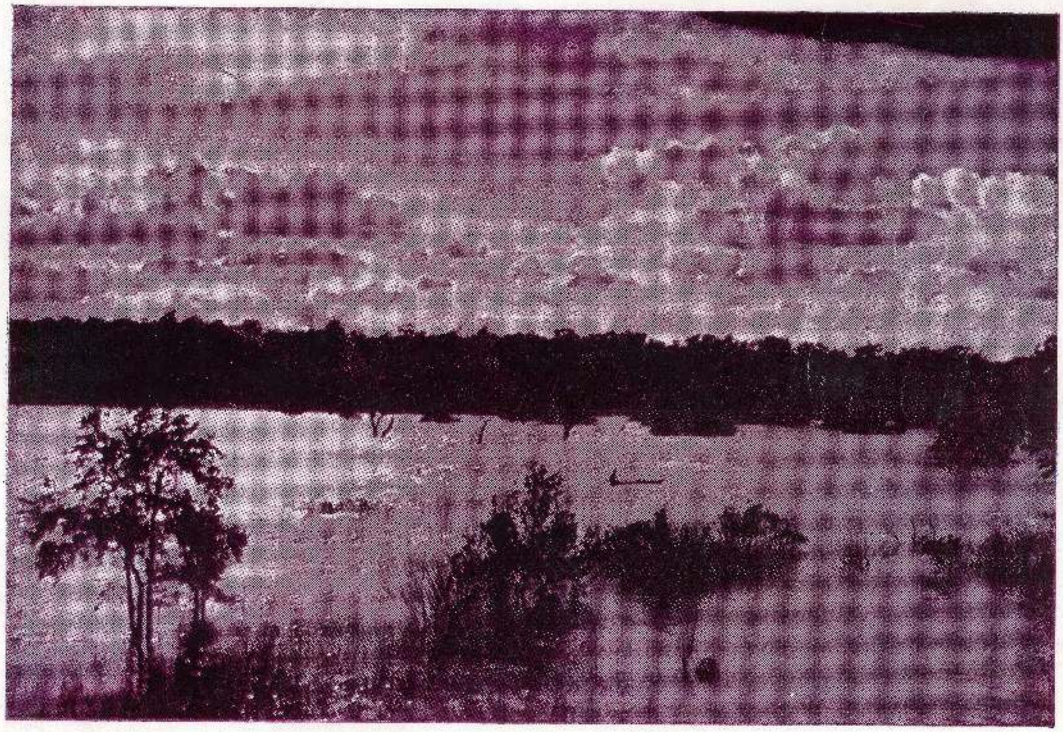
VOLUME XIII – Nos. 3 & 4
(NEW SERIES)
JAN. – DEC. 1978

Local – Rs. 5.00
Foreign – US $ 2.50

THE SRI LANKA FORESTER
(THE CEYLON FORESTER)



Published by the Sri Lanka Forest Department

Printed at the Department of Government Printing, Sri Lanka (Ceylon)

THE SRI LANKA FORESTER

(THE CEYLON FORESTER)

Journal of the Sri Lanka Forest Department

Editor

K. VIVEKANANDAN, B.SC. (CEY.), Ph.D. (ABERD.), M.I.BIOL.

Editorial Office

FOREST DEPARTMENT
P. O. BOX 509
COLOMBO 2
SRI LANKA
(CEYLON)

THE SRI LANKA FORESTER

(THE CEYLON FORESTER)

The Sri Lanka Forester (*The Ceylon Forester*) is published in June and December (biannually) by the Sri Lanka Forest Department.

The new series was started in 1953 and the journal publishes articles, reviews and research communications pertaining to forestry and allied subjects.

Articles published express the opinions of the authors and do not necessarily represent the views of the Forest Department.

SUBSCRIPTION RATES

Foreign :

Annual (2 numbers)	...	U. S. $ 2.50
Half-Yearly (1 number)	...	U. S. $ 1.50

Local :

Annual (2 numbers)	...	Rs. 5.00
Half-Yearly (1 number)	...	Rs. 3.00

Cheques/Money Orders/Postal Orders should be drawn in favour of the 'CONSERVATOR OF FORESTS' and crossed.

All correspondence regarding contributions, subscriptions, etc., should be addressed to—

THE EDITOR,
"SRI LANKA FORESTER",
FOREST DEPARTMENT, COLOMBO 2,
SRI LANKA (CEYLON).

