living tribe, the Chimbu of New Guinea, may be cited (Brookfield, 1966).³² Till 1933 when these people were discovered they were a neolithic people having no knowledge of metals and using tools of wood and stone. Their stone tools were axes of sharpened polished metamorphic rocks. There were two types of axes, the heavy bladed work axes used for chopping down trees, making fence posts and houses, and wielded in warfare; and the fire bladed nicely mounted ceremonial axes which are only used as valuables and which had no utilitarian function except occasionally in fighting. Wooden tools included spades, digging sticks, spears and bows and arrows. With these tools the Chimbu cleared the forest and tilled the the land. Long before 1933 the Montane Forests had been entirely cleared, except on a few steep slopes and replaced by a mixed vegetation of grassland and fallow. Further evidence in support of this is provided by Walker (1970)³³ who records the discovery of agricultural implements stratified into the pollen-analysed deposits from about 2,300 years ago onwards in several New Guinea sites. He argues that from that date and at these altitudes at least, human activity has been partially responsible for the disruption of the vegetation.

The above authentic account of the Chimbu shows a great similarity to the hypothetical account by the Noones in 1940³⁴ of the people of the Bandarawellian culture. Hence, it would be not unreasonable to deduce that the neolithic people of Sri Lanka practiced some form of rudimentary agriculture,

29. Krishnaswami, V. S.—opp. cit. 24.

30. Tansley, A. G.—*Britains Green Mantle*, George Allen & Unwin, London, 1949.

31. Senaratne, S. F. P.—The later Pre-history and proto-history of Ceylon, *Journal of the National Museums of Ceylon*, Vol. 1, p. 7-19, 1965.

32. Brookfield, H. C.—The Chimbu. A Highland People in New Guinea pp. 194-198, In *Geography as Human Ecology* edited by S. R. Eyre and G. R. J. Jones. Arnold London, 1966.

33. Walker, D.—The changing Vegetation of the Montane Tropics, *Search* Vol. 1. No. 5, pp. 217-221, 1970.

34. Noone, N. A. & H. V. V.—opp. cit. 7.

and that living as they did on the slopes and summits of the hills they would have cleared the original plant communities with the help of their implements and fire.

Fire in itself, is not so much an enemy of forest vegetation as when it is used frequently and repeatedly. Carl Saver (1961)³⁵ says, "Through all ages the use of fire has perhaps been the most important skill in which man has applied his mind". He has shown that primitive man's stone tools and fire were strikingly effective in clearing the drier type of forest. Then the great forest appears as a vulnerable system. The micro-climate and the micro floras are destroyed and the door is open to the invasion of foreign elements of great resistance, undesirable and dangerous to the local flora, especially because they do not find in the new habitats the enemies which might check their proliferation. There will also be the parallel effects on the fauna by the destruction of its habitats and the creations of new ones. Change of plant cover brings about the denudation of enormous areas, ruined and lost, because, torrential rains and run-off soon attack them and carry to the sea a prodigious quantity of the soil.

Such erosive action in the Tropics paves the way as Aubert De La Rue (1958)³⁶ explains, to the plague of the superficial hardening of lateritic clays which leads to the formation of ferruginous crusts and in many cases the irreversible sterilization of the soil. Cumberland (1962)³⁷ has described similar happenings in New Zealand where the forest ecosystem, wrought from the dawn of human settlements by fire, purposely or accidentally ignited by man, had replaced nearly eight million acres by grass. This has resulted in soil forming processes being widely reversed and polymorphic profiles being introduced.

THE HISTORIC PERIOD

Sinhala Period

The origin of the early settlers of Sri Lanka is shrouded in myth and legend. The recorded history commences with the arrival of the Sinhalese in the island about 2,500 years ago. No evidence to corroborate this statement or to testify to its authenticity as recorded in the *Mahavamsa* has yet been found, chiefly because of the fact that the *Mahavamsa* was written a number of centuries later. The earliest written records discovered are those that were inscribed on stone with the advent of Buddhism about 2,200 years ago.

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35. Saver, Carl,—Fire and Early Man, *Land and Life*, edited by John Leighly, pp. 288-299 University of California, Press, 1961.
36. De La Rue, Aubert,—Man's Influence on Tropical Vegetation, *Proceedings of the 9th Pacific Science Congress*, pp. 47-58, 1958.
37. Cumberland, H. C.—Moas and Men in New Zealand, *Geographical Review*, Vol. 53, pp. 1-20 1962.

