TRANSFORMATION OF THE LANDSCAPE OF NUWARA-ELIYA

A DISSERTATION PRESENTED TO THE UNIVERSITY OF MORATUWA FOR THE MASTER OF SCIENCE DEGREE IN LANDSCAPE DESIGN-2003

D.W.K.WEERASINGHE
FACULTY OF ARCHITECTURE
UNIVERSITY OF MORATUWA
SRI LANKA

THIS IS TO DECLARE THAT THE DISSERTATION PRESENTED TO THE UNIVERSITY OF MORATUWA FOR THE DEGREE IN MSC LANDSCAPE DESIGN HAS BEEN COMPOSED BY ME.

WASANA WEERASINGHE

TO MY

DEAR PARENTS

TRANSFORMATION OF THE LANDSCAPE OF NUWARA-ELIYA

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LIST OF ILLUSTRATIONS

ABSTRACT

Chapter one introduces the natural landscape of Nuwara-Eliya and explains the location of the city, with it's climatic and topographical background and it's landscape elements.

Chapter two describes the historical background of the city. It includes the pre-British period, that is during the king's time, its original landscape which was as virgin forest patches, and it describes the British period, which explains the starting of its transformation, to meet their needs.

Chapter three concerns the present city of Nuwara-Eliya. It describes the post-independence period and transformation of the city during this period. Further more the haphazardly added buildings and renovations which started to break down the English city character of Nuwara-Eliya due to the irrelevance of British ideas. The town evolved as a holiday resort for it's scenic beauty and as a commercial center due to a great increase in the area given to agricultural crops.

The economy of the city dwellers much depended on the agricultural crops supplying rather than facilities during the holiday season. The problems and impacts associated with the development of the city including socio-economic and political problems, visual pollution are also looked in to.

Finally the thesis considers how to restore the city by understanding what is relevant to the city now. Guidelines to enhance it's beauty, and proposals to restore the city sustainability, are considered.

INTRODUCTION

Background of the study (Historic development)

In the modern world most cities have developed economically, physically, demographically but in a rather haphazard and unplanned manner. They have grown rapidly during the past industrialization and its ultimate effect on the environment has given rise to certain problems.

"Man shaped the environment to suit requirements, activities and behavior. The organized environment provides a setting for human activity..." (Reeki, F.R. USA p 63)

We must begin to see these problems more analytically to understand the role of the environment in urban living and the interaction of city dwellers with the environment and their effect on environmental change.

"Haphazard development of any urban community has a historic logic...."(Wingo Lowdon J.R. 1963 p78)

Nuwara-Eliya is one of the important towns located in Sri Lanka's hills and influenced by the colonial occupation of the British. In comparison with other cities in Sri Lanka it differs from its topographical and climatic factors as well as its development.

Nuwara-Eliya didn't become a town by planned intentions of the Sinhalese, but it evolved on its own, due its location and to colonial influences. This settlement and development of the city was credited to the British and therefore British architectural impacts can be identified clearly. Due to the closeness of the climate of Nuwara-Eliya to their native land they built their residences their homes away from home.

Pre-British Period

The original landscape of the city consist of crispy clean of water and air with green virgin forests which were carpeted in hilltops. It was a transit and resting place on long journeys to the seat of power for the Kandyan Kings, which doesn't have sufficient evidence for sinhalese habitat from the old, and control the water supply to the downwards of the country. T here was various hypotheses about native history of Nuwara-Eliya.

British Period

Invention and the development of the city was credited by the British in the 19th century and therefore British architectural impacts can be identified clearly. Closeness of the climate in Nuwara-Eliya to their native land they built their residences and make home away from home. Governor Sir Edward Barnes, who found this sanatorium, built the Barnes Hall for himself and started a road from Kandy and encouraged the settlement of the place. In 1847 the famous explorer Sir Samuel Baker visited Nuwara-Eliya and was so enraptured by the unspoilt beauty of the place, that he bought a large block of land establish a typical English village.

British opened the forest patches in hilltops for cultivation of coffee, tea and European crops such as peas, beans, turnips, carrots and cabbages. They used this place as a get-together city and project the image of the British upper class in all the time, while working for their government and business organization. For their relaxation they developed community places like the golf links, the race course, Lake Gregory and a large number of clubs for reaction and social entertainment. They also had a hunting ground, Galways land, which is now a sanctuary, but locals were prevented from hunting.

Post –independence Period

After independence the British occupants of Nuwara-Eliya left the country. This started a change in ownership, which was practically completed with the nationalization of the tea estates. The new owners were the richer strata of Sri Lankan society. This class of people

desired to imitate and live like British nationals in Sri Lanka. Initially the local owners too wished to have their houses in Nuwara-Eliya as their second home in the cooler climate, but they soon found they could be occupied only during a continuous holidays due to Sinhala and Hindu New Year and Easter holidays. The climate in Nuwara-Eliya is moderately cold and desirable during this period. This led to a holiday season being created spurring the middle class too, to spend time on holiday in Nuwara-Eliya, although they could not afford to own and maintain bungalows on Nuwara-Eliya instead they had to be content with rented out rooms and lodgings. To meet this demand business entrepreneurs had to emerge as supplies of this accommodation.

CHAPTER ONE

1.1 The siting of the City

1.1.1 Location

Nuwara-Eliya is located in the central highlands that belong to the central province of Sri Lanka and 180 km east of Colombo, the capital of Sri Lanka. The city is located in a valley surrounded by the mountain ranges including Pidurutalagala, the highest mountain of Sri Lanka rising up to 2524 m, Kikiliyamana and Single Tree Hill. The terrain consists of hills and valleys with elevations ranging from 1800 m to 2000 m.

Figure 1.1 Nuwara-Eliya is located in the Central Province of Sri Lanka

The English author H.W. Cave in 1900 has described this picturesque place in following terms:

> "There is probably no other place in the world that possesses such a remarkable combination of attractions as Nuwara-Eliya and its surrounding districts. Seven thousand miles from London, six degrees from the equator, and 6200 feet above the sea, lies this unique retreat, whose precious attributes, hitherto particularly inaccessible, must now become familiar to thousands"

Nuwara-Eliya is centrally located, with approach roads from five directions, from Kotmale in the Northeast, from Uva in the Southeast, from Dimbulla in the West, from Kandapola in the East, and from Kandy in the North. Two main roads that have their own distinctive scenic beauty and which are different from each other can provide access for visitors from Colombo.

The most popular access route runs via through the small towns of Peradeniya and Gampola. It takes nearly six hours of travel to complete the 225 km journey from Colombo. It has a steep climb at Ramboda Pass, just before entering the city. This road is renowned for the greatest number of cascades, which descend the sides of the high mountains. Close to the village of Ramboda is one of the finest waterfalls, crossed by a bridge connecting the main road. It is known as the Ramboda waterfalls and was described by Capt. Charles O'Brien in 1864 as follows:

"Still ascending towards Nuwara-Eliya, the road from Pusilawa winds through the valley skirting the base of the hills, till it reaches an apparently insurmountable barrier of mountains in the glen of Ramboda. Here the acclivities that bound the ravine are overcome by a series of terraced windings, cut out of the almost precipitous hill; and so narrow is the gorge that the road enters between two cataracts that descend on either side of the pass."

Figure 1.2

Figure1.3 Contour map of Nuwara-Eliya Source: Geological Survey and Mines Bureau of Sri Lanka, sheet 17, (published in 1997) Nuwara-Eliya-Haputale

A picturesque view of the Kotmale Ganga, which forms one of the most considerable tributaries of the Mahaweli Ganga, is also seen on the way.

Further on and higher up neatly manicured tea estates become a familiar part of the landscape with acres of tea bushes extending over the hills on either side of the road, reminding the visitor that he is entering to the headquarters of the 'Ceylon tea' industry.

Figure 1.4 A Picturesque view of the Kotmale Ganga

Figure 1.5 Tea Estates become a familiar part of the landscape

The other scenic access road goes through Awissawella, Karawanella, Kitulgala, Ginigathhena Watawala, Hatton, Thalawakele and Nanu-Oya. On the way the scenery is spectacular and as the road winds higher, the breathtaking Devon's waterfall and St. Clare's waterfall are seen tumbling down hills from viewpoint panoramas of rugged, hills stretching far in to the distance. Up here a visitor can enter a different world beside the road where many of the highest peaks are enveloped in the mist and fog of cloud forests. In these forests, twisted, stunted trees are draped everywhere in orchids, mosses and ferns. They are cooler and drier. During the winter months ground frost is not uncommon on the higher peaks of them.

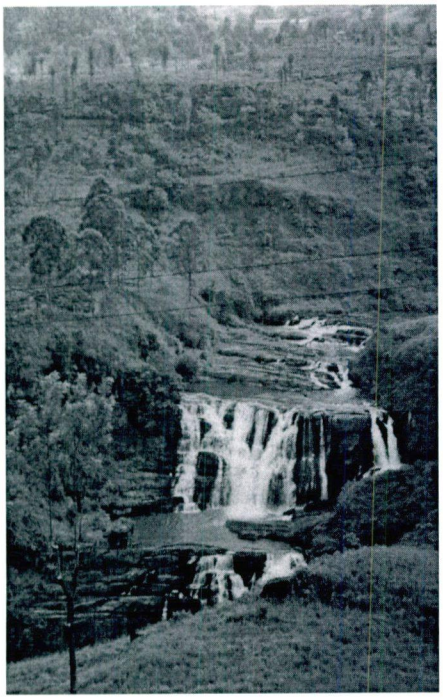
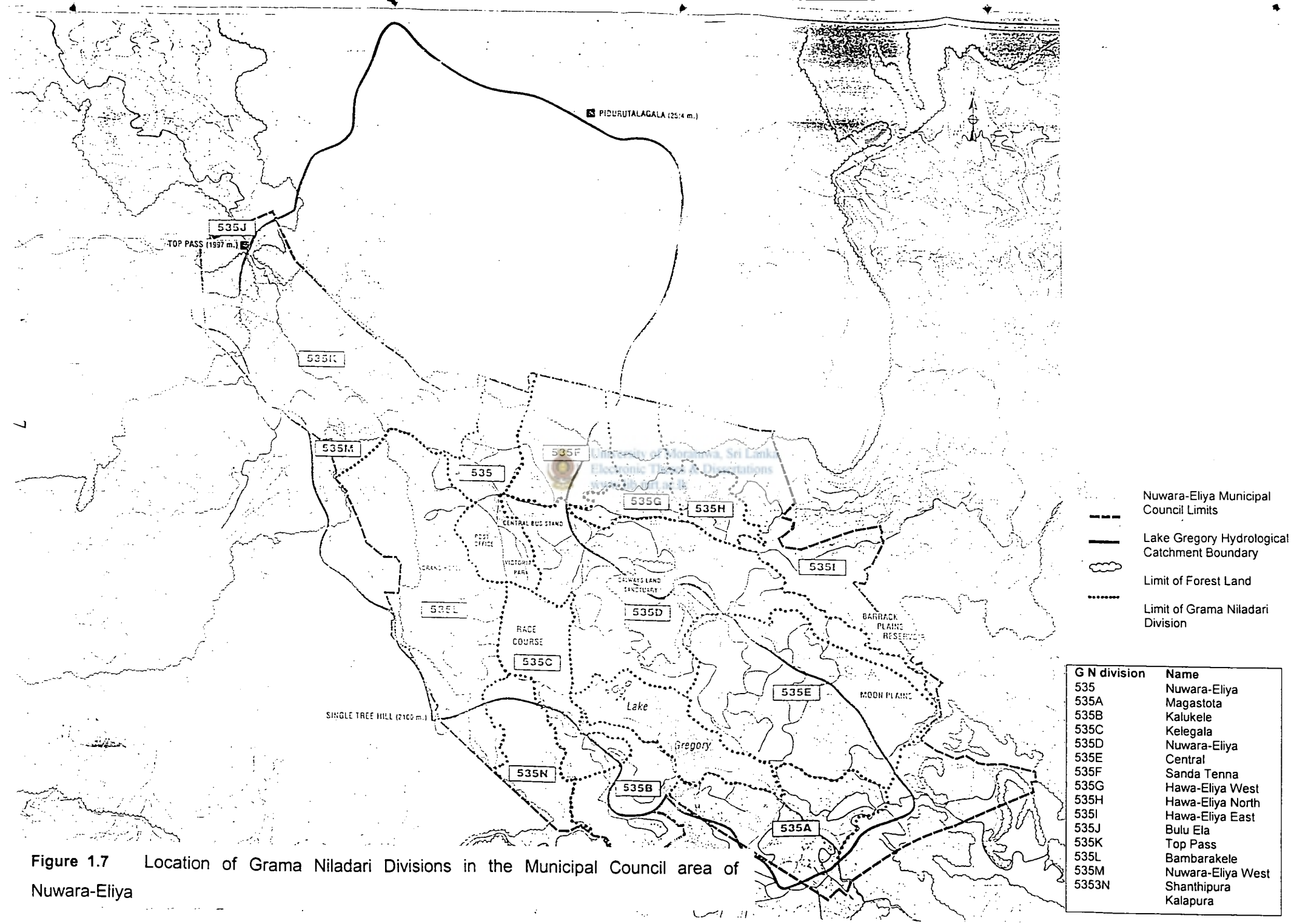


Figure 1.6 St. Clare's waterfall



G N division	Name
535	Nuwara-Eliya
535A	Magastota
535B	Kalukele
535C	Kelegala
535D	Nuwara-Eliya
535E	Central
535F	Sanda Tenna
535G	Hawa-Eliya West
535H	Hawa-Eliya North
535I	Hawa-Eliya East
535J	Bulu Ela
535K	Top Pass
535L	Bambarakele
535M	Nuwara-Eliya West
5353N	Shanthipura
	Kalapura

Figure 1.7 Location of Grama Niladari Divisions in the Municipal Council area of Nuwara-Eliya

1.1.1 Climate

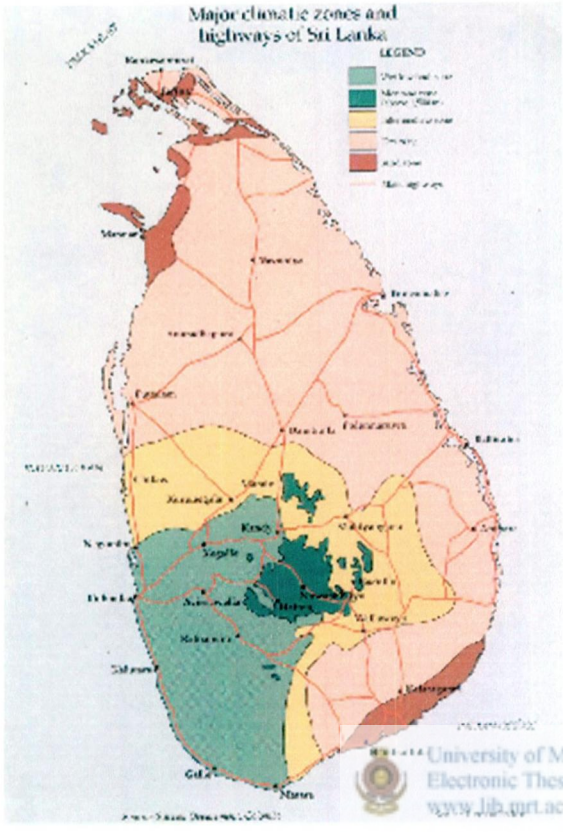


Figure1.8 Climatic Zones of Sri Lanka

Sri Lanka is divided agro-ecologically in to three zones, the wet zone, the intermediate zone and the dry zone. Nuwara Eliya belongs to the intermediate zone. The most striking climatic features in the city are the frequent low intensity rainfalls and relatively low temperature when compared to the other parts of Sri Lanka. According to the Report of the 5th International Meeting on Statistical Climatology, surface air temperature has recorded an increasing trend and annual rainfalls have recorded a decreasing trend recently in Nuwara-Eliya.

(a) Rain fall

Due to the presence of mountain barriers, Nuwara-Eliya mostly experiences orographic precipitations, in which, moist clouds get lifted-up to higher altitudes and consequently undergo cooling, condensation and precipitation. Nuwara-Eliya has nearly 200 rainy days per year. The daily total rainfall varies highly throughout and among the years. Generally, mean monthly rainfall exceeds 150 mm except for the months of January, February, March and April. Though the number of rainy days is high, the city experiences severe dry spells during February, March and April annually.

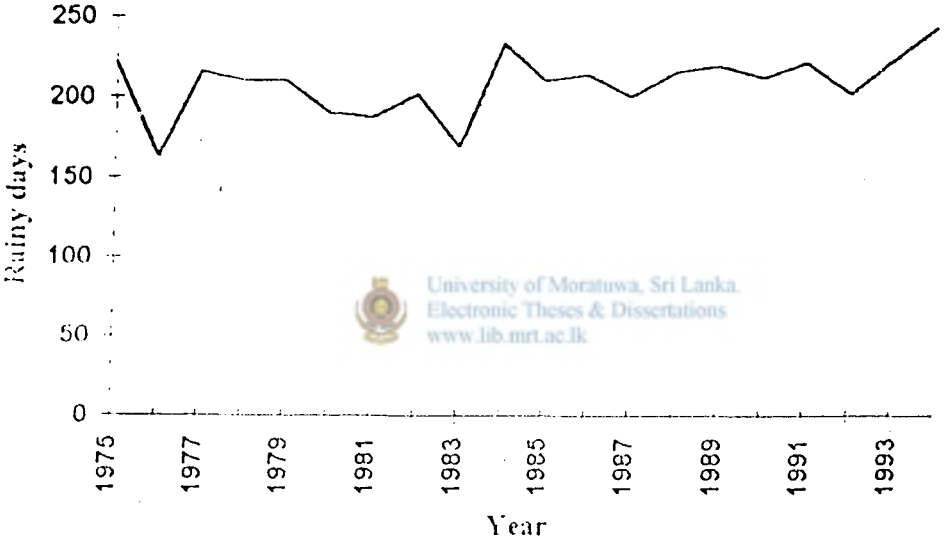


Figure 1.9 total numbers of rainy days for a year

(b) Evaporation

According to the data recorded, by the meteorological department a comparison between monthly average evaporation and rainfall shows that the evaporation exceeds rainfall in

February and March. The highest excess of rainfall over evaporation occurs in October and November.

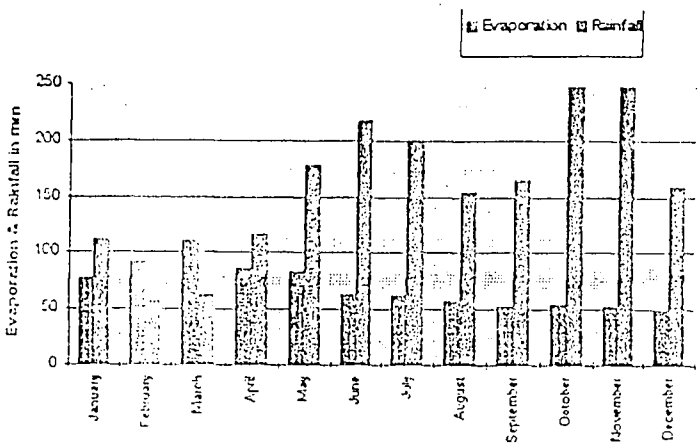


Figure 1.10 Monthly average evaporation and rainfall in Nuwara-Eliya

(c) Temperature

Average daily maximum, minimum and mean temperatures, which were recorded over ten years, are shown as follows. According to this the highest average daily maximum temperature (21.5 C) recorded in April and the lowest mean daily minimum temperature (10.3 C) recorded in January.

High temperature in the city has positive and negative implications for wastewater and sanitation. High temperature and abundant sunlight ensure a high degree of biological activity in natural and manmade waste treatment systems, which contribute to break down organic loadings. Also it contributes to the excessive growth of aquatic weeds in the water bodies. The negative impacts are in long dry periods during which the insufficient water flow

in canals and the water bodies create anoxic conditions due to the waste loads imposed on them.