Editorial Office,
FOREST DEPARTMENT,
P. O. BOX 509,
COLOMBO 2,
SRI LANKA (CEYLON).

2—A 34162—1,507 (5/78)

THE SRI LANKA FORESTER

(THE CEYLON FORESTER)

VOL. XIII Nos. 3 & 4 (NEW SERIES) JAN.-DEC., 1978

CONTENTS

Cover Photograph

"My Environment"

Photo by: W. R. H. PERERA

THE SRI LANKA FORESTER
(THE CEYLON FORESTER)

VOL. XIII **Nos. 3 & 4** **(NEW SERIES)** **JAN.–DEC., 1978**

> " *The forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends generously the products of its life activity : it affords protection to all beings, offering shade even to the axeman who destroys it.*"—GAUTAMA BUDDHA

EDITORIAL COMMENT

NEARLY 40 per cent. of the earth's surface is covered with forests. On this land area the forest ecosystem is the key factor in determining the capture and flow of solar energy, biomass accumulation, local climate and hydrology, mineral cycling and the general physiognomy of the landscape.

Forests are therefore of great ecological significance and what happens to them has profound implications not only for the ecology of the area in which the forest is found, but for the entire biosphere.

Forests have a major influence on the environment and affect local climate and hydrology. Forests serve to ameliorate climate and regulate run-off and infiltration. They are an important segment of the biosphere and environment.

It is imperative to recognise and take into account all the possible resources provided by the forests, rather than be preoccupied with only a few uses or products so that the real ecological significance of the forests will not be overlooked.

In this issue we are publishing four articles on the ecological and environmental aspects of our forests. Two are written by Mr. W. R. H. Perera, Conservator of Forests entitled ' *Catchment Areas and the Protection of the Environment* ', and ' *Thotapolakanda—an Environmental Disaster* '. The third one is written by Dr. (Mrs.) Savithri Gunatillake on ' *Sinharaja Today* ', who incidentally is considered an authority on the ecology of the primeval Sinharaja forest. The fourth one is a position paper prepared by a Committee of Scientists of various disciplines on ' *Conservation of Mahaveli Catchment Area.* '

We hope that these articles will bring to focus the importance of our forests in maintaining the balance in our biosphere and in creating a healthy and habitable environment.

APPRECIATION

K. B. ARIYAWANSA

IT is with profound regret we record the sudden and untimely demise of Mr. K. B. Ariyawansa on 12th November, 1977. His sudden death, at the prime of his life, was shockingly sad to us all.

Born on the 3rd January 1945, he received his secondary education at the Thurstan College, Colombo. After obtaining a science degree with honours from the University of Sri Lanka (Vidyodaya Campus) he was selected as an Assistant Conservator of Forests on 1st February 1972. He successfully completed the two-year Post-graduate Diploma Course in Forestry at the Indian Forest College, Dehra Dun, India (1973-1975).

On his return from India, he served as Additional Divisional Forest Officer of the Up-Country Division till 1976. Thereafter he was attached to the Silvicultural Research Section of the Department.

His service in the Forest Department was just over five years and during this short period his impartiality and forthrightness were evidently mainfest in all his actions. He was a perfectionist and did not tolerate any imperfections. But he was above rancour or malice.

'K.B.' will be sadly missed and fondly remembered by the fraternity of the Sri Lanka Forest Service for his meaningful contribution to the social activities of the Department which he thoughtfully conceived and actively pursued.

He was an active member of the Forest Department Scientific Officers' Union and functioned as it's Secretary at the time of his death. During his short tenure of office as Secretary of the Union, he had performed his duties with dynamism seldom encountered among contemporary officers.

His amiable disposition, pleasant and endearing manners, sympathy for all with whom he came, in contact made him an unforgettable gentleman of rare character.

He died after a brief illness. He is survived by his wife, son and a large number of friends, associates and admirers. Our sympathies are with them.

A.D.R

The Sri Lanka Forester, Vol. XIII, Nos, 3 & 4, January–December, 1978

Catchment Areas and the Protection of the Environment

W. R. H. Perera
(*Conservator of Forests*)

> " *The Forester is one of the prime guardians of our conditions for continued life on this planet, not merely for some poverty stricken existence, but for the kind of environmental quality which civilization requires* "

WITHOUT water the biotic ecosystem cannot survive. It is the most important commodity in man's survival.