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The Sri Lanka Highlands which was known as the *Malaya* region was not a distinct political unit except for periods between the 6th and 11th centuries A.D., when the mountain principality was ruled from time to time by a minor prince (*Madirigiriya Pillar Inscription of Kassapa V (980-990 A.D.)*)³⁸. Apart from this, it formed part and lay within the boundaries of the three major administrative divisions of the country, viz., the Rajarata, or Pihitirata in the north, Mayarata in the south west and Ruhuna in the south and south east. Codrington (1947)³⁹ is of the opinion that this was so even as late as the 14th century. The exact boundaries of these divisions varied from time to time according to the strength and influence of the king whose seat of government till about the middle of the 13th century was the Rajarata. During much of the medieval period the mountain fastness of *Malaya* generally afforded sanctuary to defeated rebels and fugitives from justice. Its contribution to the economy was little during this period except as a source of precious stones, tumeric (*Crocus sativus*) and ginger (*Zingiber officinale*), (*Mahavamsa* XXXVIII, verse 21)⁴⁰.

The earliest settlements began in the two regions that receives the least amount of annual rainfall, in the north west and south east of the island. By the end of the 1st century B.C., the lower valley of the Mahaweli Ganga, around Kandy, Teldeniya, Gampola, the lesser hills to the north west of Badulla, and the north and west slopes of the Matale hills were populated (Nicholas, (1963)⁴¹. The routes of these early settlers along the montane valleys at elevations of 1,000 to 2,000 feet are marked by an ascending series of contemporary inscriptions mainly at the sites of the temples they founded. Many of the place names of these sites in *Malaya* and *Ruhuna* have survived in the original or modified forms, (Nicholas, (1963)⁴².

The Mahaweli Ganga and its tributaries as well as other rivers like the Deduru Oya and the Maha Oya facilitated the movement of these early settlers into the Hill Country. As climatic conditions generally above 3,000 feet were too cold for paddy cultivation as in other parts of Tropical Asia, (Wickizer and Bennett, 1941),⁴³ much of the Highlands above 2,500 feet was unoccupied till perhaps the ninth and tenth centuries. The conditions in the Highlands above 2,000 feet in the 11th century are well expressed in the *Culavamsa*,⁴⁴

“In the great Malaya country which was difficult to penetrate owing to the inaccessibility of the main mountains, and on account of the danger of

38. *Ephigraphia Zeylanica*. Vol. 2. pp. 25-33.

39. Codrington, H. W.—A Short History of Ceylon, Macmillan p. 76-96 1947.

40. Mahavamsa,—Translated by W. Geiger, *Pali Text Society*, London,

41. Nicholas, C. W.—Historical Topography of Ancient and Medieval Ceylon, *Journal of the Royal Asiatic Society* New Series, Vol. 6, p. 115. 1963.

42. Nicholas, C. W.—opp. cit. 41. p. 59-72, 1963.

43. Wickizer, V. D. and Bennett, M. K.—*The Rice Economy of S. E. Asia*, University of California, Press. 1941.

44. *Culavamsa*, Part 1, W. Geiger, Vol. 1, Ch. 70 verses 3-5.



wild animals, shut off from intercourse with, and passible only by a forest path, offering all kinds of perils and dangers”.

Similar references to the forested nature of the Highlands are met with in associations with various place names, and it may be concluded that the mountain areas above 2,500 feet, because of the many difficulties they presented, were not settled. The only exception to this was the pilgrim route to Adam's Peak. The earliest recorded inscription in the Nuwara Eliya district is the 10th century inscription at Harasbadda in the Walapane Division, (Nicholas, 1963).⁴⁵ which incidently is in the lowest part of this district. Hence it is improbable that there were many permanent settlements in the Upper montane zone above 4,000 feet prior to the 10th century.

From the 13th century there was a concentration of settlement into three main regions :- the first in the wet zone lowlands in the south west, the second in the Jaffna peninsula and the third in the Highlands. It was after the coming of the Portuguese in 1505 that the Sinhalese began penetrating increasingly into the Highlands. Here again, it was, those parts in which settlements had been made earlier, nearly all of which are in the drier parts of the Highlands below 2,500 feet. It is in these areas that the principal towns were founded like Kandy (Senkadagalapura), Hanguranketa (Diyatilakapura), Gampola (Gangasiripura) and Badulla-centres which all served as the capital city at one time or another. The principality of Uva which comprises much of the Uva Basin had its capital at Badulla. It is here that the climate approaches the climate of the Dry Zone lowlands, and hence it is not surprising to find the remains of many ancient irrigation projects in this area.