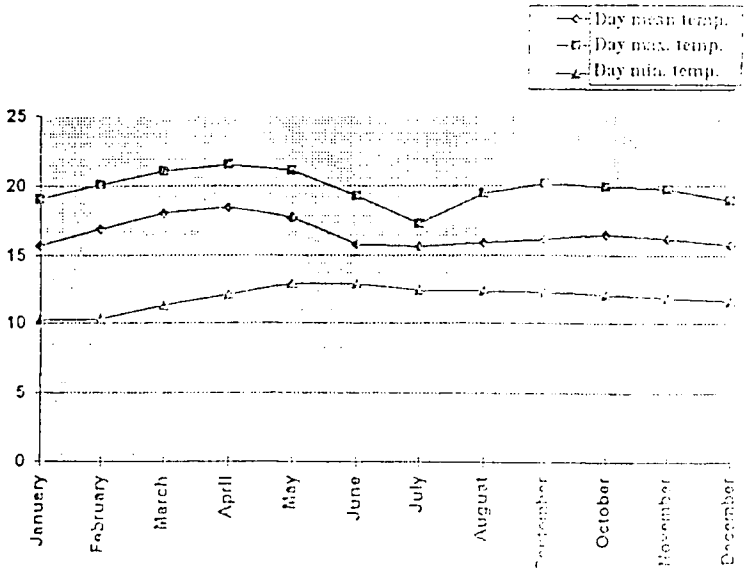


Figure 1.11 Average of mean monthly surface air temperature in Nuwara-Eliya

(d) Winds

According to the recorded data from June to September, the city experiences strong winds reaching speeds of approximately 20 km/hour. These strong winds represent an obstacle for outdoor activities during these months. The crosswind conditions on lake Gregory are not favorable for sailing activities.

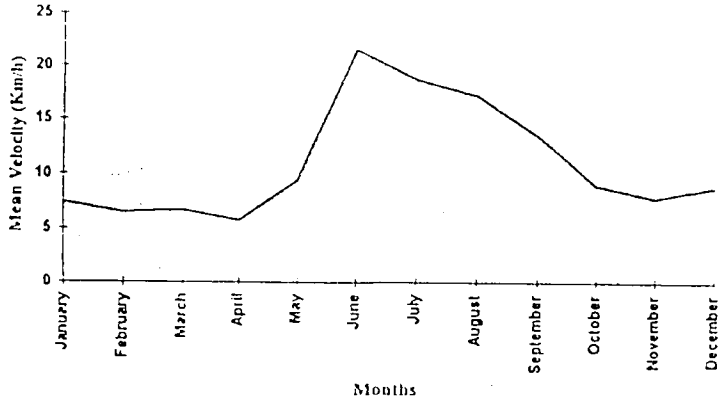


Figure 1.12 Mean wind velocities

(e) Relative humidity

The mean relative humidity is low during the dry months of the year. (January, February and March) In other months it reaches as high as 90% causing discomfort and heavy sweating for those working out doors during the sunny weather.

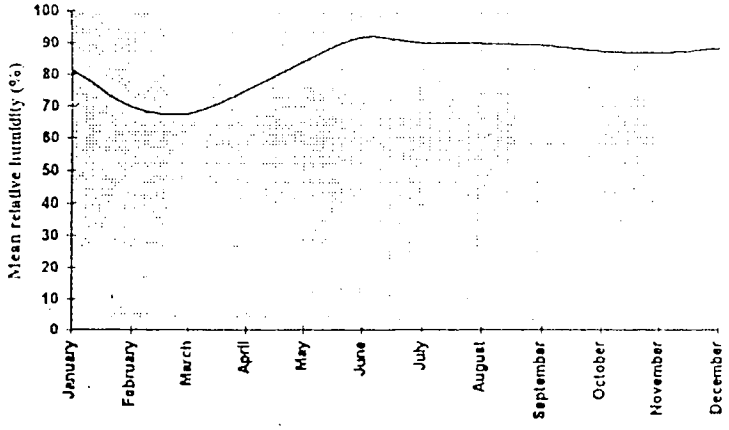


Figure 1.13 Mean relative humidity

(f) Solar radiation

Generally, because of the sunny conditions which prevail in the both cities, the solar radiation for the months of February and March in Nuwara-Eliya equal that of Colombo. However cloud cover is higher in Nuwara-Eliya than in Colombo for the months of April through to January.

1.2 Geology, Soil and Physiography

1.2.1 Geology

Geomorphologically, the city is located in the Central province of Sri Lanka which has a combination of highly variable landform units and topography. Precambrian high-grade rocks belonging to the Highland Complex of Sri Lanka underlie this area. These rocks have been metamorphosed at granulites facies. Charnockite rocks are the commonest. The acidic varieties of charnockite rocks (containing more silica) are resistant to chemical weathering and as a result they stands as topographically high features such as ridges and hills. These rocks have first been folded into tight isoclinical folds and then into large open folds. The synform-structures with axial planes running in the Northwest-Southeast are a result of the large open folds.

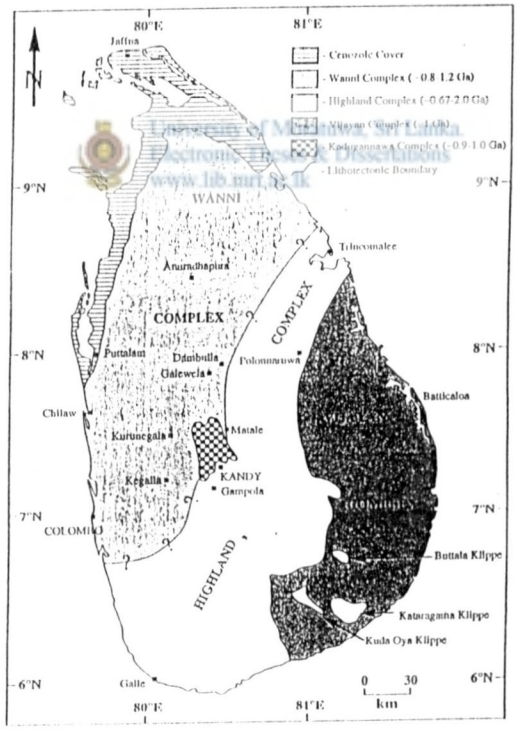


Figure1.14 Simplified geological map of Sri Lanka showing major tectonostrati Graphic units and localities, source; A kroner et al. (1991)

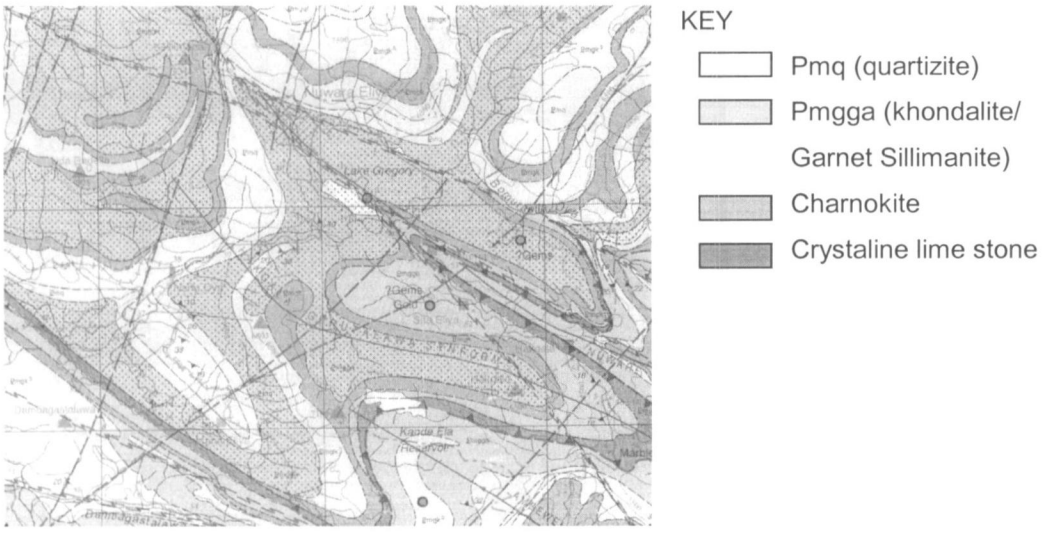


Figure 1.15 Geology map of Nuwara-Eliya, source, Geological Survey and Mines Bureau of Sri Lanka, sheet 17 (published 1997) Nuwara-Eliya-Haputale

1.2.2 Soil

Soil parent materials are derived from in-situ weathering of local rock formations. On slopes they consist of mixed slope colluviums. More residual materials are found on the dissected plateaus, hillcrests and rounded hills. Alluvial parent materials are confined to the valley plains and valley plats.

The modal upland soils of the city are formed under intense weathering and strong leaching conditions. These soils are generally depleted of all bases, and are very poor in base saturation. The major soil forming processes are erosion of the surface materials and movement down slope, leaching of all bases under well drained conditions, illuviation or accumulation of organic matter.

Different kinds of soil types are identified in the city. They are;

- Modal Red Yellow Podzolic soils
- Red Yellow Podzolic soils with dark B horizon
- Red Yellow Podzolic soils with Prominent A1 horizon

- Mountain Rogosols
- Lithosols
- Alluvial Soils
- Half Bog soils

The Red Yellow Podzolic soils is the most wide spread soil type in the city. It is predominant in the upland landform units. These soils are strongly acid in reaction. A wide range of commercial crops is grown on this soil. The major perennial crop type is the tea and in addition fruit trees and exotic vegetables are grown.

The Red Yellow Podzolic soils with dark B-horizon occur in uplands and slopes of the landscape. They are strongly leached and strongly weathered soils with a high content of organic matters.

Red Yellow Podzolic soils with Prominent A1 horizon occur mainly in the dissected plateaus area in upland slopes and also under 'patana grasslands'. These are strongly leached and strongly acid in reaction. Some of these are used for the cultivation of exotic vegetables and potato. But most of the 'patana lands' are encouraged to be protected for conservation purposes now.

1.2.3 Physiography

Sri Lanka first separated from the Deccan Peninsula during the late Miocene, but geologically it has Gondwanaland origins. The post-Miocene up lift of the land with its steep slopes of erosion created the three peneplains the 1st peneplain, the 2nd peneplain and the 3rd peneplain with well-defined escarpments. The Kaltota escarpment and the Worlds End escarpment at Nuwara-Eliya, which belongs to the 3rd peniplauin consists of higher peaks of the central massif with heights of more than 2500 m, but an average height is about 1800 m. The city is located in a broad valley with a flat arrangement surrounded by the mountain ranges.

Figure 1.16 Peneplanes of Sri Lanka

All of Sri Lanka's major rivers originate in the central mountains and radiate outwards. All of the perennial streams in Nuwara Eliya originate from the Pidurutalagala mountain range. (Figure 1.3) At present all of these streams are used as a source of water supply or to irrigate agricultural lands. But during the dry months of January, February and March, the flows of these streams are not sufficient to meet the water demand of the city.

Name of the stream	**Length (km)**
Nanu-Oya	6.8
Water fields	3.10
Lover's Leap	4.6
Talagala Oya	3.0
Brewery	2.5
Piyatissapura stream	2.05
Gamunupura	1.5

Table 1 Length of the perennial streams that start from the Pidurutalagala mountain range and flow through the city.

The Nanu-Oya and its tributaries flow in steep valleys in the upper part. The bed material is quite coarse and the flow velocity is relatively high. The rivers flow through narrow beds, and the riverbanks are generally well protected by natural vegetation, which also contribute to limit sediment loads from entering into the stream.

When these streams enter the plateau zone, their flow velocity starts to reduce and bed material gets smaller. The presence of sand and silt can be noticed. Also the width and the depth of these streams have been reduced in residential and agricultural areas due to encroachment and silt deposition (from construction sites, roads, agricultural land). As a result of this their carrying capacities have reduced and therefore the city area has become more susceptible to floods during heavy rains. The entrance of the city near the junction of Kandy road and St. Andrews drive are some places subjected to flooding.
In the valley areas, the streams are characterized by flat terrain and low velocities with greater depths. In the stretch of the Nanu-Oya located between the bridge, located at the corner of the racecourse and the mouth of the river, both shores of the Nanu-Oya are generally flat and grassy with presenting some signs of erosion.

1.3 Physical Elements of the Landscape

(a) Land Forms

The landform is a major contributor to the character of Nuwara Eliya. It provides a picturesque and scenic landscape. In the city the landform consist of parallel strike ridges with valleys in between. They are the major element of visual definition. The dip slopes along the ridges form spatial niches along the direction of strike, which acts as secondary spatial definers. The valleys, which are formed due to the strike ridges in the city, can be identified as follows. (Figure1.3) They are:

- Bambarakele to Lake Gregory.

(This can bedefined by Bonavista – Single Tree – Kalapura ridge on One side with Underbank Rd. – Wedderburn Rd. – Galways – Naseby ridge on the other.It has Pidurutalagala as a backdrop to the visual containment. The Bonavista – Single Tree – Kalapura – ridge is punctuated at three points. They are the Nanu Oya road access point, the Lady Hortons gap near Bonavista and the Lake Gregory spill.

- Hawa Eliya to Barrack Plains

(This can be defined by Pidurutalagala – Lovers Leap ridge on one side and the Galways – Naseby ridge on the other side.

The two ends are visually defined by top pass at one end and Haggala along with the rising landform of Sita Eliya at the other. The steep slopes are common and allow a clear vision of the surface of the landform and positions from which vistas and panoramas are possible. At present the landforms are degraded due to certain factors. The unsuitable land uses on crowns and summits, bare patches of soil on slopes, structures which are not integrated with the surrounding landforms, and their unsympathatic form and volume are some contributory factors.

(b) Water Bodies

The water bodies in the city can be identified as streams, waterfalls, lakes (reservoirs), wetlands and man-made water features. They form major attractors and beautifying features in the landscape.

The major stream, which forms a very picturesque meanders through the town, is Nanu-Oya. (Fig.1.3) It meanders through the Golf links, through the bazaar collecting debris and urban wastewaters, through the park and Race Course and then to its destination at Lake Gregory. At the mouth of Nanu Oya to the lake there is considerable debris with plastics and vegetable matters and turbidity. There are many other streams flowing down from Pidurutalagala and these meander across the Barrack Plains. The stream which starts from Lovers' Leap, flows down passing the hospital and appears turbid and unsightly. The streams in their upper levels have a fast flowing character but hide from the view. However the vegetation characterizes the stream and the sound of the streams are easily seen and heard.

The main waterfall to be seen in the area is the Lovers Leap waterfall. (Fig.1.3) This has a misty ethereal character provided there is sufficient flow of water. Any water less than at present, would greatly affect its character and it is recommended that water as a source of supply should be tapped only downstream of this fall because of its scenic potential, conservation of habitat and special flora. The Glen waterfall, which has dried up now and does not appear to flow even in wet weather.

Lake Gregory in the middle of the city has a major aspect on the landscape. (Fig.1.3) Though it is called a lake it is a reservoir, formed by damming the Talagala stream. The part of the lake below the Badulla road bridge is referred to as 'Kuda wewa'. This reflective body of water ensures open space and serves as a foil and platform to the surrounding landforms. However the lake shoreline and the margins do not follow a naturalistic outline. This is due to the construction of bunds and dykes serving to hold back dredged material and functioning also as silt traps. This water body provides much potential for passive recreation, both on its surface and around its margins.

Figure 1.17 A view of lake Gregory from the Single Tree Hill

The wetlands are a habitat for birds and are host for a range of wetland plant species. Wetland areas are found in Shanthipura, the Northwest end of the Race Course, the Northeast end of the Race Course, along the lake Gregory shoreline, near Upper Lake road and close to Barrack Plains reservoir. None of them are developed for passive recreation as they are having tourist potential. Also their habitat needs to be conserved.

The artificial water bodies are very few in the city. Ornamental ponds in the Victoria Park and Queen Elizabeth road are some of them. Also there are some abandoned water bodies too. The fishing Club tank on Thataka Mavata and the fisheries hatcheries ponds are some of them.

(c)` Streets

Nuwara Eliya's Streets are another important physical element in the landscape. They can be identified in different categories as major transport access ways, roads in urban areas, scenic driveways, scenic walkways, cycle tracks and footpaths. The Road

Development Authority (RDA) and the Municipal Council mainly maintain these roads. Some roads are in good condition while the others are not.

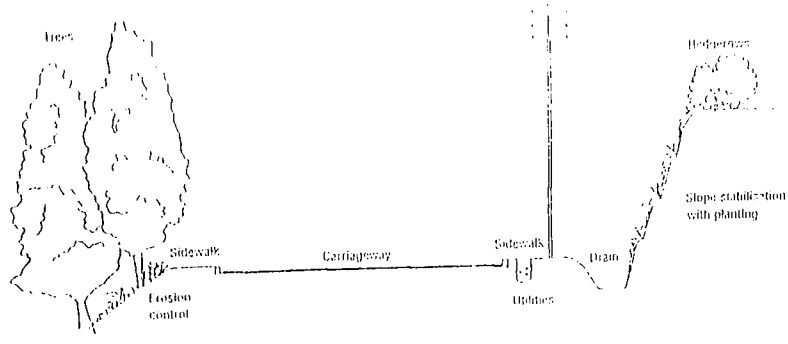


Figure 1.18 Generalized cross-section of a road

Source: NEES Report, UDA, 1995

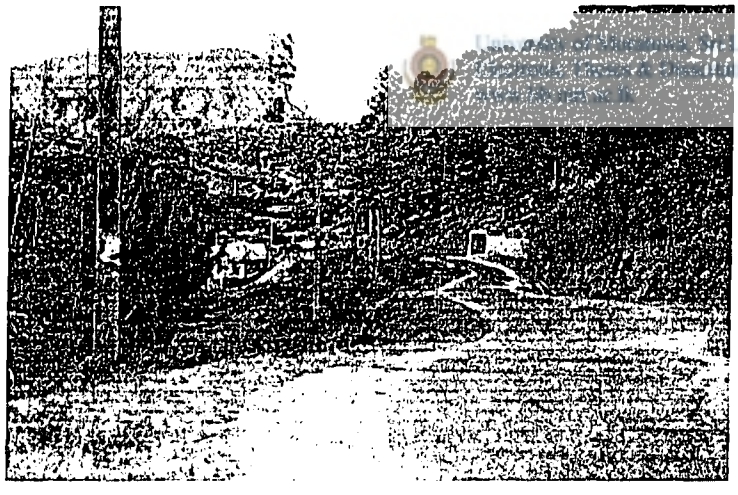


Figure 1.19 Upper Lake road

Some scenic roads in the city are,

- St. Andrew's Drive
- Lady MaCallums Drive
- Upper Lake Road
- Lower Lake Road

- Moon Plains / Barracks Plains Road
- Lady Hortons Drive
- Shanthioura road
- Grand Hotel road
- Haddon Hill road
- Kalukelle road
- Church road

Scenic walkways and scenic driveways are major recreational elements in the consideration of streets in the city. Some of them are as follows.

- Path around the lake Gregory
- Road through Galwaysland Sanctuary
- Path leading to Lovers Leap
- Shanthipura road
- Ridge road from Kalapura to Single Tree Hill
- Paths across the Golf link
- Park road
- Water field Drive

In general the condition of the road surfaces are very poor. The sidewalks (pavements) are uneven and not properly drained. Also the street furniture is minimal.