It has been estimated that of the total annual precipitation on earth about 79 percent falls on the ocean. From the remaining 21 percent, 13.4 percent is lost in evaporation leaving 7.6 percent for surface run off and ground water reacharges—and at present half of this is considered to be beyond the control of man.

Of the earth's total water resoruces—some reserarches have concluded that 93 to 97 percent is salt water. A major part of the balance is ice at the north and south pole. Of what is left, once again a major part is underground while only a small fraction — some estimate this as low as one percent — is surface fresh water.

One of the most enlightening concepts of the last half century has been the growing apprehension of the complexity of the forest biome and the part it plays as the 'guardian' of the water resources.

The greatest depth of precipitation which usually falls on forested land located at higher elevations and on hilly tracts, is initially captured, —by the sponge effect of the forest floor,—and gradually released as life sustaining water to vast areas below in the valleys and plains.

One cannot but emphasise, and repeat, that forest cover since it maintains good water quality and stabilises flow is the best and most natural protection for streams. Man's use of forest land has a major influence (misuse a catastrophic influence!) on stream flow over most of the surface of the earth—control of flash floods—water losses from a basin— low flows and dry weather flow and water quality.

Thus it is apparent that enlightened forest management in all its aspects constitute a major and continual influence on the hydrological regime of whole drainage basins.

As one eminent Ecologist has philosophised, our relatives the orang outang, gorilla and chimpanzee ; or going further back the lemurs ; will fail to survive if their habitat is interfered with even a little. The emergence of man as the species that is supposed to be capable of occupying all the environment of the earth has led to the mistaken belief that man is weaned of the forest —but if one gives careful thought and study one would realise that the forest is still very much part of us or more properly that we are still a part of the forest.

In Sri Lanka all the major rivers including the Mahaveli have their origin in the mountainous regions of the wet zone—the watershed and the catchment, both direct and indirect, are entirely or for the most part situated in the hills of this zone.

In view of the paramount importance of the wet zone, a technical committee—of which the writer was privileged to be the Chairman carried out a study on the protective benefits of the wet zone forests and made concrete recommendations.

This Committee in assessing the effects of the forest in the protection of the environment considered certain factors and gave a rating for each factor in respect of every Forestry Reserve in the Wet Zone.

The factors considered were : gradient, rainfall, the situation of the forest in relation to sources of rivers, possible effects on irrigation schemes, incidence and intensity of floods, elevation, siltation of and damage to cultivated land, local climate and other environmental effects.

After careful study of the total index rating for each forest and also carrying out field inspections, the Committee was convinced that the clearing of any forests with a total index rating of 250 and over will have serious detrimental environmental effects. The effects would be more pronounced because the total extent of Reserved Forests in the Wet Zone had dwindled to the alarming low figure of 9% of the land area of the region. Except for 7 small reserves—all the other 159 Forestry Reserves had an index rating of over 250.

Based on the findings of this Committee, a firm recommendation was made that no Forestry Reserves in the wet zone should be alienated but should be managed purely for forestry.

Another Sub-Committee on the Conservation of the Mahaveli Catchment Area of which the writer was once again privileged to be the Chairman, found that only about 8% of the Upper Catchment area of the Mahaveli was under forest cover, and made firm recommendations on conserving these areas and also of rehabilitating critical areas of the Montane Catchment. These recommendations will apply to all the catchment areas of Sri Lanka.

A successful programme of watershed management, and an overall shaping of the environment integrated with rural development can be achieved in the hilly tracts, only if the conservation of the natural forests are coupled with a rational but dynamic reforestation programme, of degraded, denuded (forests cleared under the auspices of the food drive and then abandoned) and encorached forest land. One aim of this programme should be the creation of buffer zones of forest plantations around natural forests vulnerable to illicit clearing and cultivation.

The Forest Department has embarked upon such an ambitious programme. Patches of permanent agricultural crops and permanent buildings are left untouched—often resulting in a mosaic of flourishing forest plantation and smiling village gardens.

One could already see the result of this type of shaping of the environment, by visiting the Pine plantations integrated with rural settlements in the Welihena, Beraliya, Wellana, Oliyagankelle, Mulatiyana, Pannilkande, Diyadawa, Kandewathugoda, Kananpella Ingiriya reserves ; and the Keptipola (formerly Palugama), Ginigathgala, Haldumulla, Wiltshire, and other plantations—in hilly tracts of the wet zone of the island. While a few years back these encorachers resented this integrated Development Programme even uprooting Pine seedlings—they now cordially welcome inspecting forest officers.