Having thus given a brief account of the settlement pattern prior to the occupation by the British in 1815, it is appropriate to examine the salient features of the social structure and economy of the Sinhalese of the Highland region up to this time, to see among other things how this economy was adapted to the environment of the area. The Sinhala word *Gama* usually signifies a village, but the word is also applied to an estate or even to a field (Codrington 1938).⁴⁶ In its wider sense it was the smallest landholding in ancient Sri Lanka and even today signifies a collection of land holdings with their respective dwellings. The nucleus of the village was the muddy land on which paddy was grown, while the higher land was considered the ap-purtenance. This was the case as early as the 10th century, (*Badulla Pillar Inscription of Udaya III (942-950)*)⁴⁷. Such an area would have garden land, *chena* or shifting cultivation plots, and forest. In most localities where

4 . Nicholas, C. W.—opp. cit. 41 p. 117.

46. Codrington, H. W.—*Ancient Land Tenure and Revenue in Ceylon*. Ceylon Government Press, p. 1, 1938

47. *Epigraphia Zeylanica*, Vol. 3, pp. 71-100.

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chena land reverts, it is called *valpiti* meaning adjoining wild growth. Forest was kept in areas chiefly adjoining the villages as a part of the landscape patterns and to ensure a sort of necessary material to the people (*Culavamsa*)⁴⁸. In the Kandyan Period (1505-1815) in almost every province there were "Forbidden Forests" in which no *chena* could be cut, and which no unauthorised person could enter. Such a forest was the forest of Udawattekele near the Royal Palace in Kandy or those along the borders of the Kandyan frontier which were preserved for military purposes (Codrington, (1954-55).⁴⁹ References to these forests were also made by Knox (1681)⁵⁰ who was a prisoner of the King of Kandy before he escaped. His observations are as follows :- "All the counties are divided from each other by great woods, which none may fell, being preserved for fortification". D'Vincent (1882)⁵¹ in a report on the forests of Sri Lanka stated that this protective forest could no longer be traced and very little remains in regions below 5,000 feet.

Evidence pointing to the fact, that even in the Uva Basin, especially in the drier eastern part of the Highlands, with its characteristic wild vegetation, the *Patana* grasslands - sub montane grasslands, were not so widespread till after the introduction of the plantation economy in British times, is indicated by literary references too. The *Magasalakuna*⁵² (literary "Itinerary of the Way"), a 17th century poem, is one such source. It is a poem that describes the route from Badulla to Kandy and many of the places mentioned are still on the map. It was more or less the same route that Constantine de Sa took in his expedition to Kandy in 1620 and nearly two centuries later by John Davy in 1819. What is of particular interest to this study is its description of the forests naming some of the trees and also a description of the *Patana*. John Davy's (1821)⁵³ account of this part is also interesting :- "Thus again where the winds are not very powerful though there is a dry season and burning is practiced, the face of the country remains covered with wood with the exception of a few localities where the operation of burning had been performed".

Early British Period

After the fall of Kandy in 1815, the opening of new roads and the development of plantation agriculture based, at first on coffee, and after its eradication by a blight, on tea, began the final stage of the settlement of the Highlands

48. *Culavamsa*, opp. cit. 44.

49. Codrington, H. W.—Notes on Ceylon Topography in the 12th Century, *Ceylon Historical Journal* Vol. 4, pp. 81-94, 1954-55.

50. Knox, Robert,—*Historical Relations of the Island of Ceylon*, London, 1681

51. D'Vincent, F.—*Forest Administration in Ceylon*, Ceylon Government Press, 1982.

52. *Magasalakuna*, Translated by Rt. Rev. E. Peiris & M. E. Fernando, Ceylon Government Press, 1947.

53. Davy, John,—*The Interior of Ceylon*, London 1821.

Hitherto, nearly all settlements had been confined to the low plateau and valleys below 3,000 feet. But with the introduction of coffee cultivation, this settlement spread not only to the parts below 3,000 feet which had not been occupied, but also to the montane and upper montane zone above 3,000 feet. At the same time a piece of legislation known as the Crown Land Encroachment Ordinance of 1840, altered the village economy based on the three fold aspect of land use - muddy land, garden land and *chena*. Under this law, all forest, and waste land-unoccupied or uncultivated, was presumed to be the property of the crown until the contrary was proved, and this included all *chenas*. Further, the new government assuming the right to dispose of all forest land, proceeded to make grants to coffee planters not only of remote forests, but what was really communal village forests.⁵⁴ This upsets the balance of the ecosystem on which the Sinhalese village economy was based.