Figure 1.21 A roundabout in a street of the city

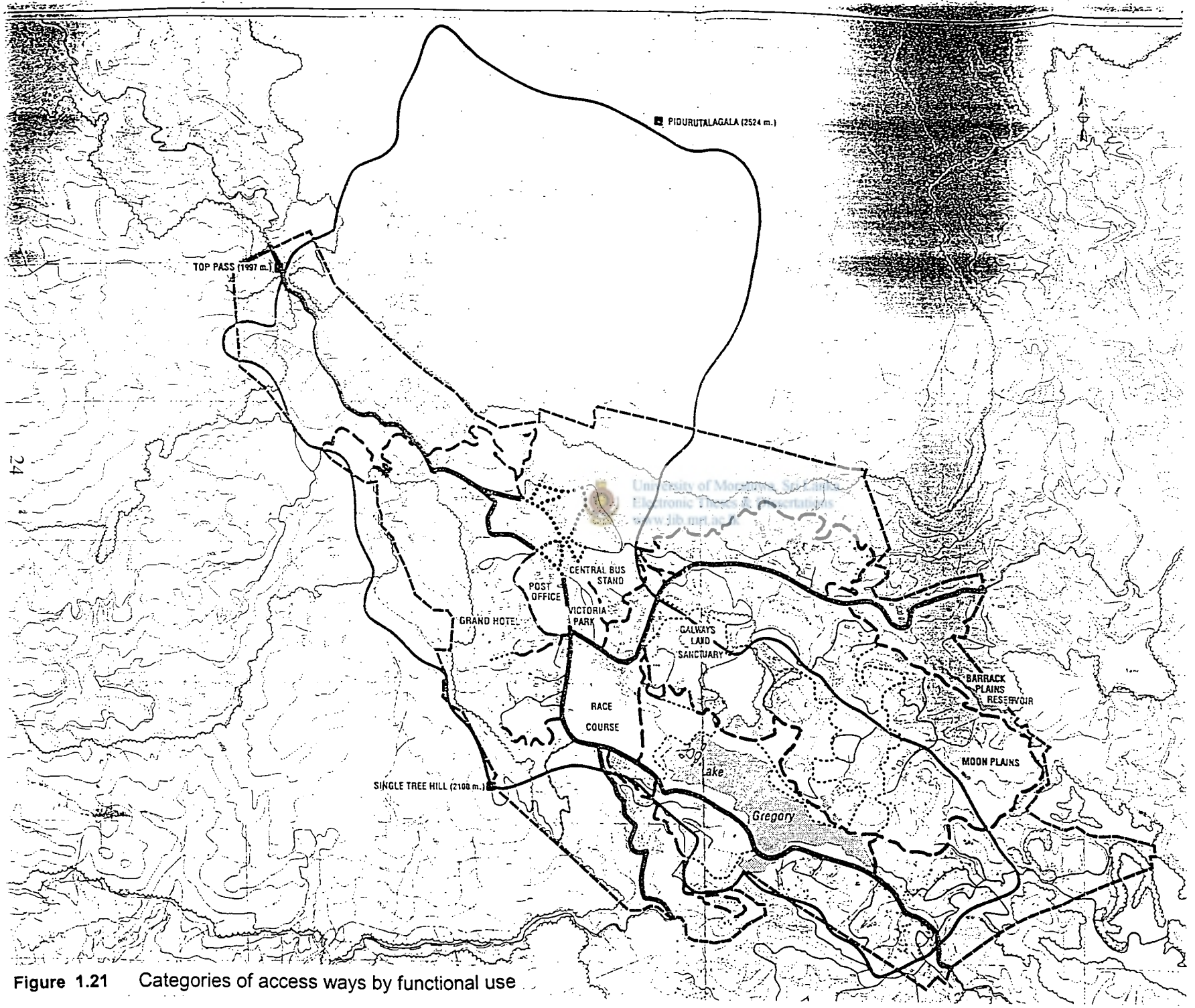


Figure 1.21 Categories of access ways by functional use

(d) Vegetation

Much of the vegetation in Nuwara-Eliya is unique to the city and it s immediate surrounds owing to climatic conditions. This aspect contributes to the character of the city. Different kinds of vegetation types can be identified in Nuwara-Eliya. They are;

a. Natural (forest) vegetation
b. Plantations (timber and tea)
c. Agricultural Vegetation
d. General Vegetation cover (shoreline plants, aquatic plants, grasslands)

Natural forests in the city limits belong to the upper montane rain forests. They can be identified within the city and surround the city. (Fig.1.22)

- Pedro Forest reserve to the North
- Kandapola-Sita Eliya reserve
- Meepilimana and Nanu-Oya proposed reserve to the South
- Kililiyamana proposed reserve to the West
- Galway land Sanctuary

Different kinds of plant species can be identified in different strata of the forest.

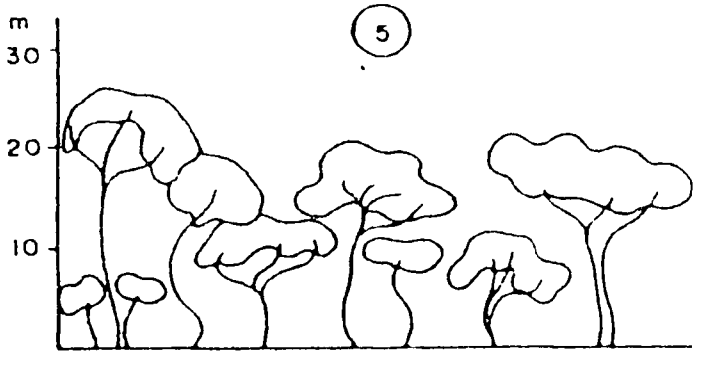
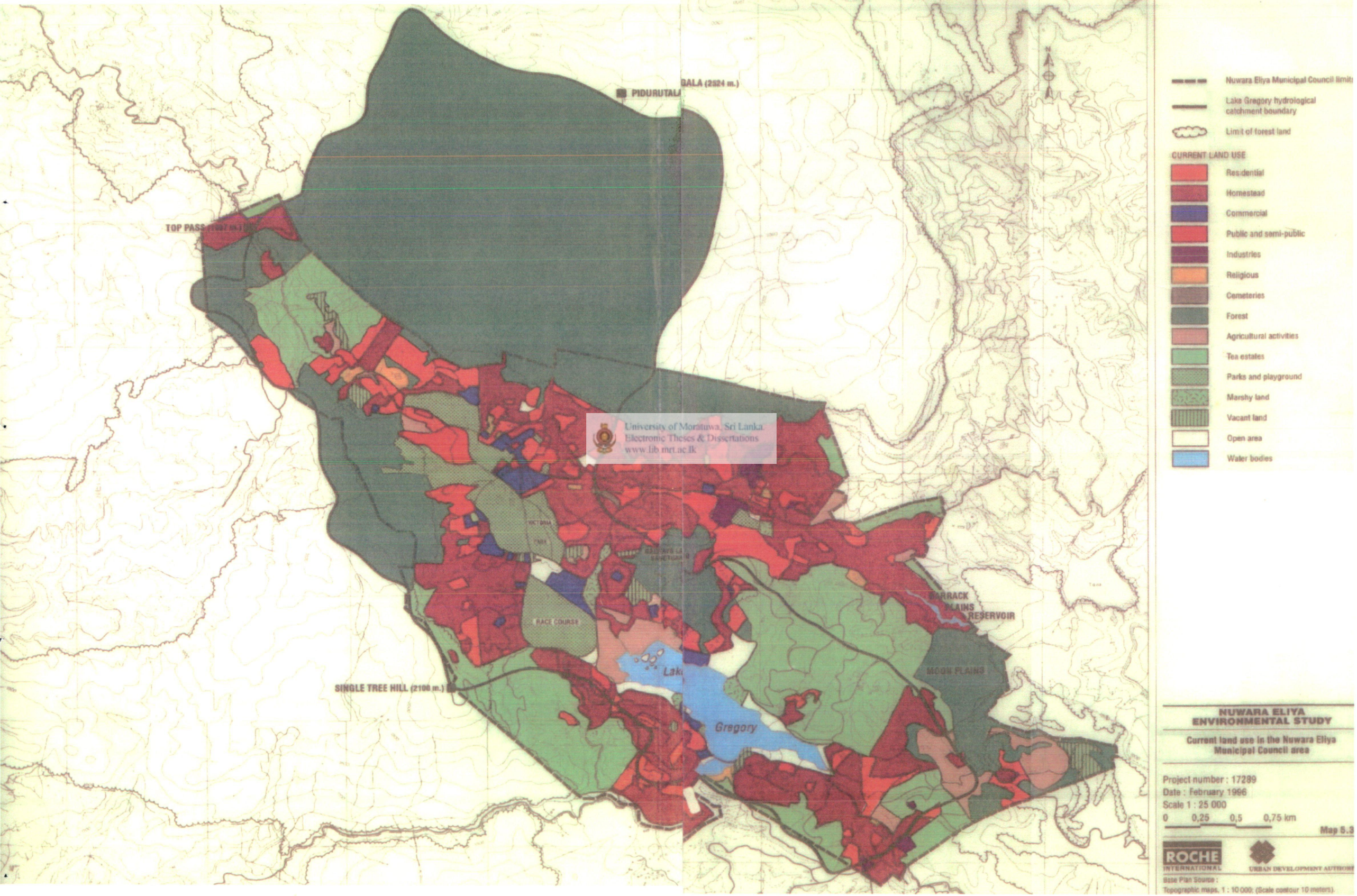


Figure 1.23 Vegetation profile of the Montane Forests



NUWARA ELIYA ENVIRONMENTAL STUDY

Current land use in the Nuwara Eliya Municipal Council area

Project number : 17289
Date : February 1996
Scale 1 : 25 000
0 0,25 0,5 0,75 km

Map 5.3

ROCHE INTERNATIONAL

URBAN DEVELOPMENT AUTHORITY

Base Plan Source :
Topographic maps. 1 : 10 000: (Scale contour 10 meters).

- *Actinodaphene speciosa*
- *Calophyllum walkeri*
- *Calophyllum cunifolium*
- *Syzegium rotundifolium*
- *Syzegium sclerophyllum*
- *Eugenia mataeoids*
- *Rhododendron arboreum*
- *Michelia nilaginica*
- *Berberis aristata*
- *Olea polygama*
- *Vaccinium lescheenaultii*
- *Ilex mightiana*
- *Ilex denticulate*

The tree species are stunted; 3-5 m tall with umbrella shaped crowns and twisted branches. But in depressions to protect from strong winds and thriving in thick soil layers these trees may reach 15-20 m. They form a dark green backcloth of mottled texture.

In the mid canopy following tree species can be identified.

- *Cinamomum*
- *Listea*
- *Neolistea*
- *Actinodhaphene*
- *Calophyllum litsefolium*
- *Cslophyllum ovalifolium*

In the understorey following species can be identified.

- *Strobilanthes* spp
- *Impatiens* spp

- *Hedyotis* spp
- *Amomnum* spp

Various epiphytes belongings to the groups of orchids, mosses and ferns cover the stems and the branches of these trees. Some of the orchids are;

- *Phaius tankervillae* (Yellow and red star orchid)
- *Eria bicolor* (Lilly of valley orchid)
- *Satyrium nepalense* (Hyacinth orchid)

In disturbed forests and clearings the following naturalized herbs occur.

- *Aristea ecklonii*
- *Polyganum spp*
- *Eupatorium riparium*
- *Solanum spp*
- *Berberis aristata*
- *Osbeckiya spp*
- *Rubus spp*
- *Acacia melanoxylon*
- *Passiflora mollissima*

Galways land sanctuary with a large patch of native vegetation within the city is a unique site that needs to be preserved. (Fig. 1.3) The vegetation consists of a juxtaposition of evergreen Mountain Rain Forest and undergrowth. Also two patches of wetlands with their wild life are inside the sanctuary.

Plantations consist of forest plantations and tea plantations, which are grown for different objectives. Forest plantations are managed by the Forest Department, which consist of following species.

- *Eucalyptus grandis*
- *Eucalyptus microcoris*

- *Eucalyptus robusta*
- *Pinus patula*
- *Cyppersus macrocarpa*
- *Cyppersus torulosa*

These species are mainly of tall, upright and with feathery texture, also with light color and are found often below the forest. They give a pleasing color gradation to the down slope. Tea plantations are found at Bambarakele, Pedro Estate, Magastota Estate, Naseby Estate and elsrwhere. Abandoned tea plantations and poorly managed tea plantations can be identified in viewpoints. These are not pleasing aesthetically

Figure 1.24 *Pinus* forest plantation In Nuwara-Eliya

Figure 1.25 Tea plantations at the valleys

Agricultural vegetation consists of potatoes and low growing European vegetables like cabbage, carrot, leeks, radish, bush bean, cauliflower, tomatoes and beetroot. They are planted in rows for the purpose of irrigation and ease of harvesting. A wide color variation and range of textures can be identified in different crops. They are light green, feathery for carrots, medium green, vertical linear for leeks and red and bushy for beetroot. A major requirement of this vegetation is sunlight with out shading. Dripping from the crowns of trees also needs to be avoided. These considerations do not allow for trees or large shrubs to be planted close to the vegetable plots.

General vegetation consists of aquatic plants, grasslands, plants on road verges, shoreline plants, wetland plants and plants on slopes.

Figure 1.26 General vegetation that covers the marshy area near Lake Gregory

Aquatic plants can be identified in lake Gregory, Nanu-Oya, and in marshy areas. The following can be identified:

- *Eichornia crasipes*
- *Salvinia spp*
- *Hydrolea spp*
- *Utricylavia spp*
- *Cyperus papyrus*
- *Nymphaea sp*
- *Aponogenton sp*

- *Cumbula spp*
- *Aponogenton jacobsenii*
- *Utricularia spp*
- *Eriocaulon spp*
- *Liccopodium spp*

These aquatic plants are invasive species and in favorable conditions they invade the aquatic environment. The presence of nutrients in abundance (due to the agricultural activities and inputs of sewage), the shallowness of Lake Gregory and its high transparency, are all factors that contributed to the excessive growth of aquatic plants. This situation impedes its recreational potential. The arum lily (*Zantedeschia* spp) is a marsh plant and *Osbekia* spp is a common shrub seen on the hill slopes.

(e) Structures

The built form in the landscape of Nuwara Eliya is another important factor. The overall form, volume and scale of structures and the manner in which they relate to the surrounding landscape are important. The character of a street or hillside is also dependent on the relationship of one building to another as well as its individual surface treatment, solid to void ratio, and the color and placement of structures on their individual sites. Different kind of structures can be identified in the city. They are public buildings, bungalows, line houses, middle class housing, hotels, guest houses, commercial buildings, industrial buildings and other structures such as bridges, temporary structures...etc.

There are some public buildings, which belongs to the British period. They are the post office, Holy Trinity Church and vicarage, old railway station, the Golf Club building and the park superintendent's cottage all of which are in a fairly good state of preservation. But recent public buildings catering to functional uses do not show much consideration to the surrounding landscape.

The bungalows, which belong to the British period, occupied scenic locations such as along the Badulla road, St. Andrew's drive, Lady McCallum's drive and upper lake road. They have a distinctive English character screened from the road, affording only glimpses of the building, with a driveway perhaps open to a lawn, and a vegetable patch, and kitchen garden at rear. Some of the recent bungalows have been designed considering the past character and are well integrated in to the landscape. But the majority of them are in varying styles without considering the city character and the landscape.

1.27 An old house that views to the racecourse

The line houses built for the lower income class are scattered throughout the city. The concept "houses in a line or row" brings these line houses for the estate workers, municipal workers and so on. In time as their families have expanded they have become inadequate in user space. Also less maintenance makes them unsightly.

Figure 1.28 Line houses at the edge of the Race Course

The housing, the hotels, and the guesthouses of Nuwara Eliya erected throughout the city, contribute much to the city character and to the landscape. The city's commercial buildings, on the other hand, have mixed styles, and contribute little to the city's character except confusion.

(f) Open Spaces

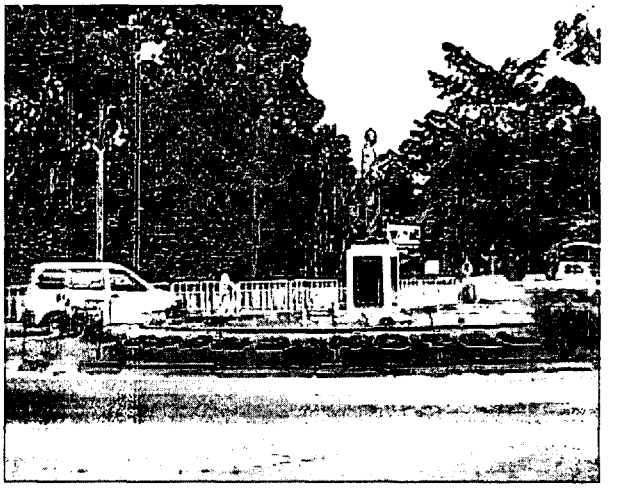
Parks, open spaces and lake reservations form the open areas of Nuwara Eliya. They are the Golf Course, Race Course, Victoria Park and the lake Gregory reservations. The golf course is the major tourist attraction in the city that helps to maintain the English character of the city, while the racecourse needs to be upgraded a lot. Victoria Park is the main resting point in the city for visitors at present. It is the only place that keeps the tourists inside the city and supplies recreation for them. The open areas surrounding the lake provide some seating here and there. Cattle occupy most of this area, and cow-dung makes this place less amenable for visitors. All of these open spaces need improvement.

Figure1.29 Open spaces near the Lake Gregory

(g) Artifacts

These include signboards, street lamps, garbage bins and other street furniture. Signboards are located everywhere in the city and at entrances without considering the surrounding landscape. Also the existing street lamps do not add to the city character. While the garbage bins are far too small.

1.29 The lamp posts at the Grand Hotel



1.30 A roundabout in a junction

CHAPTER TWO

2.1 Historical Background of the City

2.1.1 Pre British Period

Although Nuwara-Eliya was unsettled before Europeans made it popular, it is not to be supposed that its existence was unknown to the Singhalese. The name itself proves its former importance to the kings of Kandy as Nuwara-Eliya signifies 'Royal Plains'.

The word Nuwara-Eliya literally means and traditionally refers to "The City of Light". According to 'Walmiki's' Ramayana this was one of the places where king Ravana hid the stolen beauty, Princess Sita and it describes how it get its name as follows:

"According to folklore during the rule of 'Yakkas' of this country, King Ravana brought the wife of King Rama, by force from 'Dambadiva' and hid her in the 'Ashoka Garden' at Sita Eliya. Rama's envoy 'Hanumantha' who came seeking Sita, was captured by the Ravana's army. They wrapped cloth on Hanumantha's tail and set fire to it. Hanumantha, with his burning tail, set fire to Badulla town. The area brightened by the burning flames of Badulla is known as Nuwara-Eliya."

Evidence for Nuwara-Eliya serving in the way is slight but according to history the very existence of the population has depended upon the supply of water. The hilly areas, the neighbourhood of Nuwara-Eliya, were the watersheds of the country during the king's time. Therefore the king in possession of Nuwara-Eliya had the most complete command over his subjects; that is he could either give or withhold the supply of water at his pleasure by allowing its free exit or by averting its course. Therefore during the rebellion he could starve his people or lay waste to the land in time of foreign invation. Samuel Baker talked about a fort that controlled the water supply to the low country.

"I have seen in an impregnable position the traces of an ancient fort, evidently erected to defend the pass to the main water course from the low country. This gives us a faint clue to the probable cause of the disappearance of the nation. Therefore in time of war or intestine commotion the water may have been cut off from the low country, and the exterminating effects of famine may have laid the whole land desolate."

Therefore it is no matter of astonishment that the present vale of Nuwara-Eliya may receive its appellation of the 'Royal Plain'. The Kandyan kings didn't reside at Nuwara-Eliya due to the cold climatic conditions. Therefore the kings came to Nuwara-Eliya for special reasons; to manage and control his water supply and also to superintend the digging for precious stones.

There are some evidences that the 'diggings' of the kings of Kandy must have been conducted on a most extensive scale. Samuel Baker in his book; described it as "Not only has the Vale of Rubies been regularly turned up for many acres, but all the numerous plains in the vicinity are full of pits, some of very large size and of a depth varying from three to seventeen feet. The Nuwara-Eliya plain, the Moon-stone plain, the Kondapalle plain, the Elk plains, the Totapella plains, the Hortan plains, the Bopatalava plains, the Augara plains and many others, extending over a surface of thirty miles are all more or less studded by deep pits formed by the ancient searches for gems, which in those days a were a royal monopoly".

Even during the British period the natives continued this where they were permitted to work in the vale of rubies. Apart from this the king's use of Nuwara-Eliya, was probably limited to providing a resting point in his long journeys.

There are one or two other further references to Nuwara-Eliya. 'Dona Catharina' is supposed to have had a temporarily refuge at Nuwara-Eliya as she was driven from the capital by the Portuguese in 1628. Almost two centuries latter in 1818 'Kaykary Mudiyanse' Of 'Udunuwara' giving evidence before John D'Oly then resident in Kandy on the rebellion said that he accompanied Kappetipola disava from 'Bulugahapitiya' to 'Aluthwella' and stated they stayed two days in Nuwara-Eliya among other places during their journey.