There are still some isolated instances of a lack of appreciation of these measures taken to safeguard the catchment areas and to shape the environment. We are brought up against the hard fact that politics is a potent factor in forest ecology. This is especially so in the face of an advancing technology becoming available in political situations, little worried about the persistence and development of the forest;—if it can yield ready cash now.

It is not a question of what extent of forest land is cleared in the mountain or hilly catchment of rivers, streams and resources, but it is a question of how many acres of land in the valleys and plains, and how many people, will be adversely affected by lack of water especially the dry weather flow for every acre of the montane catchment that is tampered with.

Similarly the converse is also true, it is not as to why the Forest Department is concerned about planting a few acres or a few patches of encoroached and denuded land in a catchment area but how many rivers, how many streams, how many acres and how many people would be benefited and also enjoy the resultant improvement in the quality of the environment, for every acre reforested within strategic areas of watershed management.

A few years back I had mentioned in my administration report that any further clearing of forests in the montane zone, would be tantamount to spiking the Mahaveli at its source. This concept is applicable to all other rivers, streams and reservoirs. It could also be stated that failure to protect, develop and rehabilitate this renewable resource could be tantamount to spiking the very fountain of life.

" *The forest is mighty and awe inspiring, and yet it is so tender and fragile that it may be asked if we can really keep the great forests going at all.* "

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January–December, 1978

Thotapolakanda—An Environmental Disaster?

W. R. H. PERERA

(*Conservator of Forests*)

Standing sentinel over the magnificent Horton Plains of Sri Lanka lies Kirigalpotta to the South-East and Thotapolakanda to the North-West.

Kirigalpotta with an elevation of 7,857 feet is the second highest mountain in Sri Lanka while Thotapolakanda the more majestic and larger mountain has an elevation of 7,741 feet and is the third highest mountain in the country. Kirigalpotta lies about 5 miles away from the patana grasslands of Horton Plains which was cultivated with potatoes. It is separated from Horton Plains on the North-East by a range of hills with 3 peaks which form the summit of the Agrabopaththalawa Range. This range of hills itself is about 3 miles from Horton Plains. Thotapolakanda, however, rises directly from Horton Plains and towers over Horton Plains.

The South-East slope of Kirigalpotta drains into Belihul-Oya and thence to the Walawe Ganga. The streams from the South-Western slope feed the Bogawantalawa-Oya, which flows into the Kelani Ganga. The Northern slope of Kirigalpotta is mostly barren sheet rock devoid of any vegetation. This slope drains into the Agra-Oya which flows into the Mahaweli. Being barren sheet rock, the Northern slope does not play a major part in the retention of water. The Agrabopaththalawa range lies in the North-South direction and drains into Horton Plains, Belihul Oya and Walawe in the East, and into Agra-Oya and the Mahaweli in the West.

Thotapolakanda has a larger catchment than Kirigalpotta. The Southern slope drains into Belihul Oya through Horton Plains and ultimately feeds the Walawe Ganga.

The Northern slope merges with the natural forests of the Pattipola Reserve—now declared a Man and Biosphere Reserve — and the Pattipola forest plantations. These act as a catchment for the streams that flows into the Ambewela tank and other irrigation channels in the area. This water then drains to the Dambagastalawa-Oya which is an important tributary of the Mahaweli Ganga.

It would thus be observed that from the point of view of the water resources for the Mahaweli Thotapolakanda with the complex of forest and plantations in the Pattipola area is the most important along with the Western slope of the Agrabopaththalawa.

The water which is absorbed into the soil by the sponge effect of the forest floor in Horton Plains, Thotapolakanda and the surrounding forest complex at Pattipola and Ohiya would as undeground streams feed the tributaries of Mahaweli, Walawe and Kelani rivers.

Horton Plains which is a mosaic of natural forest and natural wet patana grasslands at an elevation around 7,000 feet is a meagre 7,800 acres in extent. About 4,000 acres consist of wet patana grasslands with scattered *Rhododendron zeylanicum* trees, while about 3,800 acres comprise sub-tropical montane evergreen forest. The complex of natural forests, grasslands and forest plantations which include Horton Plains, Thotapolakanda, Pattipola natural forest and plantations and Ohiya natural forests and plantation is only about 24,000 acres. The whole complex is a major store house, or to put it metaphorically ' a sponge ' for water retention, which ultimately flows into the Mahaweli and also into the Kelani and Walawe rivers.