The following sales show the extent to which Crown land was sold in the Kandyan Provinces for the purpose of being converted to coffee plantations. In 1834 only 49 acres of crown land was sold. From 1835 to 1838 the average annual sales increased to 6,412 acres. From 1840 to 1845 the average was 42,800 acres. The peak figure was reached in 1841 when 78,685 acres were sold. Some of the speculators who bought land left the lands they purchased uncultivated.⁵⁵ The coffee industry reached its greatest height in 1870. This led to the cultivation of one of the largest remaining forest reserves in the Highlands known as the "Wilderness of the Peak", extending from the heights of Nuwara Eliya, Dimbulla, Dickoya and Maskeliya to the Adam's Peak Range. Contemporary accounts of a number of writers give a vivid picture of forest destruction. Ernest Haeckel (1883) in his book "A visit to Ceylon" describes how the forests were annihilated by felling and burning, so that after the fire had completed its work, the land was covered with black logs, lumps of charred timber, masses and often great fragments of stones, broken by the heat that had swept over them. This was the general picture of the country which at a time not many years prior to the coming of the plantation industry was one stretch of unbroken forest (Le Mesurier, 1893)⁵⁶. This is further substantiated by Ferguson in his book, *Ceylon in 1903*⁵⁷ who wrote :-

"Money was sent out to Ceylon to fell its forests and plant them with coffee, and it was returned in the shape of copious harvests to the home capitalists, leaving in some cases only the bare hillsides from whence their rich harvests were drawn".

54. *Kandyan Peasantry Commission Report*. Ceylon Government Press 1957.

55. *Kandyan Peasantry Commission Report*, opp. cit, 4.

56. Le Mesurier,—*Manual of the Nuwara Eliya District*. Ceylon Government Press 1893.

57. Ferguson, J.—*Ceylon in 1903*, Colombo 1903.

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Current Evidence

All this evidence indicates that in the clearing of new land for plantation crops, it was not usually the *patana*-sub montane grasslands or the secondary growth like the scrub of abandoned *chenas* that was cleared but forest. Some of these lands that were planted with coffee and later abandoned before being replanted with tea or other crops became so degraded that no crop could be economically grown. These were colonised by the *patana* grasses like *Cymbopogon confertiflorus* and became *patana*. The Kandyan Peasantry Commission reported that forest lands which were cleared for food production during the second world war have become *patana* lands due to soil erosion. The writer was shown examples of such areas by the local villagers in the Welimada and Uva Paranagama regions. Case studies made by the writer confirmed these reports in the following areas. Dambakella was cleared of forest in 1956 and used for shifting cultivation, It was later colonized by *Lantana*, but this was rapidly overrun by *Cymbopogon confertiflorus* and *Gleichenia*; after this the villagers set fire to this grass during dry spells with the result that it has been converted to *patana* vegetation. Diyabokanduwa, Pitiyakumbura and Ihala Andawela were three separate villages 20 years ago separated from each other by communal forests. Due to population pressure on the land, this communal forest was gradually encroached and cleared. After this, nearly all the plots which were not looked after, especially on steep slopes have become *patana*. Today these three villages have become one large village - Mahakumbura. A similar happening was found at Bambarapane village. On the other hand where the *patana* has been replanted with exotics like *Eucalyptus* as at Keppetipola (near the Certified School), and with the prevention of fire, micro-climatic and soil changes are taking place which induce native forest species to re-colonize.