2.1.2 The British Period

The beginning of modern Nuwara-Eliya was essentially British. From its accidental discovery through conception, gestation and birth as a townlet it was the British Governor, the civil servant, the military official and the entrepreneur, who acted as its collective parents or perhaps as its foster parents.

The earliest published reference to Nuwara-Eliya in modern times was made by Dr. John Davy, who had accidentally come across the plains in 1819, and recorded the following on that momentous accident of his:

"Descending this hill on the other side, we arrived, at ten o' clock at a spot of open ground, very little lower, called Kicklemann of the extent of several acres, nearly circular, of wet irregular surface, surrounded by forest consisting chiefly of rhododendrons, spotted here and there with solitary trees of the same kind, and watered by a purling stream that ran through the middle of it. Leaving this place, which is said to be the boundary of Kotmale and Ouva, we entered a forest, in which we began to see traces of elephants, and proceeded over wooded hills gradually descending the hills we came to a great extent of open country, the aspect of which was not less novel than agreeable.

Our guide called it Neuraellyia-pattan. In point of elevation and extent, this tract, there is reason to believe, surpasses every other of the kind of the island; perhaps it is fifteen or twenty miles in circumference, and its average height may be about 5300 feet above the level of the sea. Surrounded by the tops of mountains, which have the appearance of hills of moderate height, its character is that of table-land elevated and depressed into numerous hillocks and hollows. The wood which covers the boundary mountains (and they are all, without exception, covered with wood.) are of a peculiar kind, quite alpine, and very similar to what we found on the summit of Naminia-cooli kande. The same kind of wood ramifying in to the table-land, and occurring scattered about in insulated clumps, with large solitary rhododendrons here and there, has a very picturesque effect, and helps to make a very charming landscape"

But it was forgotten for a period of time and rediscovered by Sir Edward Barnes in 1826. He was credited for this by Charles O' Brien (Late Assistant Surveyor General Ceylon)

"After a slow and toilsome journey to an elevation of more than 6000 feet (the rest house on the plain is 6222ft), a sight is obtained of the plain of Nuwara- Ellia. The first visit of Europeans to this lofty plateau was made by some English officers who in 1826 penetrated so far in persuit of elephants. Struck with its freshness and beauty, they reported their discovery to the Governor; and Sir Edward Barnes alive to its importance as a sanitary retreat, for the troops, instantly took possession of it, and commenced the building of barracks and of a bungalow for his own accommodation."

His residence, which is in the shape of an Elizabethan manor house, was named as Barnes Hall, which still stands, but now the well-known Grand Hotel. At the beginning a handful of English families settled-down and built pretty little cottages.

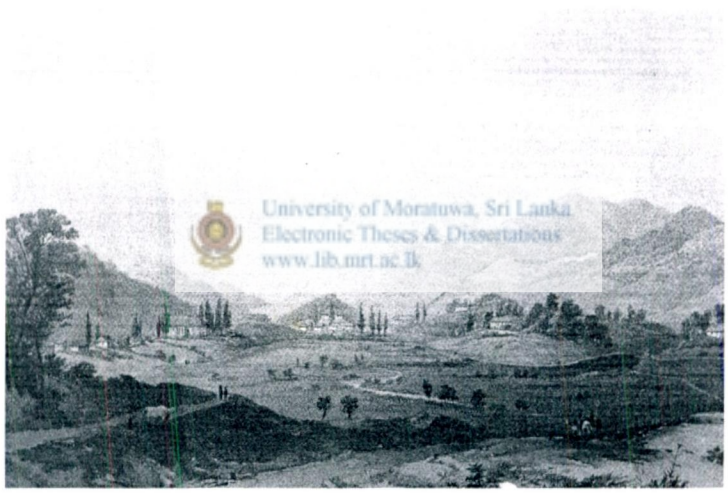


Figure 2.1 A painting of the early settlements in Nuwara Eliya (before 1850) by Charles O brien, (Late Assistant Surveyor General Ceylon), Source: Early Prints of Ceylon, R.K. de Silva

Figure 2.2 Barnes Hall is the Grand Hotel today

The view is taken from the road round the plain, that part of it leading to Badulla. The pass, which leads into it from Rangbodde and Kandy. On the extreme left are the small but neat cottages occupied by visitors from Colombo during the fine months from January to May. Next is a large and commodious house, built by Sir Edward Barnes, on the first establishment of the sanatorium. A little further on, where a few low trees mark the top of a knoll, is the burial ground, of Europeans. Over the bazaar, in the center are the clubhouse, and other accommodation for visitors and public officers. On the extreme right is the parsonage. Over Rose Bank are the rises of Peduru-talla-galla, the highest point of Ceylon.

By 1843, Nuwara-Eliya had a limited built environment with Barnes Hall, a barracks for a hundred men, an 18-bed hospital, a kachcheri, a jail, a rest house, a bazaar and a several government cottages. In those early times rest house facilities were available for visitors although they were not luxurious or comfortable. This situation was experienced by the great traveler, Samuel Baker in his first visit to Ceylon in 1845 by visiting Nuwara-Eliya was astonished by the cool climate and had a thought to become a settler in Nuwara-Eiiya.

" I wad only a fortnight at Newara-Ellia. The rest house or inn was the perfection of everything that was dirty and uncomfortable. The toughest possible specimen of a beefsteak, black bread and potatoes were the choicest and only viands obtainable for an

invalid. There was literally nothing else; it was a land of starvation. But the climate! What can I say to describe the wonderful effects of such a pure and unpolluted air? Simply, that at the expiration of a fort night , in spite of the tough beef and the black bread and potatoes, I was as well and strong as I ever had been; and in proof of this, I started instantly for another shooting excursion in the interior"

During his arrivals he had mentioned that the houses were for the most part built of such unsubstantial materials as stick and mud plastered over with mortar; pretty enough in exterior, but rotten in ten or twelve years. The only really good residence was a fine stone building erected by Sir Edward Barnes when Governor of Ceylon.

"Time passed; and the moment at length arrived when I decided once more to see Ceylon, I determined to become a settler at Newera Ellia where I could reside in a perfect climate and nevertheless enjoy the sports of the low country at my own will.
In my determination to reside at Newera Ellia I hoped to be able to carry out some of those plans for its improvement which I have before suggested; I trusted to be enabled to effect such a change in the rough face of nature in that locality as to render a residence at Newera Ellia. Something approaching to a country life in England, with the advantage of the whole of Ceylon for my manor, and no expense of gamekeepers." (Samuel Baker, 1855, p08)

Within the return of Sir Samuel Baker and his emigrant party in 1847 to Ceylon, Nuwara-Eliya, which he had found earlier to be in a poverty stricken and neglected state was gradually transformed into an English hamlet where regular agricultural activities were carried out. He established a small brewery, through his discovery that excellent beer can be made at this elevation. (6200 feet)

The completion of the church (now it is the Holy Trinity Church) was the greatest improvement in Nuwara-Eliya during Samuel Bakers' time. The grand old tree with its gnarled, twisted stem (monkey puzzle), still stands on the site and Baker described it as follows:

"How changed! There is an old tree standing upon a hill, whose gnarled trunk has been twisted by the winter's wind for many an age, and so screwed is its old stem, that the axe has spared it, out of pity, when its companions were all swept away, and the forest felled.

And many a tale that old tree could tell of winter's blasts and broken boughs, and storms, which howled above its head, when all was wildness around. The eagle has roosted in its top, the monkeys have gamboled in its branches, and the elephants have rubbed their tough flanks against its stem in times gone by. But it now throws a shadow upon a Christian's grave; and the church yard lies beneath its shade"

Around 1875, public buildings such as the court, the fiscal and telegraph offices, the police station, post office, pauper hospital and a government schoolhouse were added to Nuwara-Eliya. Also a beer brewery was started near the Lovers' Leap in 1881 and it became a successful industry.

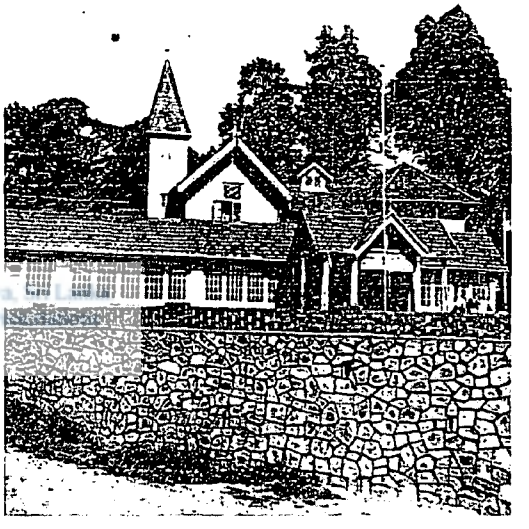


Figure2.3 Holy Trinity Church Today **Figure 2.4** Post Office Today

Also several building sites were sold on either side of the lake for the construction of small houses or cottages to be leased at reasonable terms. Modern bungalows soon followed.

In 1899 The Assistant Government Agent, W.E. Davidson noted that Nuwara Eliya should be best supplied with all that is necessary to equip it as a mountain home for Europeans, as

a sanatorium for those whose health has been debilitated by prolonged residence in the tropics and for the rearing and education of young children. Then in the following year all kinds of recreations were provided including a park, a partially completed cricket ground and drives and walks. Slums were removed and sanitation enforced. Also amenities were provided for those recreational activities for both residents and visitors. Resting facilities for the weary travelers on the way to the Pidurutalagala, Single Tree hill and Kikiliyamana were provided by making cement concrete seats. Activities like angling were carried out in the pond of Victoria Park by introducing mirror carp, as well as in the Lake Gregory with the introduction of trout.

Governor Sir William Gregory converted the swamp into what is now lake Gregory in 1874 by making a dam across the Nanu-Oya. The land,(a little over 6ha) was purchased under the wasteland ordinance. In 1868 a long standing resident of Kandy, Dr. Dickman had advised that:

"One of the most desirable improvements would be the conversion of the present swampy plain (through which runs the Nanu-Oya, a branch of the Mahaweli Ganga) into a large artificial lake. Drives and walks round this sheet of water would add considerably to the health and beauty of the place".

During 1885 clumps of trees were planted here and there on open bare spaces around the lake to improve the appearance. A path was constructed around the Lake and a bird sanctuary was created in the foreshore of the Lake Gregory.

This was done by the Local Board to improve the attraction of Nuwara Eliya in encouraging visitors. Trout were introducing to the streams and to Lake Gregory were between 1881-1886. This was successful and 6-pound fish were caught in the lake in 1889. From the time of formation of the Lake its silting has been a constant problem. Also it received the drainage and the sewage of the whole town. Weeds encroached on it to an alarming extent.

In time, due to the pollution of the lake, the number of trout started to decrease. The last fish were caught during 1905. Then carp were introduced and it became successful. Carp fishing of the lake was allowed throughout the year. In 1927 a boat yard was introduced to the Lake where visitors could hire boats and do a days' rowing or sailing.

Sir Edward Barnes during his time as governor started a road from Kandy and encouraged the settlement of Nuwara-Eliya. The road is renowned for its great number of cascades, which descend the sides of the high mountains. Ramboda pass, which is the entrance gate to Nuwara-Eliya, has one of the finest waterfalls, the Ramboda falls that is crossed by a bridge connecting to the main road. Eugene De Ransonnet (1867) described this place as follows:

"...the country is here not unlike Switzerland, but many tropical forms of vegetation again remind the traveler that he is in a warmer climate. Groups of plantains grow near the road, and the long white bell-like flowers of the Datura arborea are pendent from the rocks over the gushing water. This spot was some years ago shrouded in magnificent woods, but they have been all mercilessly cut down, to make way for the coffee plant which thrives now on the naked banks of the cascade...."

Figure 2.5 Ramboda falls that is connecting by a bridge.

In 1885 Improvements were made to the town centre's roads including James Street, Lawson road and Chapel Street. The gravel paths around the plain were also improved.

During this year the railway to Nanu-Oya was opened and increased the member of visitors to this health resort. With the development of residences more roads were built and the old ones were re-surfaced.

Figure 2.6 A railway to Nanu-Oya was opened

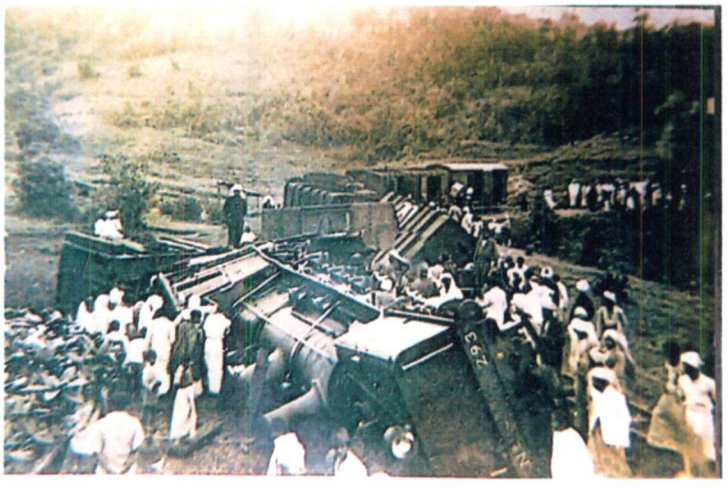


Figure 2.7 A train accident in Nanu-Oya

In the beginning the city population was mostly British. In those early days the European population in Nuwara-Eliya sang its praises and vied with eachother to settle down in the

most picturesque places in the city and enjoyed the available comforts of the period. But the local population devoid of money and generally not quite in agreement with its cold climate did not find comfort in such surroundings. A few Singhalese, a few Tamils and a few Moors only inhabited the city. However with the establishment of an Assistant Agent and the growth of the city as a planting and commercial center the population became more varied. In 1910 the total population of Nuwara Eliya was around 2500 composing a mixture of British, Singhalese, Tamils and Moors.

Due to the clearence of the huge forest coverings for cultivation and residences, water and irrigation became a great problem in Nuwara-Eliya District by 1884. The rain fall during that period was ample and sufficient to provide water for cultivation, but in areas around the streams, where forests had been cleared for the opening of estates, surface runoff was rapid and drought was felt more quickly. To fulfill the need of water a dam was constructed on the Talagala Stream to provide a reservoir and pipes were laid out to distribute water to the in 1885. In some selected sites a few bathing places were constructed. In 1899 extention works were done to the Nanu-Oya to improve the water supply for the population of Nuwara-Eliya. In 1925 pure water was supplied to the town by the Pedro water field intakes. But during the dry months a slight shortage of water continued to occur. It made a problem for the people who used large quantities of pipe water for watering gardens. Therefore to provide a surplus of water the Lovers' Leap water scheme project was completed. Through that project it was anticipated that the water supply for the town would be adequate for many years to come.

The original landscape of the city was its original forest patches, which were cleared for the European crops and coffee. It led the city to a dual economy. But coffee became a failure due to the coffee-rust and tea was experimented with and introduced.

2.2 Impacts of the British on the Landscape of Nuwara-Eliya

The British for their plantations encouraged the openings of the original forest patches in the hilly areas. These forests belong to the upper montane rain forest. (Also called cloud forests) In these forests, twisted, stunted trees are draped everywhere in orchids, mosses and ferns. The higher elevation forests are cooler and drier than the Sri Lanka low land rain forests. During the winter months, ground frost is not uncommon on the higher peaks, some of which are over 8,200 feet (2500 m) high. This eco-region receives 2500-5000 mm of annual rainfall. Most of the rainfall is from the May to September southwestern monsoon, which expends its moisture on the western, windward side. The northeastern monsoon, which sweeps in from the northeastern coast and ascends the gentler eastern slopes, brings additional rainfall to the eco-region from December to March. All of Sri Lanka's major rivers originate in the central mountains and radiate outwards. It is an ideal habitat for many animals and new species of frogs, lizards, fish and crabs are still being discovered here. The vegetation is primarily influenced by climate and ranges from Dipterocarpus-dominated montane rain forests to montane savanna and cloud forests with Rhododendron species. Rhododendron species occur at the highest elevations where could forests prevail and in the transition zones with the wet montane grasslands, locally known as wet 'patana'. Several animal species have also adapted their life history and behavior. (Nesting patterns)

With the arrival of British these long time growing forests were reduce to ashes. Many acres were cleared for the coffee plantations from 1830 onwards. They were responsible for the cutting down of large tracts of forests up to an elevation of about 5000 feet. Prior to British occupation a belt of primeval forest about thirty miles wide, dividing the Kandyan country from the low country, was kept by the kings as the best means of military defence against foreign invaders.

The early coffee planters were encouraged by selling lands at the upset price of five shillings per acre. It became the policy of government to encourage the formation of coffee estates in the country to attract European capital on the assumption that it would be a welcome "catalyst of modernization". Governor Sir Edward Barnes encouraged this policy.
"Investors in coffee were readily accommodated in regard to loans and waste land (i.e. jungle or scrub jungle). Coffee holdings were exempted from the prevailing taxes on land,

and the export duty on coffee was abolished". All these measures were originated by Sir Edward Barnes who deliberately devoted the resources of the state to promote coffee culture. The government itself opened an experimental coffee plantation of 200 acres attached to the Botanical Gardens at Peradeniya.

"The ruthless flames have cleared his hands
No trace remains of green;
When lost in thought of our Planter stands,
And views, the sterile scene.

In dreams he sees his coffee spring,
Fed by the welcome rain;
And berries many a dollar bring
To take him home again."

-Vereker M. Hamilton and Steward M. Fasson
"The new clearing" from scenes in Ceylon, 1880

Figure 2.8 The new clearings for the coffee plantation
Source: Early Prints of Ceylon, R.K. de Silva

The policy, which began during the time of Governor Sir Edward Barnes, of selling highland forestland for the purpose of forming coffee plantations, and it continued in the following

decades. In the six years from 1839 to 1843 no fewer than 120 plantations were opened up in the Central Province, almost all of them in districts within 30 miles of Kandy. By 1846 there were some 500 coffee plantations in the island, the great majority of them in the Central Province. Indeed the acreage under coffee nearly doubled between 1st of January 1845 and 31st December 1847, from 25,198 acres to 50,071.

Sir Emerson Teanant has described the coffee cultivation as follows:

"The mountain ranges on all sides of Kandy became rapidly covered with plantations; the great valleys of Doombera, Ambogammoa, Kotmalie, and Pusilawa were occupied by emulous speculators; they penetrated to Badulla and Oovah, and coffee trees quickly bloomed on solitary hills around the very base of Adam's Peak.

"The first ardent adventurers pioneered the way through pathless woods, and lived for months in log-huts, whilst felling the forest and making their preliminary nurseries preparatory to planting; but within a few years the tracts by which they came were converted into highways, and their cabins replaced by bungalows, which, though rough, were picturesque and replete with European comforts. The new life in the jungle was full of excitement and romance, the wild elephants and leopards retreated before the axe of the forester; and elk supplied their table with venison, and jungle fowl and game were within call and abundant".

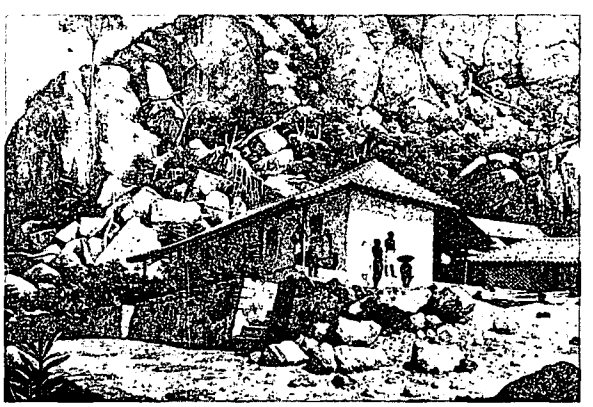


Figure 2.9 A bungalow of a coffee planter at Haputale.
Source: Early prints of Ceylon (Sri Lanka) 1800-1900,R.K. de Silva

Further more he described; "the coffee mania was at its climax in 1845. The governor and

the council, the Military, the Judges, the Clergy , and one half the civil servants penetrated the hills and became purchasers of Crown lands. The East India Company's officers crowded to Ceylon to invest their savings, and capitalists from England arrived by every packet".