What is, or more correctly, what was, the vegetation of Horton Plains and Thotapolakanda ? The writer could well remember about 30 years ago the grasslands with its scattered *Rhododendron* and the sub-tropical montane evergreen forest in the Plains and Thotapolaka nda with *Calophyllum* species (Keena) and *Syzygium* (Dambu) as the dominant tree species. Individual trees in these forests resemble ' Giant Bonsai of Japanese tree culture ' ! There were some *Rhododendron* trees on the the foundaries of this natural forest as well as a few scattered trees within the sub-tropical evergreen borest. The main undergrowth consisted of *Strobilanthes* and *Osbeckia.* The crowns of the trees were draped with lichens especially *Usnea barbata* (old man's beard) oozing with water often referred to by the endearing old Professor of Botany, in the early 1940s as ' beautiful bits hanging from trees '!

Periodically the *Strobilanthes* bursts into flower resulting in a riot of mauve, blue and white flowers within and under the trees of the natural forest. This was followed in a few weeks time by drunken jungle fowl who had feasted on the *Strobilanthes*, dancing in the plains and the forest, while sambhur grazed peacefully on the then tranquil grasslands.

Early this year after a lapse of many years the *Strobilanthes* flowered once again. Though the *Strobilanthes* is the undergrowth to the tree cover, the writer was surprised to notice that at dawn the entire slope of Thotapolakanda had a purplish glow. In fact the whole hill was a flame with colour.

With the dense top canopy of Keena and Dambu festooned with lichens how did this phenomenon occur. Namely how was the flowering *Strobilanthes*, which was the undergrowth of the thick natural montane sub-tropical forest, visible through the canopy of trees ?

Subsequently a detailed study was made of Thotapolakanda after reconnoitering right up to the summit and what was observed could very well be called an ' environmental disaster '.

Over 50 percent of the dominant Keena and Dambu on the slopes and top of Thotapolakanda were dead or dying.

The lichens were mostly dead, black and charred. A few *Rhododrendons* normally not noticed within this forest were observed, now exposed due to the death of the dominant trees. Thotapola kanda now appeared to be more a parkland of *Strobilanthes* and other shrubs with scattered trees of Keenas and Dambus. No regeneration of these tree species was observed.

Since there was no direct interference by man such as cutting of trees on these slopes and on the summit, the question arises as to what has caused this ecological retrogression.

Commencing about 12 to 15 years ago the grasslands in Horton Plains have been cultivated with potatoes, with all that it implies-breaking up of the soil—draining of excess water—application of fertilizer and pesticides, tractors working on the plains with exhausts pouring out fumes, burning of tar for maintenance of roads, burning of the grasslands accidental or otherwise. All these factors never occurred before potato cultivation commenced in this area.

Has the very rarefied and unique microclimate of the area in which this rare and sensitive vegetational community occurred been upset by the environmental pollution caused by the factors referred to above ?

Could the water regimes in the Plains and on Thotapolakanda have changed as a result of the constant breaking up of the soil for cultivation, draining of water, removal of the sponge effect resulting in less water being absorbed. Could the water in the soil in Thotapolakanda which would have been absorbed and retained longer, drained down faster and quicker thereby changing the entire water regime in the complex ?

These are only observations and comments on the probable causes for the retrogression. Fortunately further cultivation of potato in the Horton Plains has been stopped. It is the writer's opinion that this ' disaster ' if studied by Scientists of various disciplines could positively prove the hazards we would face on a large national scale by tampering with the environment in such critical and sensitive areas.

The fact that the forest complex at Horton Plains, Pattipola and Ohiya which comprise the ' sponge ' that retains the water ultimately flowing into the Mahaweli Ganga and other rivers is a mere 24,000 acres has already been stressed.

It would appear to be absolutely essential that all the remaining natural forests and plantations in the Horton Plains, Pattipola, Ohiya complex should be permanently dedicated to forestry and not cleared for cultivation.

These observations confirm the views expressed by the writer some years earlier and also referred to in another article appearing in the journal that it is not a question of how many acres are cleared, but it is a question of how many acres are affected for every single acre cleared in such catchments. Here the cultivation—not even the clearing of forests—of a small acreage of wet patana grasslands has apparently been the cause of a complete upset in the ecological balance of the region with all its attendant implications it will have on our water resources. It is hoped that this ' environmental disaster ' would serve as a deterrent to hasty tampering with the environment in such sensitive and critical areas—thereby assuring environmental stability leading to prosperity.