The Upland Savana

This type of savana community is in two layers. The upper shrub or tree layer is of an average height of 12-24 feet, characterized by fairly thick corky barks. The tree and scrub species in favourable areas carry about 75-100 plants per acre. Curiously enough the most frequent tree species are widely used in native (Ayurvedic) medicine (Attygalle, 1917).⁵⁸ They are bulu, (*Terminalia belerica*); aralu (*Terminalia chebula*), (*Combretaceae*) and nelli (*Emblica officinalis*), (*Euphorbiaceae*). These and other species of economic importance occur together, sometimes in such seemingly regular order that the myth of Royal Physician Gardens has been conjured to explain their presence. The ground layer consists mainly of a mixture of tall, shoulder-high coarse tussock grasses, mainly *Imperata cylindrica*, *Cymbopogon confertiflorus*,

58. Attygalle, J.—*Sinhalese Materia Medica*, Colombo, 1917.

Cymbopogon filipandulus and *Sorghum nitidum*. The upland savana community is confined almost entirely to the middle and upper slopes of the hills and ridges in the eastern and south eastern Highlands of average height between 1000 - 2,500 feet. Perera (1969A)⁵⁹. A characteristic feature of most of the savana tree and grass species is that they are resistant to fire (Aubert De La Rue, 1958),⁶⁰ and they are plants which had been introduced, but are now found wild, the type that (Abeywickrema, 1956)⁶¹ calls naturalized aliens.

In this region of Eastern Uva where the upland savana is found to its greatest extent, the three fold pattern of land use which formed the basis of the agricultural economy of Ancient Sri Lanka could not be pursued to its fullest extent. This is because, for some reason or other, no large irrigation schemes could be constructed in this area during this period. Even minor irrigation schemes are rare. Hence the people must have had to resort more to *shifting cultivation* to obtain their food, than if irrigation had been available for rice cultivation. This is the position even today (Ryan, 1950)⁶². Inscriptional and other archaeological evidence in this region, though not so numerous as in areas of large irrigation works, and hence large populations, nevertheless indicates that there was considerable settlement (Nicholas, 1963)⁶³. Further, if subsistence was mainly dependent on *chena* cultivation, the ratio of land to man would have been more than where this type of cultivation does not play a dominant role. Consequently, instead of the normal, forest-*chena* - forest cycle being allowed to take place, a *chena* plot which had not fully recovered from the effect of such cultivation would have to be used with the resultant soil erosion and degradation. Once this has taken place, new fire resistant and sun loving species, like the savana species, would colonize and eliminate the forest species, (Perera 1969A)⁶⁴ Detailed investigation of the savana problem was done at Madugastalawa and Kitulgolle in the Passara area. Land deeds showed that the savana are always situated on the slopes and that they were mostly crown lands. They are hardly cleared for *chena* because of the unfertility of the soil and also because the soils consists mostly of quartz grains with little water retentive power. The Government obtains rent for collection of savana produce, hence the perpetuation of the savana in their present state; though Weeraratne (1963)⁶⁵ has shown that it might revert to climax forest if left undisturbed to a sufficiently long time under certain conditions.

59. Perera, N. P.—The Ecological Status of the Upland Savanna of Ceylon, *Tropical Ecology*, Vol. 10, No. 2, 1969 A pp. 207-221.

60. De La Rue, A.—opp. cit. 1958.

61. Abewickrema, B. A.—opp. cit. . 1956.

62. Ryan, B.—Socio-Cultural Regions of Ceylon, *Rural Sociology*, Vol. 15. pp. 3-19, 1950.

63. Nicholas, C. W.—opp. cit. 41. p. 47-58.

64. Perera, N. P. —opp. cit, 59. 1969A

65. Weeraratne, W. G. (1963). Potentialities of Beedi leaf production in Ceylon, *Ceylon Forester*, Vol. 6 pp. 12-17, 1963.