The coffee planters as well as the chena cultivators were thus denuding forests at an alarming rate. Dr. J. Hooker, Director of the Royal Gardens at Kew wrote to the Earl of Kimberly at Downing Street On 27th May 1873, drawing attention to the annual report made by the Director of the Royal Botanical Gardens at Peradeniya, Mr. Thwaites, in which he referred to the extensive felling of the forests in Ceylon, for coffee and other plantations.

"It is principally on climatic considerations that the cutting down of forests seem to require government supervision. **There is good reason to think that in tropical countries the removal of wood operated effectively in reducing rainfall.** There can at any rate be no doubt that the presence of forests plays a most important part in storing the rainfall, and yielding up gradually to the streams a continuous supply of water, a thing, I need hardly say, in a hot country is of primary importance".

"More ever, the rain is retained by the forests on the surface of the ground; it gradually permeates the subsoil, and so feeds the underground water-bearing strata, upon which springs and wells must eventually depend. If the forest is indiscriminately removed, the rain runs off as fast as it falls, and washes away the superficial and fertile soil with it'. (Seasonal papers of Ceylon 1867-1877, Dr. Hooker to the Earl of Kimberly, 27, May 1873, p. 396)

Further more Dr. Hooker stated that; "in former times they were clothed with dense forests, and their oldest inhabitants remember when the rains were abundant, and the hills and all the uncultivated places were shaded by extensive groves. The removal of the trees was certainly the cause of the present evil. The opening of the soil to the vertical sun, rapidly dries up the moisture, and prevents the rain from sinking to the roots of the plants. The rainy seasons in these climates are not continuous cloudy days, but succession of sudden showers, with the sun shining hot in the intervals. Without shade upon the surface, the water is rapidly exhaled, and springs and steams diminish."

Dr. Hooker suggested that not only should the destruction of forests be prevented but that also a start should be made of new plantations of forest trees useful for timber. These

plantations would serve a double purpose of retaining the desired humidity as well as yielding revenue to the island.

Heeding the warning sounded by Dr. Hooker, Lord Kimberly impressed upon Governor Gregory the importance of taking effective steps to prevent the destruction of forests in order to preserve existing climatic conditions as well as timber. He further observed that conflict would arise between the desire to conserve the forests on the one hand and to extend plantations on the other hand as a result of the prosperity of the coffee trade.

However the 'coffee craze' was spreaded fast throughout the hill country. Although Nuwara-Eliya started on oats, potatoes and English vegetables successfully experimented by Samuel Baker, it soon fell in line with the 'coffee craze'. Public officials and private entrepreneurs, who purchased crown-land at nominal rates, converted the jungles to elegant coffee estates even though the ideal altitude for coffee was supposed to be between 2500-5000 feet.

But due to the coffee rust (*Hamileia vastatrix*) attacked the coffee plantations first in1864 and reduced them short-lived. The brief two decades of coffee cultivation in Ceylon became an event of the past. The planters looked for alternatives. At first Cinchona was interplanted with the coffee, but over production of it, soon saw to its demise too. But it was not the end of the plantation agriculture of the British. The early experiments on tea made by Mr. Normansell and Dr. Thwaites, and nurtured over the years in a small scale now found their importance. Dr. H. Trimen who was the director of the Peradeniya Botanical Gardens in his Administration Report (1886) mentions it as follows:

"This is the proper place to put on record the facts with regard to the first introduction of Assam tea into this country. In December, 1839, Dr. Wallich, the eminent Indian botanist, at that time at the head of the Calcutta Botanic Gardens, sent to Peradeniya seeds of the then recently discovered "Indigenous Assam Tea" ; and these were followed in February, 1840, by 205 plants. In May, the then superintendent at Peradeniya, Mr. Normansell, sent several plants to Nuwara-Eliya, and a man was supplied to look after them. This was after a representation to Government that tea was likely to prove a "new and profitable speculation" and a "valuable source of revenue". Again in April 1842, another instalment of Assam plants

was received from Dr. Wallich, and in October some of these were sent to Mr. Mooyart at Nuwara-Eliya, with directions for cultivating them.

" I had often wondered what became of these, and by accident in London I met the gentleman to whose care they were committed, the Rev. E. F. Gepp, at that time tutor to the son of Sir. A. Oliphant, chief Justice of Ceylon. He informed me that in October 1842, he received the plants from Mr. Mooyart at Nuwara-Eliya, about thirty in number, and cleared a piece of jungle for them on Sir. Anthony's land there, they were doing well when he left the island a few years after. Mr. Gepp thinks the ground was somewhere in the neighborhoods of the present Queens cottage, and it will be worth a search to discover whether some of the plants may not be still in existence".

In no time tea replaced the coffee. The first tea estates were established on former coffee plantations. The clearing of jungle was thus unnecessary. Only the dead coffee bushes had to be removed. Where the old fields were not thought suitable for tea plants, they were abandoned and these are still distinguishable in many 'patana' areas of today. The start of tea from ten acres in 1867 had become 1070 acres by 1875 and 200,000 by 1900. In 1867 the fields of James Taylor were the first tea fields in Ceylon.

Figure 2.10 Recently abandoned tea Plantations, Source: Forest Conservation In Sri Lanka, Nihal Karunaratne

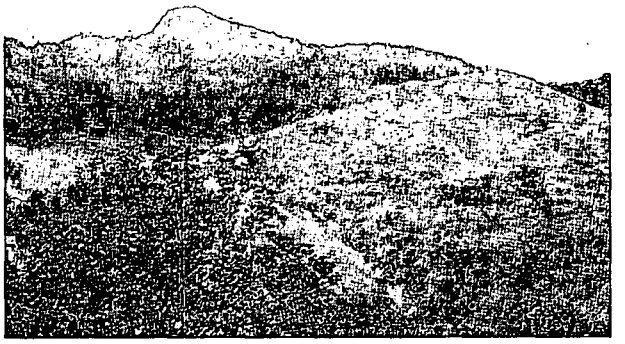


Figure 2.11 Abandoned tea plantations are turning into grasslands

This clearance of forest patches makes a visual detractor in the landscape as well as causing the loss of natural habitats of wild animals: John Still described it as follows:

"I well remember the first time I entered a jungle. The planters of coffee and tea had cleared the valleys of their primeval forests, and stark uniformity duller than a market garden, had taken their place except where, in ravines or swamps too steep or too wet for tea, wild scrub still harboured a few mongooses, a few wild cats, rare porcupines, and rarer jackals. But here and there on thehill-tops prudent planters had left small patches of the ancient woods untouched as timber reserves, whose most interesting functions was to offer a last refuge to a few wild animals whose habits required larger sanctuaries than those of the ravines. Wild pigs were to be found in them, and families of the deep-voiced wanderoo (monkeys); and of the deer tribe the little muntjac was common, and even the great sambhur, as large as a pony, not unknown. Eagles built their nest there in the tops of age-old trees, whose towering forms stood like giants looking out over scores of miles of hills and valleys, once the home of ten thousand of their kind, but now given over to tea, a humble white-flowering camellia, precious to man the destroyer, grown in neat rows. In these rare woods jungle fowl abounded; and beautiful rose-coloured begonias, red and white balsams, tree ferns and orchids made lovely their dim recesses where the streams sang their songs of the ages, and ran down to turn turbines in the valleys far below."

Clearing of forests nevertheless continued for the European crops, fruits and vegetables that were demanded. R. L. Brohier who was a surveyor in Ceylon observed this situation and mentioned it in his book, Discovering Ceylon in these words:

"In forty years of active field-life, I have seen in political zeal and ardency, lands being made available to the landless, on the basis of "village expansion" or a "grow more food" drive, in many regions of the mountain zone. I have seen hundreds nay thousands of acres handed over in these circumstances to individuals and companies, savaged and stripped of its valuable timber, the saplings, or as they may be rightly described "the forest of tomorrow", irrevocably damaged in the process, and abandoned after a few sultry attempts at cultivation to be ever more a scab of scrub-jungle on the landscape. And alas, I have lived to hear of acres of forest in the uppermost peniplanes, where lie those delectable montane regions off the Horton Plains and Nuwara-Eliya, sacred to the scarlet Rhododendron or rare Begonias and once a wilderness of dainty forest fern, turned over in vain glorious effort to growing potatoes and apples".

Further more soil was improved by draining and manuring for cultivation. Manure was necessary for the crops to survive and even grasslands were manured with guano imported into the country. Peas, beans, turnips, carrots and cabbages thrived. Potato was the main crop, which yielded 4-6 tons per acre when heavily manured. This crop was ready in three months and yielded quick money. Vegetable gardening spread through the interest of the Tamil labour force in earning some extra money. Also it was promoted by the attraction of the market of the up-country. Thus it was that the city developed a dual economy with vegetable and tea estate.

CHAPTER THREE

3.1 Post-Independence Period

3.1.1 Changes of Use in the City

In the post independence era the British occupants of the Nuwara-Eliya left the country. This situation meant a change in ownership, which was practically completed with the nationalization of tea estates. The new owners were the richer strata of the Sri Lankan nationals who were based mainly in Colombo. This class of people had the desire to imitate and live like British nationals in Sri Lanka. Initially the local owners too wish to have houses in Nuwara-Eliya as their second home in its cooler climate. But they soon realized that they could occupy their homes only during the continuous holiday season due to the uncomfortable cooler climate for them. April is the month when the Colombo temperature rises to uncomfortable levels. Also this month has a large number of holidays due to the Sinhala and Hindu New Year and the Easter Holidays. The climate in Nuwara-Eliya is moderately cold and desirable during this month. This led to a holiday season being created during which people could use part of their annual leave too. The development of this holiday season spurred the middle class too to spend some time in Nuwara-Eliya, where they could have a holiday, meet other people who came on holiday and project an image. This new class of holidaymakers could not afford to own and maintain bungalows in Nuwara-Eliya. Therefore they had to be content with rented out rooms and lodgings. To meet these demand business entrepreneurs started to emerge. Some of the better oll were also able to buy property, and particularly those who had business interests in Nuwara-Eliya.

3.1.2 Socio-economic changes in the city

3.1.2.1 Socio-Economic Situation

The plantation economy of the city has developed for the last five decades rapidly. The population has increased significantly and the plantations have covered every inch of the valley and the mountain ranges. While most of the people are engaged in the plantation economy a few deal with other kinds of work.

The first primary economic category that generates money for the population is the unskilled laborers force. The most vulnerable working force belongs to this category. They do agricultural work, construction work, clearing, loading of lorries, trucks that are used for vegetable transport...etc. Their work is not regular, it is usually on a daily basis, the salaries are low and there are no social benefits attached to it. Two-third of this working class is men while the others are women. In all wards of the city except the New Bazaar the female laborer force is hired. In New Bazaar only men are being hired. In Bambarakele and Magastota the child laborer force is hired. The Bambarakele wards give the lowest average income for the workers while the New Bazaar gives the highest. It is declared that the agricultural work period was based on the specific demands of the production and carried out on a monthly basis.

The second primary occupation is agriculture. The individuals engaged in agriculture are considered as agricultural producers, not as laborers. They are small or large-scale producers and do it on a self-employment basis. The majority of these groups are men and the remainder is women.

The skilled labourers in the working force working mainly in the construction sector and in industry. This includes a smaller female labour force and a higher male labour force. Most of the skilled labour force is works for SS international Limited, Inter Fashion Garments Limited or Huejay International (Multiflora) Limited.

The SS international Limited is an eyelashes factory. 90% of the production is made of human hair imported from India while 10% is synthetic. 100% of the production is exported overseas. Employees work in the factory and most of them are from Nuwara-Eliya.

The Inter Fashion Garment Factory, which started in 1982, produces ladies garments for export.

The Huajey International Limited specializes in the production of flowers (carnations) for exportation. More than 1000 beds are on the site that produces carnation and roses for the local market.

The next category of the working class consists of "other". This includes the working population engaged in the tourism industry; clerks in hotel, cooks, caddy, cleaning crew...etc. The above data implies that in Nuwara-Eliya, there is a large labour force reservoir. The economic development of Nuwara-Eliya is not currently able to absorb the labour force.

3.1.2.2 **Social changes during the season**

The peak period for Nuwara-Eliya is the April season. At this season people make their way up to the hills leaving the dusty scorching cities behind. The formal 'April Holiday Season' in Nuwara-Eliya has developed during the last five decades. Formerly it was the British who visited Nuwara-Eliya for their holidays while locals with some means, followed suit. Over the years the rigid and exclusive class boundaries broke down giving way to a more informal, social relaxed atmosphere. Nuwara-Eliya now is the popular destination of all those who love the area and would want to enjoy its balmy climate, cool nights and beautiful flowers and fresh vegetation.

During the April season the city expects more than fifty thousand holidaymakers for the entire month with the city benefiting economically. The business communities and those in the tourist trade describe it as the boom period. It appears during the April season. The leading hotels, guesthouses, private bungalows and other holiday homes are heavily booked by both local and foreign travel organizations for the month. The Hill Club, The Grand Hotel, St. Andrews Hotel, and The Tea Factory Hotel are some of the leading hotels that provide accommodation. The hotels organize many social events including entertainment shows, dances and other activities.

Figure 3.1 Seasonal Activities; A fashion show in the Race Course, 2003

The sprawling velvety tea gardens are a delight to weary eyes. Holidaymakers make it a point to come away from Nuwara-Eliya with fresh homegrown vegetables. Wayside stalls are filled with European vegetables and fruits during the season. Little children run to parked vehicles and try to sell some posies of flowers and tiny baskets of fruit. There is no nightlife during the rest of the year but Nuwara-Eliya comes alive in a carnival atmosphere during the season. A lot of recreational locations are scattered throughout the city. They are identified as follows:

(a) Victoria Park

This is the large ornamental park in the center of the town, which is a good spot to see a number of hill country bird species. The yellow-eared bulbul, the pied thrush, the Kashmir flycatcher, the Indian blue robin, the grey tit, the Indian pitta, and the Pacific swallow are some of them. The Green sand piper is a common sight along the stream that runs through the park. Holidaymakers find that Victoria Park filled with beautiful flowers is a restful place for a quite stroll or a picnic or other quite relaxation. It is open from dawn till dusk.

Figure 3.2 Victoria Park

(b) Race Course

The racecourse, to the south of the park, becomes the host to many pony races, horse races, motor races, flower and garden shows during the season.

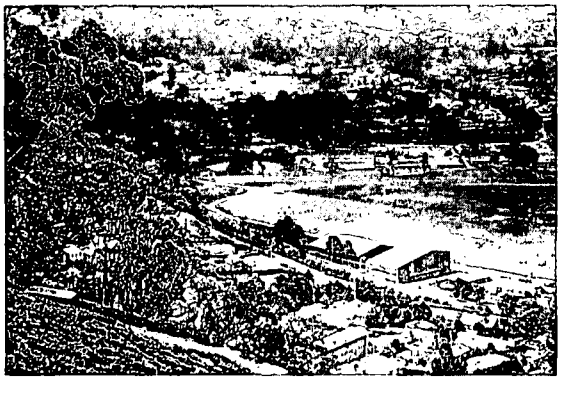


Fig. 3.3

Fig. 3.4

Figure 3.3 The race course from the Single Tree Hill

Figure 3.4 A horse race took place in the race course during the April season in 2003

(c) Galways land Sanctuary

Galway's land Sanctuary is a nature reserve that consists of evergreen montane Rain forest and under growth. It is a primary forest patch that is located within the city to the North of Lake Gregory and offers environmentalists and nature lovers a wide variety of plant and bird life not found in any other part of the country. A visitor who likes to enjoy the calm and quite environment within the city can have that experience while walking in the Galway's land sanctuary. Also this nature reserve creates a background to the Northwest end of the Lake Gregory. It is managed and maintained by the forest department. The canopy trees are less than fifteen feet in height, two storied and floristically poor. The vegetation type is as mentioned in the chapter 1.3. Other than this introduced spp such as Pinus spp., Eucalyptus spp., Accacia spp. and Cyppressus spp. can be seen in the sanctuary. They are relics of the colonial period or trees that were planted in the 1960's.

Figure 3.5 A wetland in the Galway's land forest

(d) Golf Course

The Nuwara-Eliya golf club is in walking distance from the town center. It was established in 1889. The club offers 18-hole course for a green fee of about Rs. 1500 (could rent clubs, shoes and buy old balls)

Figure 3.6 Golf Course in Nuwara-Eliya

(e) Lake Gregory

Lake Gregory is another attractive feature in the city. It was formed by constructing a weir across the course of Nanu-Oya during the period of Governor Sir Willam Gregory (1872-1877). Trout fishing and boating activities were a common sight at the beginning. But due to the excessive siltation and pollution these activities were disappeared. However the boat yard supplies the boating activities and other recreational activities during the season for the holidaymakers.

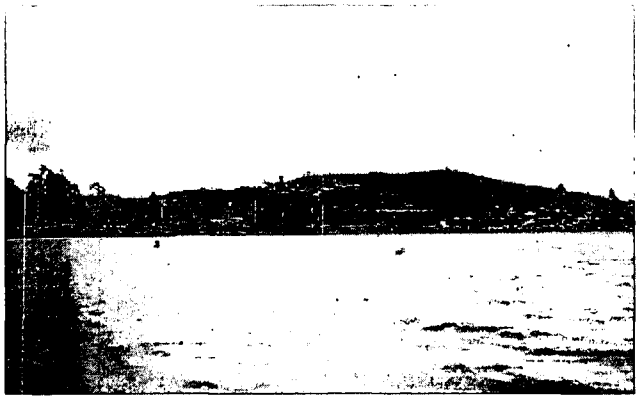


Figure 3.7 Lake Gregory in Nuwara-Eliya

(f) Pidurutalagala and Single Tree Hill

Nuwara-Eliya offers good adventure sport locations for tracking and hiking because of its landscape. Sri Lanka's highest peak the Pidurutalagala also known as Mount Pedro, rises 2524 m (8281 feet) above sea level, immediately behind the town. Unfortunately, the path to the summit, which is the site of Sri Lanka's main television transmitter, is closed to visitors for security reasons. For a view of the summit, and a superb panorama of the surrounding hills and plantations, a visitor can walk to the top of the picturesquely named Single Tree Mountain, south of town off the Badulla road.

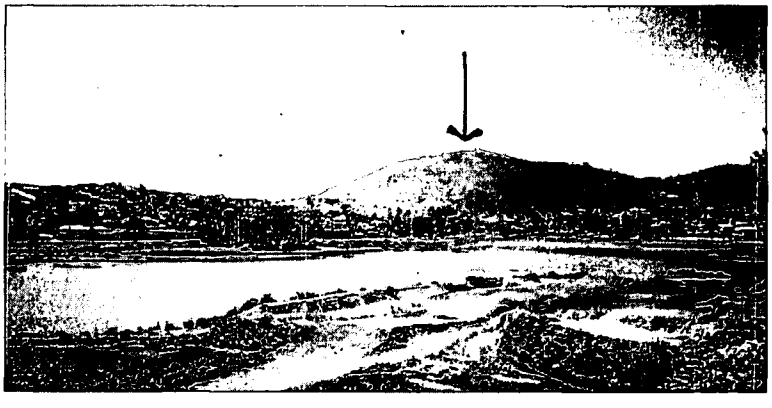


Figure 3.8 Single Tree Hill Mountains from the Upper Lake Road

(g) Horton Plains and the Worlds End

The landscapes of this high, misty plateau, 20 km south of Nuwara-Eliya and up to 2400 m above the sea level, are unique in Sri Lanka, combining mountain grassland with areas of miniature 'elfin' forest – dwarf forms of trees and shrubs adapted to the climate and skimpy soil of the plains. The eco-system in the Horton Plains provides rich diverse plant vegetation with many future potential uses in the fields of horticulture, agriculture and medicine. A unique collection of mountain flora adapted to the winds and climate of the region are also noteworthy. Due to the wide expansion of the plains, bird watching is easy and their flights may be followed unhindered.

Fig. 3.9 A mantle of mist over Horton Plains

Fig.3.10 A magnificent specimen of the Large Giant Fern (Cyathea)

Fig. 3.11 A pool scattered over the Horton Plains

Fig.3.12 Red Flowered *Rhododendron ceylanicum*

Horton Plains is famous for the World's End where the Southern side of the plains plunges 5000 feet into nothingness. Added to this the fascination of the place and the cold grandeur of it is incomparable. Hiking would certainly be a thrilling experience from the plains. The 2150 m tall Thotapolakanda and the spectacular 2392 m tall Kirigalpotta provide nature lovers with panoramic beauty.