Thotapolakanda may well be whispering one of Rabindranath Tagore's great poems—

" *If they answer not your call—walk alone, walk alone.* "

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January-December, 1978

SINHARAJA TODAY

C. V. S. GUNATILLEKE*
(*Lecturer, Department of Botany, Peradeniya Campus*)

LIVING in an era when most of the first world countries, conscious of the importance of their remaining natural resources, are taking active steps to conserve them, it is heartening to find that, at last, Sri Lanka has made a start in this direction. In the first world countries, life has become far removed from nature, and every human, irrespective of age and creed yearns for an opportunity to live close to, nature. This, to a degree, is manifest by their annual summer holidays, made to relax and recreate in far away places yet untouched by developed man. In Sri Lanka we do not have to go far in search of nature, because it still surrounds us. Unfortunately the majority of us do not realise this fact and cannot appreciate it. Consequently little effort is made to safeguard nature. Some of the world's most valuable natural resources are very fragile and delicate ecosystems ; irreparable damage results when they are misused and mismanaged. In our own country Sinharaja is one such natural resource, and though partly touched by man it still remains nature's own creation.

Most of us are familiar with Sinharaja because of the controversies that have been aired, through the local newspapers, regarding its exploitation to feed the gigantic Kosgama plywood complex, but few would have actually visited it.

Sinharaja is situated in the south-western part of Sri Lanka, in the lowland wet zone. In extent it is about 22,000 acres. The length of the forest, from the eastern to the western end, is about 13 miles and its width only 4-5 miles. Two-thirds of the forest lies in the Sabaragamuwa province and the remaining third in the Southern province.

The boundaries of the forest are said to be on the north Napola dola and Koskulana ganga which leads to the Kukulu ganga further down. This is one of the main tributaries of the Kalu ganga ; on the south and south-west, Maha dola and Gin ganga ; on the west, Kalukandawa ela and Kudawa ganga ; on the east, Beverly estate and Denuwa Kanda.

The elevation ranges between 1,000 and 3,838 ft. with an increase in the average elevation from west to east. The area is also very hilly with steep slopes and rocky outcrops.

Two main rivers are fed by streams arising from Sinharaja. The streams on the northern side eventually join up with the Kukulu ganga and then Kalu ganga while those on the south lead to the Gin ganga. Unlike the Kalu ganga whose main catchment area is in the Adam's Peak range, most of the Gin ganga catchment area lies in the Sinharaja range.

To know what is happening at Sinharaja today, we must know what happened there yesterday.

---

* Dr. (Mrs.) Savithri Gunatilleke holds a First Class Special Honours Degree in Botany from the University of Sri Lanka and a Ph. D. in Ecology from the University of Aberdeen, U.K. She is a Lecturer in the Botany Department University of Sri Lanka, Peradeniya Campus. Dr. Gunatilleke has been working on ecological problems for quite some time and has the unique distinction of being the first Ecologist to carry out systematic scientific investigations in the primeval Sinharaja forest. During these investigations she has spent considerable amount of time camping out in the forest. Dr. Gunatilleke is now considered an authority on the ecology of Sinharaja forest—*Editor.*

3—A 34162 (5/78)

In the past, Sinharaja was a very inaccessible area, only visited by people from villages situated along the main tributaries of the Kukulu ganga and Gin ganga. There are, however, a few villages, also within the forest reserve, as exemplified by Warukandeniya and Kolontotuwa. There have been two main footpaths within Sinharaja, both north-south, one on the western boundary and the other towards the eastern and between Panapola and Watugala. This latter crosses the forest where it is narrowest and was the main footpath used by villagers on the southern side of Sinharaja to get to the north. The people in the settlements in and around Sinharaja subsisted mainly by collecting cane and resins, tapping Kitul and hunting in the forest. In addition, chena cultivation has been practised in the vicinity of Sinharaja where hill upon hill has been clear-felled, cultivated and abandoned, Neither the scientists nor the environment conscious public were aware of this silent destruction. because it was the local villager or illicit timber merchant who was responsible for it. This destruction though irreparable was a slow process. The extent of damage this way has never been surveyed. It could well be quite large, appreciable reducing the size of the Sinharaja reserve itself. My contention is that with all these encroachments the actual size of the Sinharaja reserve, in virgin forest is far short of 22,000 acres. This is quite evident on the eastern side of the southern boundary, where the Maha dola marks the recorded forest boundary. However, if one visits the area the forest is no where near the Maha dola having been replaced by kekilla slopes. Looking up from Maha dola the forest itself is seen receding over the crest of the hill range in this area.