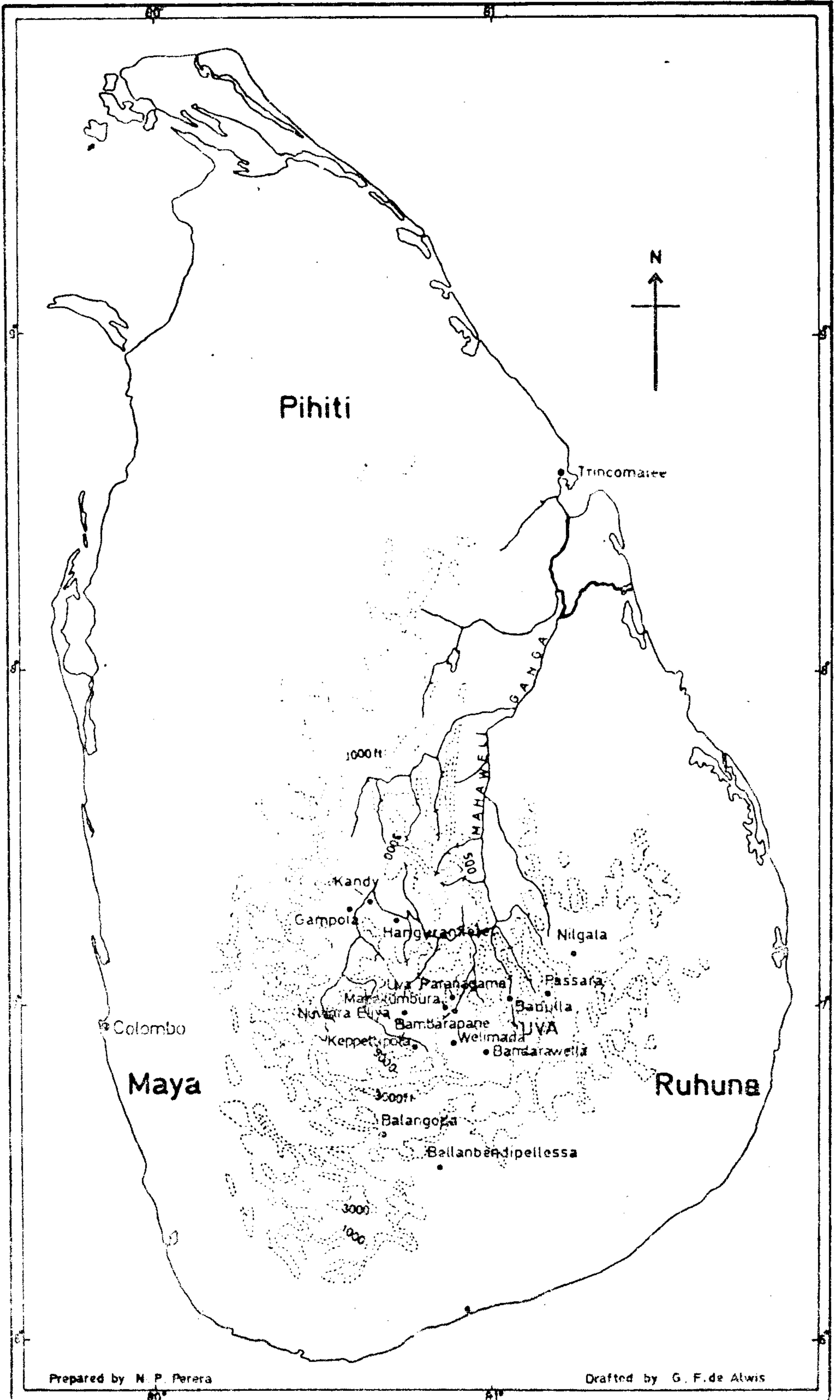
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Conclusion

The anthropogenic vegetation of the Highlands comprises chiefly the sub montane grasslands (*patanas*) and the savannas and these two types occupy the largest extents of land under a natural vegetation cover. Both types are due to the firing and clearing of the original forest types and the resulting soil erosion which paves the way for the colonization by heliophylous species. These heliophylous species are nearly all pan-tropical grasses like *Cymbopogon confertiflorus* and *Imperata cylindrica* which are the two dominant grasses in the sub montane grassland and savana communities respectively. This process probably began with the advent of neolithic man nearly 10,000 years ago and was accelerated during the Kandyan period (1505-1815) but more so during the early British period (1815-1948) with the introduction of plantation agriculture. With the rapid increase of population since the second world war this process has been hastened and is taking place even today, though reforestation with exotics has arrested this spread of grassland to a limited extent. Many of the pan - tropical species would have colonized since pre-historic times as they are all propagated by the wind. The Indian and Malayan species which are mostly tree and shrub species probably have been introduced during the Sinhala period. Most of these are the tree species of the savana and nearly all of economic importance. Hence it is not unreasonable to surmise that the upland savana plant community has arisen only since historic times.