The twin waterfalls at Thalawlkele, the Devon and St. Clare,'s on the outskirts are also popular attractions during the seasons. Many waterfalls could be visit as a part of trekking or hiking expeditions.

3.1.3 Change of Natural Forest Cover

As previously mentioned more and more forest areas were cleared in large scale around Nuwara-Eliya during the British period for the cultivation of coffee, tea and other English vegetables. This continued even after the independence of the country.

Nuwara-Eliya city, which is located in a valley cup, is surrounded by a number of natural forests, which belong to the upper montane rain forest. (These forests are mentioned in the chapter 1.3)

Changes in forest cover during the post independence period in the Nuwara- Eliya municipal council area are shown in the following air photograph in 1956, 1986 and 1993.

According to these maps, 1800 acres (720ha) of natural forest disappeared between 1956 and 1984. Most of this deforestation resulted from the expansion of agricultural land and human settlements. Also the establishment of forest plantations (nearly 400 ha i.e 1000 acres) which consists of exotic tree species gives evidence of the conversion of a certain amount of natural forest in to forest plantation to full fill the demands of timber and to provide wood for the tea industry and the rail way. Fast growing exotics species such as Eucalyptus spp, Pinus spp and Acacia spp were used for these plantations.

Further loss of forest occurred between 1986 and 1993. A prominent feature of this period was that conversion of the Eucalyptus grandis forest plantation in the under bank area in to the so-called "middle class" housing project. A significant feature during these four decades, that is after the independence was the conversion of natural forest, forest plantations and degraded tea lands in to home gardens. While this situation is continuing, the quality of the natural forest decreases mainly due to both authorized and unauthorized fire wood collection.

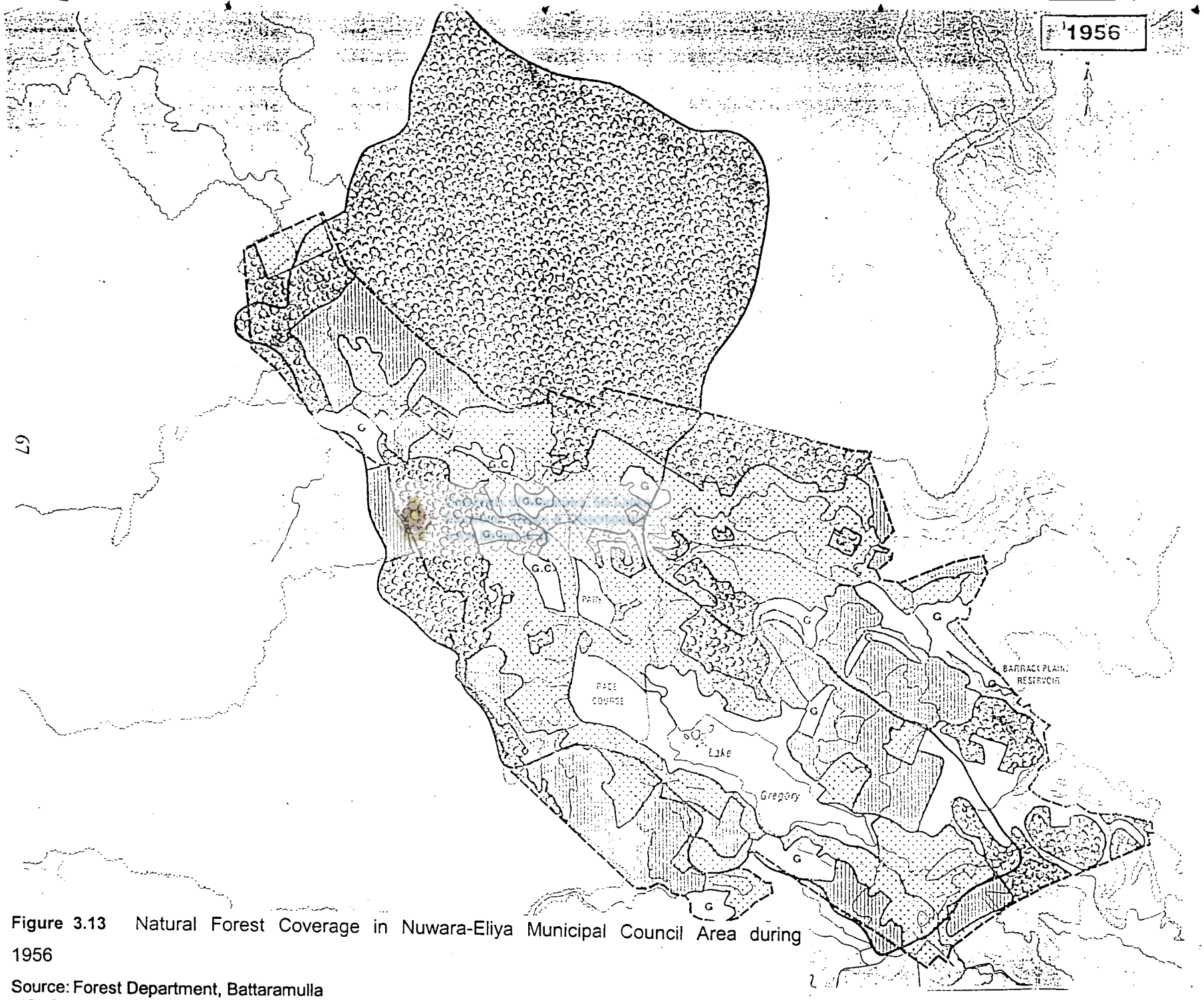


Figure 3.13 Natural Forest Coverage in Nuwara-Eliya Municipal Council Area during 1956

Source: Forest Department, Battaramulla

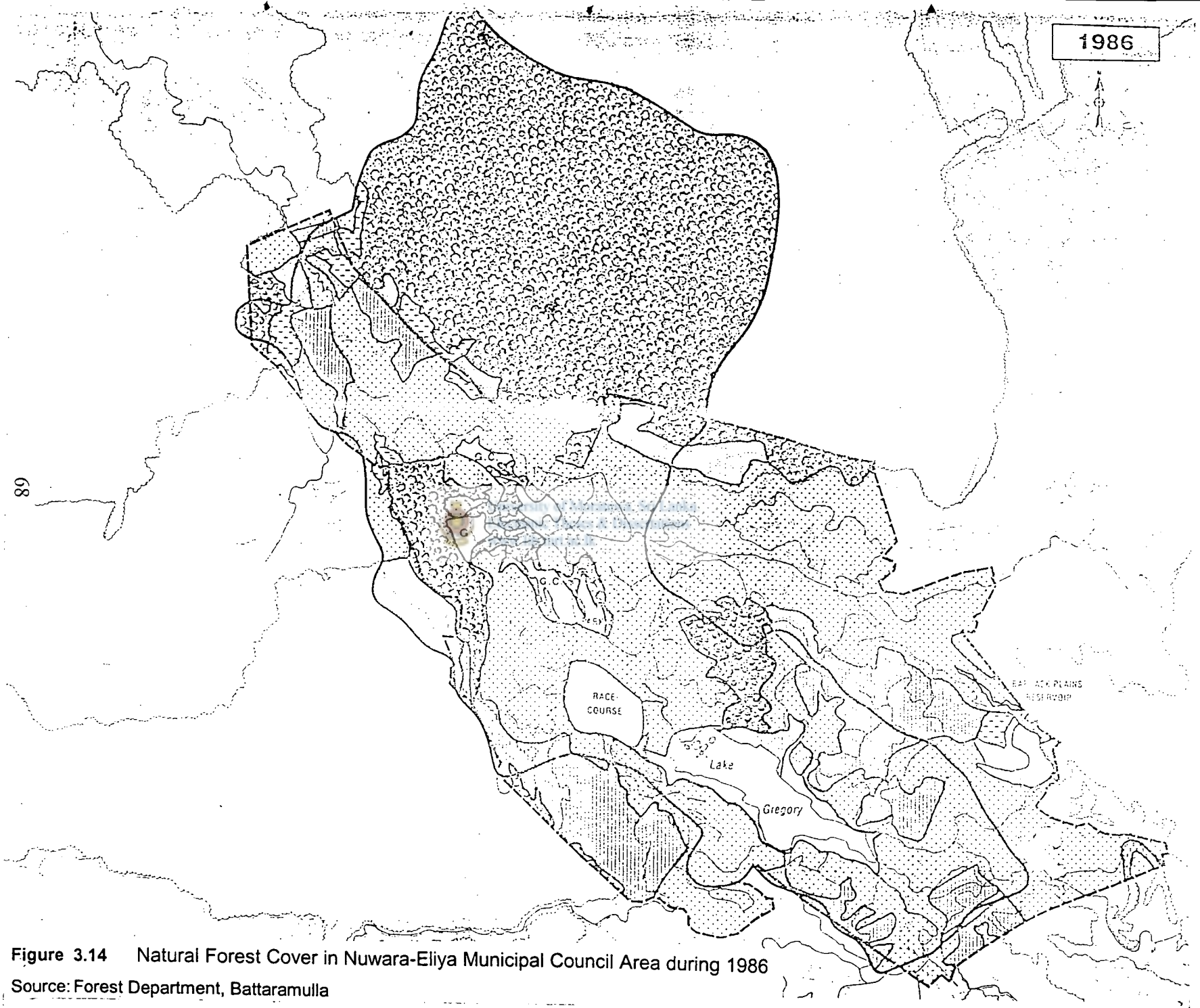


Figure 3.14 Natural Forest Cover in Nuwara-Eliya Municipal Council Area during 1986

Source: Forest Department, Battaramulla

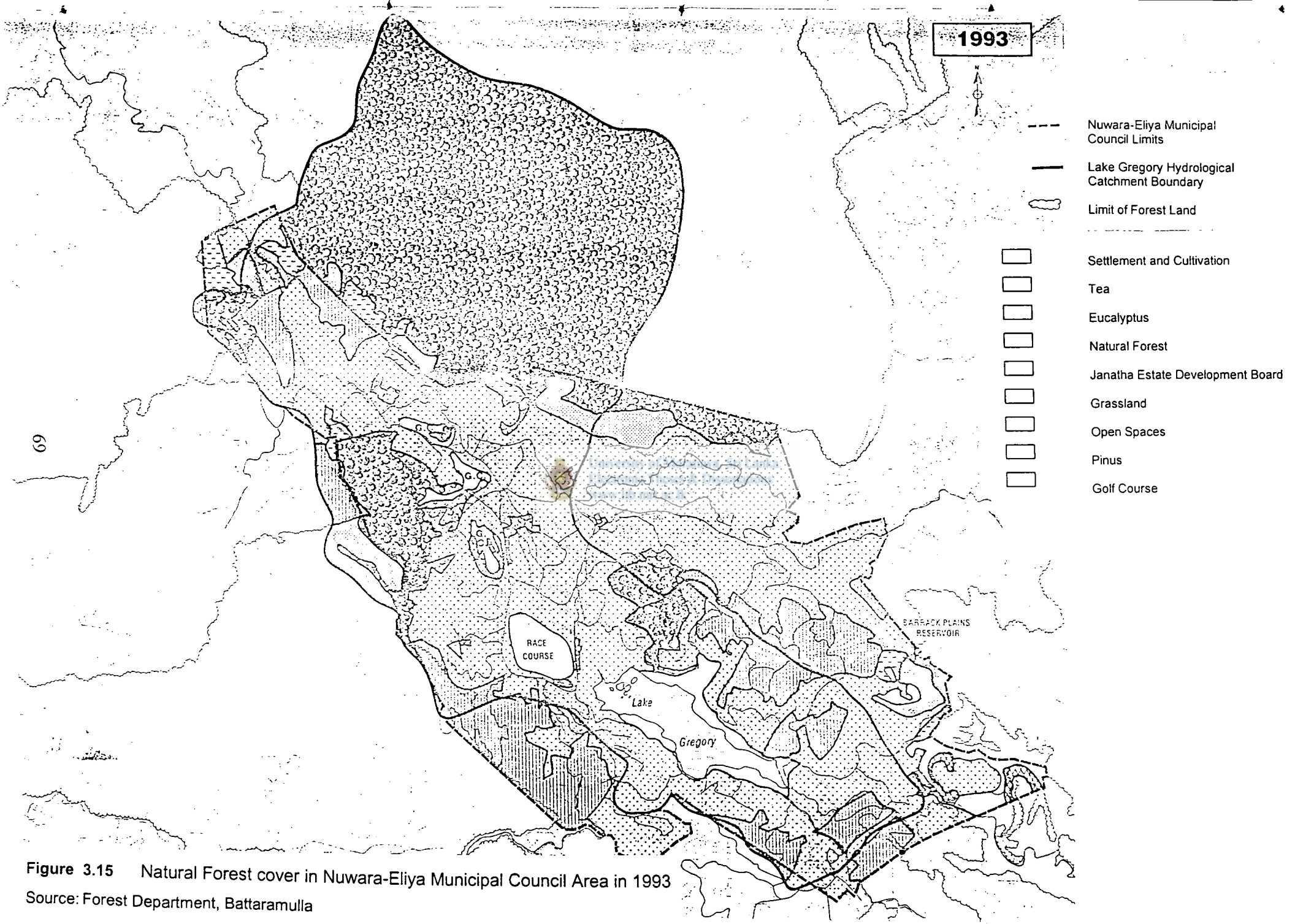


Figure 3.15 Natural Forest cover in Nuwara-Eliya Municipal Council Area in 1993

Source: Forest Department, Battaramulla

3.1.3.1 Effects of forest and forest plantations in the city

Natural forest cover and the forest plantations in the city influence the environment as well as the settlements directly and indirectly. The ecological significance of these natural forests can be described as follows:

They provide excellent natural habitats for birds. Especially the Galwaysland sanctuary represents a unique site to be preserved, as it is the only surviving large patch of native vegetation and it attracts a lot of birds within the city. The natural forests also provide habitat for orchids, lichens, and mosses, which are facing drastic reductions due to the air pollution. Other than this they supply food sources to the birds and other animals for example 'Gal veralu are eaten by the giant squirrel, 'mal veralu' fruits by the bear monkey. They also provide sources of nectar for insects and birds.

Beyond this they fulfill the needs of the human in the city. Especially the forest plantations, which are grown and managed by the forest department. In the Nuwara-Eliya Municipal council area nearly 56% of the house holds source of energy for cooking is firewood. Also a few people use it as their energy source in heating.

Most of the firewood consumed in Nuwara-Eliya city comes as a forest product. A smaller quantity mainly rubber wood is imported from the low country wet zone. The sales outlets, for example the State Timber Corporation located in Hawa Eliya, which belongs to the forest department depend solely for their only supplies, upon the forest harvestings. According to the recorded data they harvest 100-125 ha of mature forest annually for replanting. Firewood also comes as a by-product of forest harvesting. Another source of firewood is the authorized collection of Nelu sticks (Strobilanthus sexenis) from Kikiliyamana and Pedro forests. The villages are allowed by the local forest officials issuing permits to collect dead Nelu sticks which grows up to 3m in height in the undergrowth. These plant species form thick undergrowth and removal of the dead plants is beneficial for the regeneration of the other plants of the forests. Unfortunately legal permit holders are taking knives and debarking or cutting branches of standing trees, which ultimately results in death of the trees. Once these branches or trees are dead they can be freely collected as the collection of the dead fallen firewood is permitted although it is contrary to the forest law.

In order to ease the pressure on state forests and provide opportunities for the people enabling them to produce their own fuel wood requirements a home garden development program has been launched by the forest department. Besides producing fuel wood and other products this could prevent soil erosion that occurs due to the intensive cultivations carried out in agricultural practices. This also could improve the landscape aesthetic, and if the growing of fruit trees is found to be profitable more farmers might take to fruit growing.

Other than firewood collection smaller timber is used for construction work.

Eucalyptus or Pinus plantations are scattered around the city with the highest the concentration occurring at the elevation between the town and Top Pass. These tree species are appreciated for their fast growth rate, but they affect soil properties and have as well allelopathic effects on ground cover vegetation. Therefore Eucalyptus is not an ideal species for erosion control. Also as these are mono cultural forest plantations they are not acceptable either environmentally or aesthetically.

3.1.3.2 Agricultural Landscaping

Agriculture and agriculture-related business, involving a large sector of the population, appear to be the dominant economic activity in the city. Potato and other exotic vegetables of high quality are produced here and marketed in Colombo as well as in the Maldives and Middle East. The cut flower industry is a source of foreign exchange earning. Therefore agriculture is an important source of supplementary income to almost all wage and salary earners in Nuwera Eliya.

There are several distinct types of agricultural enterprise, which can be identified in the city. These are home gardens, large farms, state sector and intensive commercial enterprises. When entering to the city, at the "Top Pass " the impression that one gets is, that it is a garden city with numerous vegetables plots spread from the valley to the top of the ridges and hills. A large majority of them are home garden plots with potato and vegetables. These farms and

home garden plots are located in various places in the city. The majority of them are on hill slopes, ridge slopes and foot hill slopes, while others are in upland and in valleys. Also they are in various sizes, from less that 25 perch to as large as 290 perches.

Perches	Percent of farm plots surveyed (%)
< 20	29
21 – 40	40
41 – 80	19
81 – 160	07
> 160	05

Table 2: Sizes of Nuwara-Eliya farm plots
Source: NEES REPORT,UDA,1995

The use of fertilizers, hormones and pesticides in potato and vegetable crops is a common feature. Organic matter in the form of cow-dung is added in all the farms for the potato crops and less commonly for vegetables. Irrigation is an essential factor through out the year for the crops. At the times of dry weather, potatoes and vegetables are irrigated. The peak period for irrigation is February and March. Sources of water for farm irrigation are varying. Use of municipal water for irrigation in home gardens is very common. For the large farms, they use sources such as ground water (wells), streams and also lake Gregory. Drainage of these farms is by road drainages, adjoining farmlands and the lake. All road drains end up in Nanu-Oya or the lake directly. Tea, which is the major crop in the Nuwera Eliya city, is considered as an environmental friendly crop if it is managed well, but it will damage the environmentally if it is managed poorly. In the municipal council area of Nuwera Eliya city, three large blocks tea plantation can be identified. (Fig. 1.22) They are,

- Bambarakele Ward (between the Top Pass and the town center)
- Haddon Hill Ward (located in South-west of the lake Gregory)
- Magastota Ward (located in the North-east side in the lake Gregory)

As discussed in above, through the aerial photographs it can be clearly seen that tea cultivation has been reduced due to the conversion of the marginal tea land for housing schemes and agriculture. Abandoned tea plantations due to the low yield have also been made over to these uses.

The other agricultural activity in the city is the large-scale horticultural green houses of Huejay International Ltd, which produce the cut flowers (Carnations) and the strawberry project, which are carried out for export. These large-scale agricultural enterprises are presented separately, because of their importance in the surface area occupied in prime location for recreational activities.

3.1.3.3 Changes in the built environment

With the leaving of the British occupants of the Nuwara- Eliya it is caused to start a change in owner ship of the home garden, bungalows and tea estates.

During the British period, bungalows and cottages occupied scenic locations and were often screened from the road with trees and shrubbery, a affording only glimpses of the buildings. The driveway opened to a lawn, across, which the building often framed by more trees or plants, was seen in full view. Also a vegetable patch formed the kitchen garden act the rear or side of the bungalow. Even today some of these features can be identified in the old buildings such as The Grand Hotel, formerly Barnes Hall. The British period public buildings such as the Post Office, Holy Trinity Church and the Vicarage, the Gold club building and the building presently occupied by the Hatton National Bank still remain in a fairly good state of preservation. Also they are presently situated well in the landscape.

After independence the bungalows, cottages and tea estates were occupied by the richer strata of Sri Lankan national. This class of people had the desire to imitate and live like British. This new class of holidaymakers, who could not afford to own and maintain bungalows in Nuwara-Eliya created a great demand for accommodation, which in turn required more buildable land. The land, which belongs to large bungalows, was subdivided in to small plots.

The maximum living space was constructed in this plot of lands for the purpose of renting out to holidaymakers. Most of these building structures are permanent, but some of them improvised. Also these were not very luxurious or comfortable except a very few.

Most of the recent buildings are of varying styles, and are often not in keeping with the character of the area in many respects. There appears to be a degree of ostentation and a requirement to be seen, rather than a need for privacy with glimpses of a building given through a tracery of foliage. This to some extent is borne out by a lack of trees along the boundaries of such bungalows, due to a lack of concern for gardening.

Line houses, which were dwellings constructed for estate workers and municipal workers having lower incomes are important considerations in Nuware-Eliya. Due to family household increases over time they have become inadequate in their space. Also due to disrepair they are often unsightly.

The Golf Course of Nuwara-Eliya which is located in the heart of the city, is totally surrounded by buildings, roads and private premises. It is the key tourist attraction in the city, which makes the image of "Little England". The extension works carried out in the last decades make it a world class professional Golf Course.

Figure 3.16 Golf course in Nuwara-Eliya

3.1.3.4 Current Land Use

The land areas, which belong to the Municipal Council of Nuwara-Eliya, fall into the following categories.

	1987 %	1991 %	1991 ha	1995 %	1995 ha
Residential	25.1	25.2	377.5	7.4	112.43
Homestead (Vegetable gardens)	13.5	14.0	210.14	23.2	347.78
Commercial	0.5	0.5	8.1	2.3	34.09
Industries	1.5	0.6	8.4	0.9	13.37
Tea estates	16.0	16.0	240.16	15.9	239.00
Forest	15.1	15.1	226.8	15.1	226.80
Agricultural Activities	-	-	-	8.4	127.24
Parks & playground	4.4	4.4	65.6	3.1	45.97
Public & semi-public	4.6	4.5	68.14	5.2	78.21
Roads	9.8	10.3	154.46	10.3	154.10
Water bodies	3.2	3.1	46.53	2.7	40.42
Open areas	-	-	-	2.2	32.63
Marshy land	2.6	2.6	39.17	1.1	16.50
Religious activities	0.6	0.6	9.00	0.6	9.00
Cemeteries	0.2	0.2	3.0	0.2	3.00
Vacant Land	1.2	1.2	18.0	1.4	20.46
Tourist Industry	1.7	1.7	26.00	-	-
Total	100	100	1501.0	100	1501.0

TABLE 3 Land use categories, Nuwara-Eliya (refer the fig.1.22)

In 1987 and 1991 the residential land use, which included agricultural activities, represented 25% in the city. Residential lands where no significant agricultural activities are being carried

out represented 7.4 % of the municipal council area in 1995. During this year a distinction was made between homestead and residential land use because homesteads represent, a large proportion of land use. Residential land was considered separately and was defined as "dwelling houses without any cultivation or with and insignificant area of cultivation".

The vegetable cultivation was divided in to two categories as homestead (vegetable gardens) and agricultural activities. The residential houses with vegetable cultivation on a land smaller than 20 perches in extent were categorized as "homestead". Vegetable cultivation carried out on land larger than 20 perches was categorized as "agricultural activities". Most of the production done by the house hold was potatoes and up country vegetables.

Commercial activities "Including land areas occupied by hotels and guest houses" haven't shown a significant increase between 1991 and 1995 in the municipal council area of the city. But relatively large residential houses are temporarily converted in to guesthouses during the tourist season, that is, April and the winter season and indicate that there is a shortage of guesthouses and hotels in Nuwera-Eliya. Following the Table data, during 1995 open areas and parks and playgrounds are considered separately, but earlier together. Reductions in open areas due to the encroachment of land strips, road reservations, canal and river reservations for commercial purpose and the cultivation of cash crops.

The surface area occupied by water bodies has decreased. This is the result of dredging and desiltation works carried out in the lake Gregory in past years. In addition, the encroachment of Barrack Plains reservoir and lake Gregory is another factor, which contributed to reduce the extent of the water bodies. Also the wetlands in the Nuwara-Eliya city area, which are essential habitats of eco-systems, have decreased. Significant losses of wetlands occurred between 1987 and 1991 when many wetlands located around lake Gregory were filled with dredged materials. Additional wetland losses have occurred due to the expansion of vegetable cultivation and to the construction of unauthorized premises.

3.2 Problems and Impacts Associated with the Development of the City

3.2.1 Environmental Impact

The interventions of man on natural processes have always created environmental impacts. This is clearly reflected in Nuwara-Eliya during the last five decade, with it's fast moving development. Change of the physical environment of the city has been discussed above (3.1 Chapter), with less maintenance and agricultural practices largely responsible for the present severe environmental degradation. Major impacts have been soil erosion, the siltation of water bodies, water pollution and changes in the aquatic biology.

Soil erosion and the siltation of water bodies such as in lake Gregory and Barrack Plans reservoir are major environmental concerns in the city. Soil erosion, which is a complex process, is caused not only by agricultural activities, but by many other factors as well. During land preparation for planting, a considerable amount of soil is lost from exposed fields due to splash from rainfall. Improperly terraced land formation on steeply sloping lands has been responsible for numerous embankments slips and delivery of sediments to be carried away. In the tea plantation sector, poorly managed tea lands, particularly a high percentage of vacant area and non-adherence to soil conservation regulations are major reasons for soil erosion.

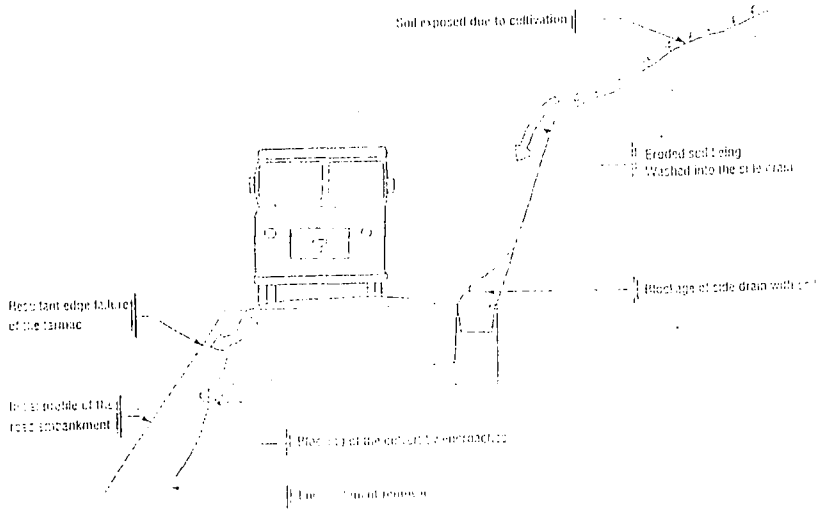


Figure 3.17 Contributing factors to road degradation

Source: Nuwara-Eliya environmental study, UDA, 1995

Land degradation is a major impact of soil erosion. Soil erosion on steep lands has been severe. Therefore, to maintain their productivity farmers are compelled to add large quantities of chemical fertilizers. In some locations, even the sub soil is exposed, on which addition of organic matter and quantities of fertilizer are essential to get any production.

Siltation of lake Gregory is an outstanding example of environmental degradation in Nuwara-Eliya. The size of the lake is much smaller and shallower than what it was 50 years ago. The other major problem in the city is water pollution. Pollutant sources are scattered through out the city adding various matter to the water, which caused a great threat. Most fertilizers and pesticides used in agricultural crops find their way to the streams and these have a high nitrate concentration. Specially during the wet season, due to the frequent showers, the high loads of pesticide which are spread on crops are washed away directly to the lake Gregory and the Barrack Plains reservoir. The highest concentrations of nitrates have been recorded from Nasby tea estate and the Magastota area.

Improper wastewater disposal is another factor that adds pollutant matter to the water. Most of the domestic water disposal is by individual septic tanks and soakage pit systems. But some households like line houses used bucket systems or they have no toilets or communal toilets. In many cases, especially in the city area, septic tanks are located too close to water ways and storm drains which result in partially treated sewage seeping in to the storm water drains and natural water ways. In almost all cases domestic wash water and sullage are discharged on to the land surface and eventually find their way in to natural waterways or storm drains.

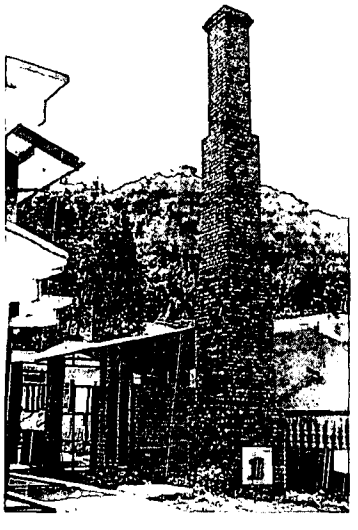


Figure 3.18 Abandoned incinerator in the Nuwara-Eliya hospital

The sewage from the hospital toilets connects to the sewage treatment facility situated in front of the hospital, and which is now abandoned. Therefore the untreated sewage seeps in to the marshy land around the facility, and ultimately finds it's way to the stream flowing by the hospital.

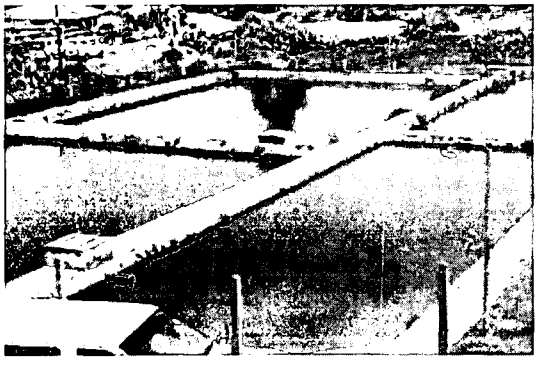


Figure 3.19 Abandoned solid waste disposal treatment system in the Nuwara-Eliya hospital

None of the hotels have proper sewage treatment facilities and it is said that they discharge their sewage in to Nanu-Oya at night.

The biohazard wastewater of the general hospital from the sinks, bathrooms and washbasins is discharged in to the open storm water drains. Used blood and blood products from the blood bank, Chemicals from the X-ray room, laboratory specimens (blood, urine, faeces) as well as chemicals from the laboratory and mortuary wastes are washed directly in to the storm water drainage system. In addition to this, the storm water drains also receive waste from the urinals in the toilet. All this is conveyed via the ground surface to the stream flowing by the hospital. (Figure 3.22) The hospital is currently a major environmental and public heath hazard because the stream is polluted by hospital sewage, solid sewage and other biomedical wastes. This steam finally flows in to the Barrack Plains reservoir where vegetables are being washed. Due to the adding of chemicals to the water bodies, the weeds have started to grow and to add visual pollutants to them.

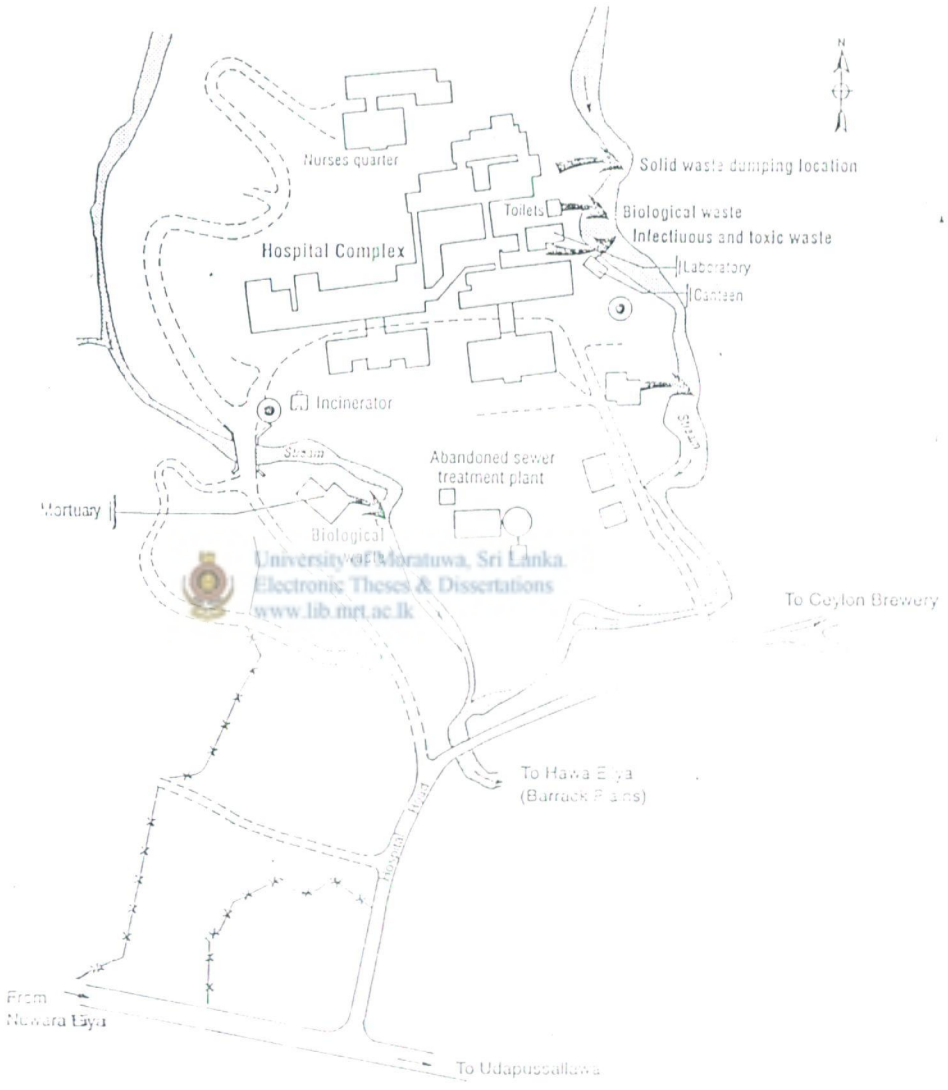


Figure 3.20 Adding the pollutant matters to the Nanu-Oya near the hospital complex

Figure 3.21 Removing the solid waste and biological waste from the hospital

Improper solid waste disposals also create environmental hazards. Such places are Nuwara-Eliya base hospital, the Garment Factory, Hotels and Guest Houses. The hospital generates different kinds of solid wastes such as anatomical wastes (body parts, organs etc), infectious wastes (bandages, dressings etc), sharp items includes needles, blades etc. pharmaceuticals and chemicals, glass and general waste (paper, food. plastic etc) All of these are disposed in many ways to the environment. The anatomical wastes from the surgical theatres are collected in plastic bags and sent to the mortuary from where they are taken to be buried in the cemetery. The placentas from the labor room are refrigerated and collected by a firm for hormone production purposes. The incinerator, which was installed for the purpose of the disposal of sharp items, is not functioning satisfactorily. Other than anatomical wastes and sharp items and all other categories of wastes are collected and dumped out side the hospital premises. Part of this waste is dumped in to an open municipal garbage bin situated at the rear entrance of the hospital.

The other great pollutant is that the current solid deposal site is located in a forest clearing at Moon Plains. It is situated in an Eucalyptus forest and is relatively flat. The site is an environmental disaster with the waste being simply tipped over the edge of a ravine. The waste slides down this ravine in to a fast flowing stream at the bottom. This stream finally

flows in to the Bomurella reservoir. (An alternative disposal site which has been identified at Meepilimana, is not functioning)

Figure 3.22 current waste disposal is done to a forest plantation

3.2.2 Visual Pollution

There are many factors contributing to the visual degradation of the city. Some are direct and others indirect. According to their visual aspect different kinds of landscape layers in the city have detracted at present.

The city in its valley is surrounded by its mountain ranges with their peaks still covered with the dark green mottled texture of gnarled trees of the natural forests. These gives way to the light green carpet of tea on the slopes and below them the human settlement. The tea plantation gives a pleasing color gradation to the down slopes. But when it is poorly managed, or abandoned it ceases to be pleasing. Such tea plantation can be identified from the viewpoints of the city, as Single Tree Hill and these are unsightly.

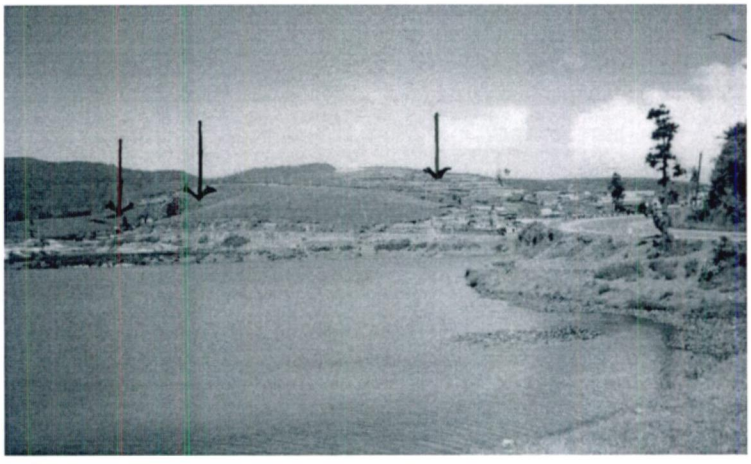


Figure 3.23 Abandoned and poorly managed tea estates; Naseby tea estate from the Southeast end of the Lake Gregory

The agricultural vegetation, which consists of low growing English vegetables, is horizontal in emphasis. These crops are planted in rows and long stretches of terracing contribute to this aspect. This is further emphasized by the absence of trees, which lend verticality to the agricultural areas.

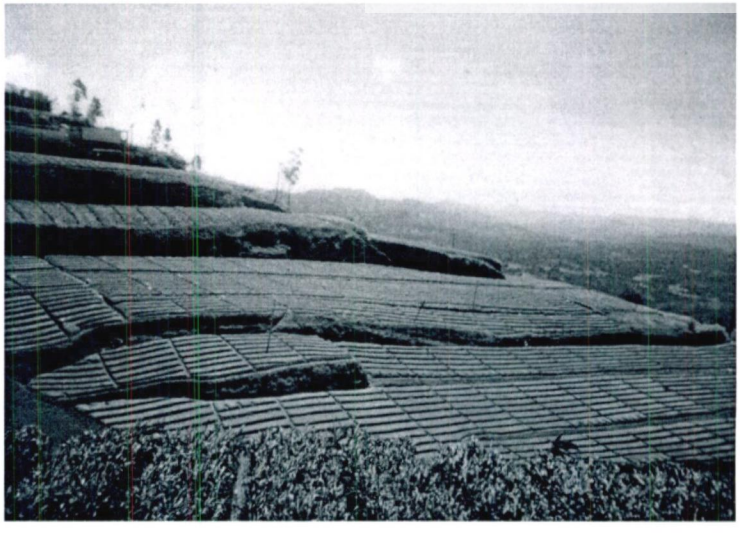


Figure 3.24 Agricultural Vegetation is horizontal in emphasis

The haphazard and rapid development of the city in the last five decades disrepair and thus unsightly. Commercial buildings are of mixed styles. The character of the buildings is such that modern styles with curtain walls are not in keeping with the character of the town. The height, volume and colors of the building are not acceptable visually. Also the positioning, size and type of sign boarding is yet another factor for consideration which brings tiredness to the eye. The industrial buildings in the city are in different ways visually unattractive. The roofscape of the garment factory are of is vast in scale. The rows horticultural green houses (located near the North west edge of the Lake Gregory) is an eyesore and they reflect the sunlight. The roofs of these structures are obstructive and seen from many viewpoints in exposed locations, with out the benefits of screen planting. The color, condition and extent of roofs are significant. The poor condition of many line rooms and shops roofs contributes little and often evokes comments that the town appears "a slum". Contributing factors to this form of degradation are the corrosion of sheet metal roofing and poor fixing methods, which require weights to be left on the top surface. (Old tires, Sacks filled with earth, grass sods) and these to a large extent negate the landform.

Another visual detractor is the dominance of man-made elements over the landform. They are the sign boards located in unsuitable places and their lack of uniformity breaking the rhythm of the environment. Also the location of the "Rupavahini" (TV) transmitting tower on the summit of the Pidurutalagala, the Telecom, Dialog, Mobitel and Celltel towers on the summit of Single Tree Hill and the ITN, Swarnawahini Towers on the summit of Kikiliyamana are all insensitive additions which contribute little to the landscape except visual clutter.