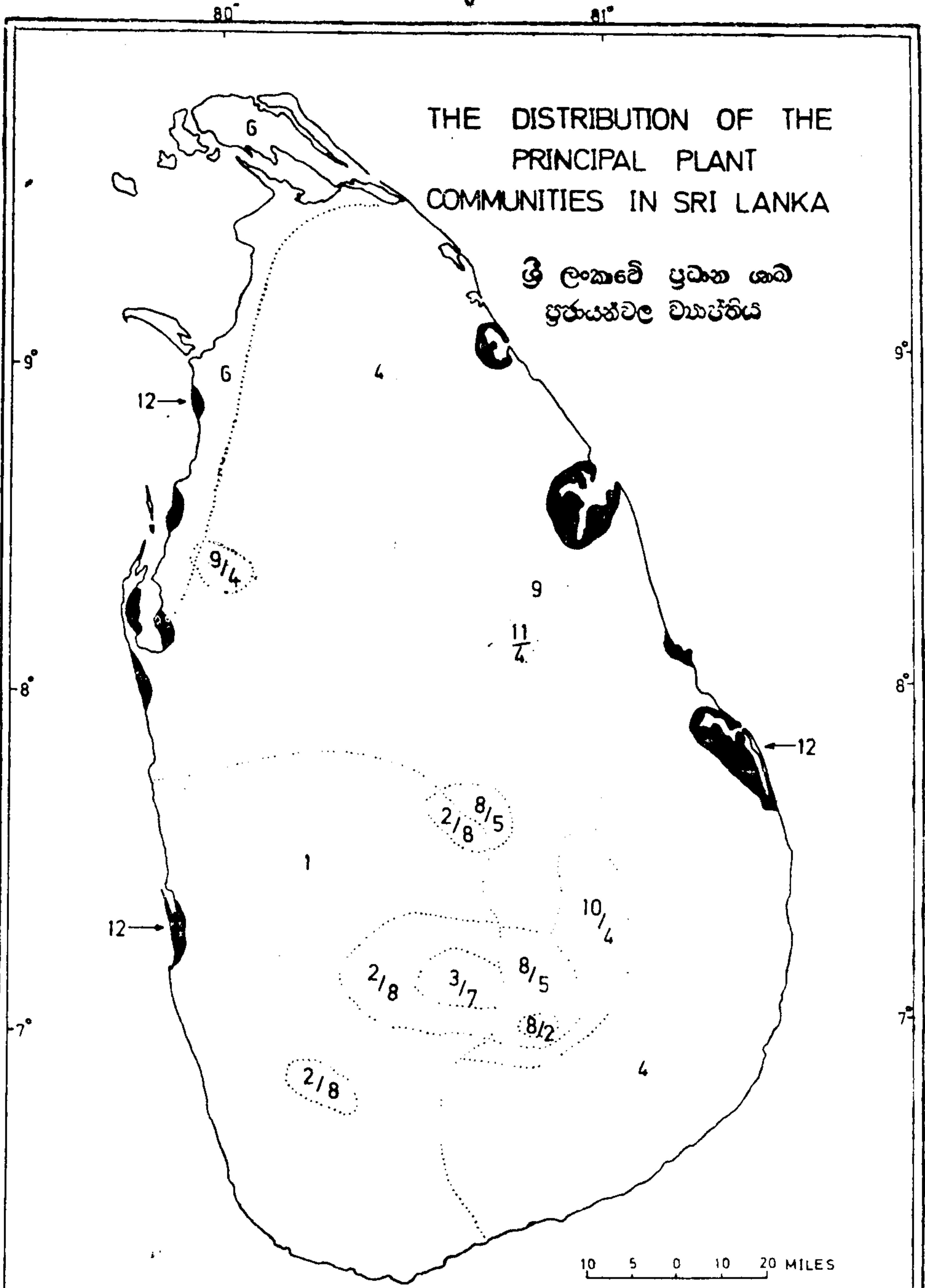
Acknowledgments

This research was supported by a grant from the Smithsonian Institution Ecology Project in Sri Lanka. I am grateful to Professor Dieter Mueller-Dombois for helpful suggestions and to Mr. G. Harasgama for assistance in field work.



THE DISTRIBUTION OF THE PRINCIPAL PLANT COMMUNITIES IN SRI LANKA

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A. FOREST COMMUNITIES

- 1 Rain Forest
- 2 Sub Montane Rain Forest
- 3 Montane Rain Forest
- 4 Seasonal Rain Forest
- 5 Sub Montane Seasonal Rain Forest
- 6 Thorn Forest

B. GRASSLAND COMMUNITIES

- 7 Montane Grassland
- 8 Sub Montane Grassland
- 9 Lowland (Villu) Grassland

C. SAVANNA COMMUNITIES

- 10 Upland Savanna (Talawa)
- 11 Lowland Savanna (Damana)

D. 12 Mangroves

Prepared by N P Perera

Drafted by G F de Alwis