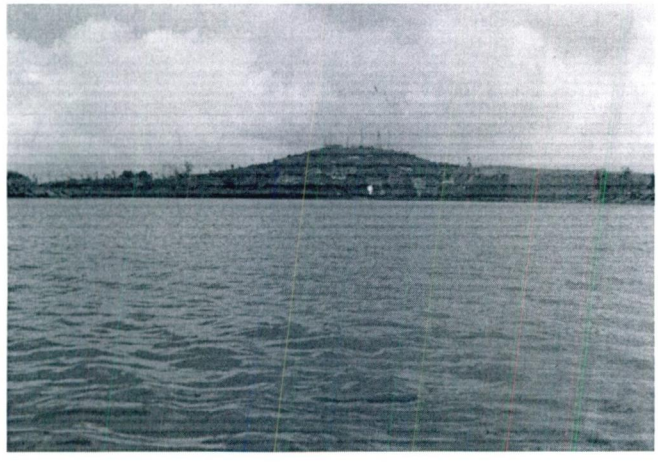


Figure 3.25 Manmade elements above the landform

Streets with scenic driveways, scenic walk ways and transport access ways, which are not properly, maintained disfigure their scenic beauty. Cattle, cowpats and the overflowing garbage bins contribute further disamenity.

The garbage bins located in the municipal collection points are usually overflowing, and the waste is scatted in the street and around by dogs, crows and other vermin. Especially during the season this visual hazard can be identified clearly due to the improper management of the municipal council of the city.

Figure 3.26 The waste is scattered everywhere

Figure 3.27 Cattle is a major detractor

CHAPTER FOUR

4.1 Restoration as a Holiday Resort and Commercial Center

Previous chapters have discussed the city character of Nuwara-Eliya. This city is unique with its cold climate and with no comparable landscape elsewhere on the island. More ever its distinction in having the highest point of Sri Lanka on its doorstep makes it a landscape location of national important.

How ever the transition of the city, in to a holiday resort for locals as well as a commercial center is causing a break with its original city character due to the non-understanding of the city's original concept. The scenic beauty and cold climate of the city brings a demand for housing densities closer to those needed to develop it as holiday resort. The agricultural practices and tea plantations continue to change the city for commercial purposes. Therefore it is necessary to identify basic concepts and make recommendations to bring the city to a balance in meeting the above purposes, but also conserving the best of its past.

It is important to consider producing a master plan for the city's conservation and future development. It should include the following.

- Suitable upgrading for recreational and tourist potential
- Improvements of forest practices
- Improvements of agricultural practices
- Upgrading and development of the city's infrastructure
- Improvements to the visual environment
- Conservation of the architecturally significant areas and historically significant buildings

These aspects are discussed further in this chapter.

4.2 Recommendations to upgrade the city and to enhance its character

4.2.1 Recommendations to upgrade the city as a holiday resort

To develop the city as a holiday resort it is necessary to improve its recreational and tourist potential. It should cater for the all year round tourism and also for the seasonal tourist peaks, which fall in April and May. It is important to develop a visitor and environmental public awareness center in order to distribute low costs maps leaflets, indicating locations of various facilities, recreational and tourists' sites and the sporting events. This is a very obvious need at present. To fulfill the requirements of holidaymakers it is necessary to provide sufficient accommodation first. Then enough facilities such as restaurants, recreational activities, transportation and access and commercial tourism related facilities are also important.

4.2.1.1 Provide sufficient accommodation and restaurant facilities

The existing tourist accommodation should be upgraded by including more facilities for the visitors. The Haddan Hill, from the Unique View area up to the Hill Club is identified suitable for medium scale tourist accommodation and for large hotels. Smaller guesthouse type accommodation might be allowed along any of the scenic roads, for example along the Badulla Road. Other than this the conversion of bungalows is preferred provided that the same character is maintained.

Restaurants and low scale developments on similar lines might be encouraged along Badulla road and Queen Elizabeth road from the roundabout to the Nanu Oya road junction. Covered areas for seating and picnic sites with controlled solid waste collection may be accommodated on selected sites between lake Gregory margin and road.

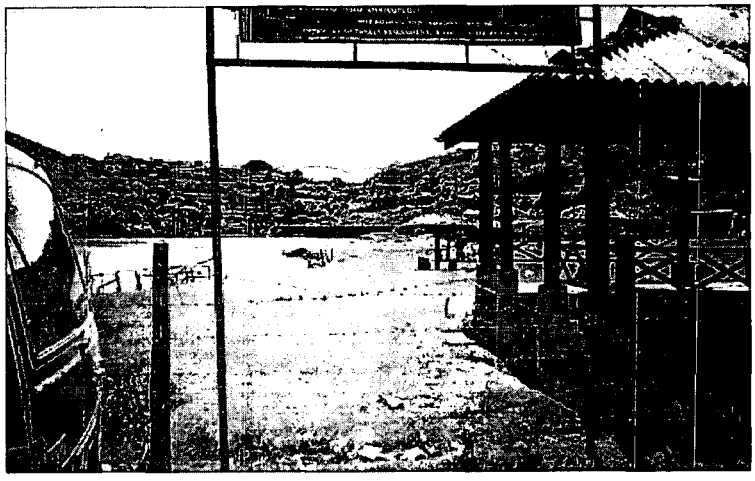


Figure 4.1 Lake Gregory margin, valuable for the developments of picnic sites

4.2.1.2 Upgrade and develop the recreational activities

Recreational activities are required as an ancillary to tourism. Active recreation can be developed in places like the Race Course, the Lake Gregory margins, the Golf Course and along scenic driveways. Passive recreational activities can be developed along stream margins and scenic walkways. Forests and plantations can be provided with trekking pathways and also at Victoria Park.

(a) Upgrade the Race Course

The racecourse is another form of sustainable tourism, which could be initiated in Nuwara-Eliya as it has all the attributes required for high attitude training of runners and other types of long distance athletes. Altitude training requires athletic facilities located at an altitude of 1800-2200m. Nuwara-Eliya thus has immense potential for development as an altitude-training center. The Race Course area has been identified as a suitable location for such development. This form of

tourism would provide a year round influx of international tourist and domestic athletes in addition to seasonal tourism.

National and International sporting events have a tendency to attract private sponsors and large crowds. This form of tourism would certainly contribute to bring private investment to the region. In addition, it does not need to greatly disturb normal activities of the local population (like motor sports) and it is usually environmentally friendly. This new form of tourism would probably trigger some changes in local activities as residents and private businesses tried to get their share of the tourist industry by providing catering services for clients who are environmentally health conscious. In this context, the diversification of agricultural crops would be desirable in order to produce, in addition to vegetables, local fruits to support the demands of athletes, who need to include many fruits and vegetables in their diets. Several athletes coming from western countries would certainly favour certified organically grown fruits and vegetables to vegetables and fruits grown inorganically.

(b) Upgrading the Golf Course

Golf Course is a major attraction for many years and requires upgrading within the constraints of its location. Many other facilities should be provided for example passive games and a spa. These should be encouraged, if provided as in-house facilities of guesthouses and hotels. However, they may also form part of the athletics training facilities.

(c) Upgrading the Victoria Park

Victoria Park can be upgraded with passive recreation activities like walks and the supplying of rest and pause points. It can be further improved by adding to the planting, stabilizating the Nanu-Oya margins and preventing the dumping of garbage.

(D) Development of the Recreational Potential of Lake Gregory

Lake Gregory is a major asset to Nuwara-Eliya in landscape terms. It serves as a reflective body of water, ensures open space and serves as a foil and platform to the surrounding landform. It has immense potential for both passive and active recreation, both on the water surface and around the lake margins. It would thus admirably respond to improvement in serving tourists visiting Nuwara-Eliya.

The Badulla roadside of Lake Gregory could be developed for its recreational and tourist potential since it is easily accessible, close to the lake and as this side has already been deforested for residential development. The Upper Lake road side should be preserved for less intensive users as there is still indigenous and naturalized vegetation remaining in the area which represents a visual attractor from the Badulla road. Active recreations like boating, sailing and rowing can be introduced on the surface of water.

The following recommendations are proposed by ROCHE International in order to develop the lake margins for the recreational purposes.

- The area around the mouth of Nanu-Oya at Lake Gregory is recommended as a Nature Park and a model for Environmental programmes.
- A more naturalistic out line to lake Gregory is recommended by modifying the outline of the bays holding formerly dredged material. The excess soil could be used for upgrading the Race Course or sold to farmers being nutrient rich.
- A wide reservation (15-20 m strict reservation) is recommended for the margins of Lake Gregory. Such margin to accommodate shoreline stabilization (preferably vegetative only) with walkways and rest areas. Structures should not be permitted. However, a few selected areas between the road and lake reservation margin could host small-scale recreational structures.
- A rowing club and boathouse to be established on the margin along with planting of trees. The location of the rowing club / boat house should be e set back greater than 50 m from the water edge.
- Sailing and windsurfing is possible provided a portion of the lake is dredged to over 2m depth and is maintained clear of aquatic weeds. The rowing club facilities as mentioned

above could be extended for use by those sailing or wind surfing as well. A cover should be provided for storage of sailboats.

- The pathway, which is proposed to meander through proposed standards of trees should offer framed views of the lake at specific locations, with veiled or screened areas as well. The path should at all locations be maintained at a minimum of 10m from the water edge.

Figure 4.2 the open spaces near the lake Gregory margin at the Badulla Road side

These recommendations are started to process at present by the UDA by zoning the Lake Gregory margins. As landscape designers we can agree with most of these recommendations. Some of them are the ideas of the British Governors at that time. Creating a nature park at the mouth of Nanu-Oya was an old concept of the British Governor L.L. Wooley in 1927. He wanted to create a woodland park at the highland of the Lake Gregory and also to add more plantings to increase the beauty surrounding of the Lake. This is a need, to attract more tourists and providing more recreational for them help the sustainability of the city, as a holiday resort. At the same time adding recreational and beautifying the Lake surrounding shouldn't break the English City character of Nuwara-Eliya.

(e) Development of Nature Trails

The potential of Nuwara-Eliya for the development of nature trails is very high. The natural forest offers some beautiful streams and water falls, flowering vegetation, outstanding landscapes and a large proportion of endemic plants and wild life species. However this important potential has not yet been developed. Guided nature trials could be developed in Nuwara-Eliya with the objective of developing the recreational potential of the area, and rasing environmental awareness while preserving the environment from intensive uses.

These nature trails would have the advantage of becoming additional assets for Nuwara-Eliya and would possibly contribute to keep local and foreign tourists longer in the region. Eco-tourism is becoming increasingly popular worldwide. Potential sites for these nature trails could be Galway's land sanctuary, Single Tree Hill, Moon Plains forest and Pidurutalagala forest.

- A network of nature trails within the Galway's Land might be provided for the visitors in the form of a footpath
- Similar nature trails could be established for guided tours across the Pedro Reserve.
- The Kandapola Sita-Eliya Forest Reserve also has the potential for the development of eco-tourism.

(f) Development of Roads and Access ways

it is important to upgrade the scenic walk ways and the scenic drive ways (which are mentioned in the above chapters) as they serve all types of tourists, whether seasonal or year round.

Transportation is another important factor, which should be responsive to the needs of visitors to Nuwara-Eliya. The major networks are able to carry luxury buses but others are not. The city's roads need much improvement and suitable recommendations have been proposed by the ROCHE International as follows:

- A 15 m building line (measured from the center of the road) is recommended along scenic driveways.
- The area between the carriageway and building line ahould be used exclusively for planting and landscape elements.
- Street lighting, Pavements (side walks) for the comfortable movement of pedestrians, lay-bys for vehicles (preferably at scenic locations of as required by the road-side land use) and lay-bys (pause points) for pedestrians along the otherwise linear sidewalks, coupled with seating, at scenic locations are some of the street landscaping should be included.
- Other street furniture (telephone kiosks, junction boxes for telecom, electricity, post boxes, garbage bins and so on.)
- Planting of trees, shrubs and ground covers with a view to provide a shade and vertically as well as to assist directional movement and view.
- Under-ground infrastructures, preferably accommodated by collective enclosure in ducts under the sides.

4.2.1.3 Improvement of the Visual environment

(a) Emphasize the visual environment

Chapter 3.2.2 discussed the visual pollution of Nuwara-Eliya. The landform is a major characteristic of Nuwara-Eliya and It can provide a picturesque and scenic landscape for visitors. According to the visual assessment done by the ROCHE International in the city, the following proposals can be made in order to enhance the landform of the city.

- The landform should be emphasized by focusing on a sense of upward movement.
- The valley flow should, as far as possible, be free of structures. Thus structures and buildings could be accommodated on the lowest slopes of the enveloping mountains.

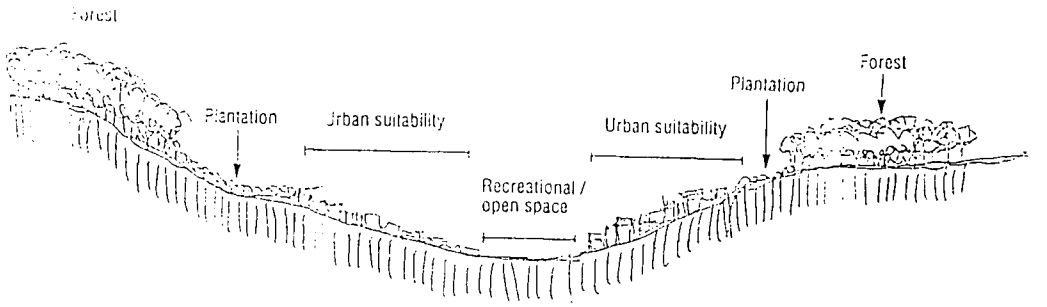


Figure 4.3 A typical section showing diagrammatically landform and land use pattern
Source: NEES Report, UDA, 1995

- Dominance of crowns of hills through the placement of structures should be avoided as far as possible. Summits to have vegetation and a naturalistic appearance.
- Agricultural practices should be improved to avoid the ugliness of bare patches of exposed soil.
- Regulation of form, volume and massing of structures on hill slops.

(b) Improvement of Vegetation

Much of the vegetation of Nuwara-Eliya is unique to Nuwara-Eliya and its immediate surrounding owing to climatic conditions. This aspect contributes significantly to the character of the city. Irrespective of weather the vegetation may be categorized as either endemic, indigenous or introduced.

The forest and tea plantation which are an intrinsic part of Nuwara-Eliya should be preserved and protected. Addition to the forest cover would improve the watershed; color radiation and the spatial containment.

The Unique vegetation, weather forest, riparian, wetland or introduced should be preserved and enriched where ever possible. These serve as important habitats for education, environmental awareness and visual appreciation.

Much of this planting is now beyond its prime and should be replaced. The planting should also be increased to provide contiguous tree cover, which is now fragmented in to isolated clumps. The following guidelines may be proposed to improve the vegetation:

- Urban areas where man's activities are dominant may be replanted with exotic species matching those already in use.
- The forest margins and buffers could have forest and plantation species.
- Forest species should not be mixed with exotics in the urban areas, from an aesthetic viewpoint.
- Mixing of forest and exotic species should be done along the margins of Lake Gregory against the backdrop of Galway's Land sanctuary to help screen the existing unsightly carnation house project.

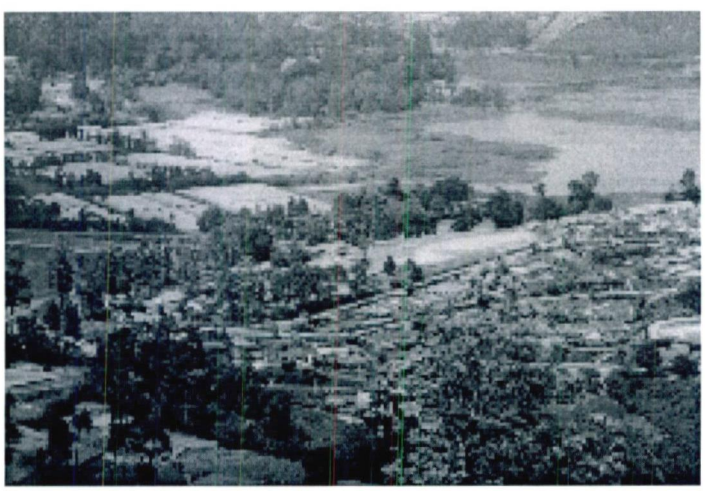


Figure 4.4 The green house carnation project at the margin of Lake Gregory

- Vegetation along stream margins should reflect its locality
- Trees of spreading habitat are not recommended. The form of trees chosen should be upright or vertical to enhance the landform. The form of all forest trees listed is characteristic and acceptable in the locations recommended.

(c) Improvement of Artefacts

Signboards, garbage bins and lampposts need to be upgraded to emphasize the character of the city. It is necessary to control signage to specific locations and to achieve some degree of uniformity. The nature of landform is such that most locations have a vast exposure within each spatial containment. It is good that advertisements do not dominate the entire zone, but only a limited group of views.

- Permanent advertising should be restricted to specific locations. These locations should command only a small visual sphere of influence and not the entire landscape zone.
- Each location should not display more than 3 advertisements at a time.
- Any permanent advertisement should not exceed a maximum stipulated area.
- Seasonal advertisements may be permitted at particular events for a maximum duration. (Eg: - Race course, Golf course)
- All trade advertisements should be only displayed on relevant buildings
- Sign boards of hotels, guesthouse should be provided only on relevant premises and in special cases a directional sign at relevant turn-off from major access role.
- Provision of suitable signs at entrance to Nuwara-Eliya.
- Banners should be discouraged.

CONCLUSIONS

In the modern world most cities have developed economically, physically and demographically but in a rather haphazard manner. They have grown rapidly during the post industrialization era, and its ultimate effect on the environment has given rise to many problems.

The evolution of man brought harmony and disharmony to the surrounding landscape throughout his concerted efforts. Looking at the landscape evolution of a city will reveal the intensions of his inclination to change the nature for the city is purely a manmade landscape.

Nuwara-Eliya is such a city, following its birth as a sanatorium by the British. A strong English architectural character was at first maintained throughout the city. In its history the city was consistently reconfigured, subjected to on going endeavors of interaction with land form. The population grew and spreading continued. The impact of it made on the environment was greater. Even if certain effects of the process tended to become irreversible the total structure of the city was left with few remarkable traces of its original landscape setting.

Following independence and the leaving of the British, changes in use brought new development and a new characters which diluted the earlier British character. The cutting of hillside forests around it to meet the increasing demand for land lead to devastrating effects, upon its natural balance. It has also leads to serious disturbance of the water regime of the hill country in which the water runs off the soil and brings drying out streams and flooding. The endemic and indeginious plant community in the hilly area was replaced by exotics and the commercial plants like tea and English vegetables. The domestic scale of the town block is overpowered by he unqualified gamuet of development. This situation is continuing at present and it was clearly defined by a fine statement of professor Donald Kennen, 'To have a natural area, a water body for instance, quite valuable and to destroy it by putting a dike around it and pumping the water out, and then at great cost proceed to make it into a- second class nature reserve' which seems ridiculus but what is actually happening here and everywhere.

Nuwara-Eliya is today an important city in tourism. It has evolved as a highly commercialized area without being concerned too much about tourism. It has much tourist potential which is not

developed or upgraded at present and this needs to be encouraged. Such development would bring a lot of opportunities in the job market and it would bring a great chance for the people who are seeking to catch even an inch of land for their cultivations. This will help to reduce the environmentally hazards which are now in an alarming approach.

Finally it is important for the city's future management to be aware of the essence of the city character and to formulate regulations to maintain its English city character with suitable adjustments for its sustainability. Also to conserve the historic buildings with restoration and adjustments and infillings to the bare patches of land where necessary all as discussed in chapter four. This will bring protection and little or no changes to the distotic areas and leaves the concerned areas alone, except for those activities needed to counterbalance the unavoidable influence of man.

But the field of landscape needs to begin this at the other end at which the areas of natural elements have been destroyed. It is here that the city needs a proper landscape master plan to confront all the destructive effects and bring what is pleasing to the eye and possibly to the ear that fits the soil and surface structure.

One of the reasons why appreciation of natural areas is generally so low is that no great human effort has gone into their establishment. Besides it will retain most of its valuable by not doing something. We seek to preserve what our ancestors have handed onto us as their architecture.

Therefore all the architects, landscape designers and urban planners aware of the city character so that their contributions may be strong enough to carry out these measures, in order to conserve and enhance the spatial landscape character of Nuwara-Eliya.

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