Apart from the activities of the people in the settlements in and around Sinharaja, the forest remained untouched and also taken for granted until 1968 when a Government directive was issued to exploit Sinharaja for timber, for plywood and the actual extraction of timber began in 1972 not at the massive scale of extraction of timber as originally planned to feed the Kosgama Complex, but at a much reduced scale on technical advice. Only then did people both in Sri Lanka and abroad begin to realise the biological importance of Sinharaja. Despite stiff opposition from a few local scientists and nature lovers the green light was given by the former Government to exploit this highly unstable ecosystem. So began the Sinharaja logging project with Canada-Colombo plan aid. Roads, as wide as 10 ft. and more, were opened up within the forest, heavy machinery, some of which Sri Lanka had never seen before, was imported for the extraction of timber, construction of roads and transport of fuel ; a workshop was installed within the forest to house and repair all this equipment. Manpower to operate this equipment was brought in from various other parts of the island and abroad. About, 3,500 acres of forest have been selectively felled during this operation.

With timber exploitation environmental pollution at Sinharaja was inevitable. Before the logging project, crystal clear water always flowed in the streams through the forest irrespective of the weather. But now with every rain, the streams overflow with a tea-coloured suspension of silt and clay. Within the forest high temperatures and dust are never experienced, but along the roads that have been constructed, the heat is quite unbearable, and the dust raised by vehicles driven on them, particularly during dry weather, is quite disturbing. The stillness of the forest was also broken by the roar of the heavy machinery. The change in the vegetation brought about by selective felling is also srtiking. In this kind of felling a certain number of trees which have attained a given diameter are cut down or harvested. In the process not only the selected tree, but many more around it are brought down, creating a wide gap in the forest. Further destruction of the vegetation is caused when the logged trees are dragged out to the timber yards by mechanical elephants called skidders. In these open places, the vegetation becomes a tangled mass with the rapid growth of climbers and secondary species like Kenda, Gedumba and Podi Singho Maram.

However, during these logging operations, outsiders were not allowed into the forest, and no villager or illicit timber merchant had access to it. Paradoxical though it may seem the exploiters themselves prevented its indiscriminate destruction.

Fortunately today there is a different scene at Sinharaja. The present Government has stopped the felling operations and both personnel and equipment of the logging project are being moved out. Their place has now been taken by personnel of the Forest Department and Wild Life Department, who are expected to police and manage this forest as a reserve. At present the Forest Department is also carrying out a large scale replanting programme around the boundary of Sinharaja and in its vicinity. Sinharaja in its entirety has now been declared a Man and Biosphere reserve.

Next, it is important to understand whether Sri Lanka, a small island with limited land for cultivation and urbanisation could actually afford to have such an extensive area under forest cover, apparently bringing no return. For this the biological significance of the forest must be weighed against the socio-agricultural requirements of this country. In other words, do we want to preserve Sinharaja as a natural resource which will continue to yield dividents, or do we want to cut it down now and use the land, perhaps with disastrous consequences.

To appreciate the importance of Sinharaja, a little about the forest vegetation of Sri Lanka as a whole must be understood. There are different forest types in the island and their distribution closely follows the climatic zones. Sinharaja belongs to the wet, low country forest type, which is quite distinct from the forests of the hill country and the dry, low country. In the wet low country the only appreciably large block of rain forest is found at Sinharaja. Its destruction would therefore mean the virtual elimination of one of Sri Lanka's forest types.

Coming to the forest ecosystem itself, there are the more obvious and well documented bene fits such as the effect of the forest on the climate, hydrology and soil conservation. In recent years Sri Lanka has experienced the ill effects of deforestation, with respect to these features ; but the less well understood biological significances of the forest are many, a few of them being the following.

The flora of the island comprises of about 3,365 flowering plant species, of them 830 *i.e*, about one-fourth are endemic to the island and not found anywhere else in the world. If the distribution of these endemics is considered, 494 out of the 830 are only found in the wet, low country natural vegetation, mainly the rain forests. Our own studies of the tree flora at Sinharaja confirms this. Having sampled all the trees in 10 acres, we have encountered 143 different species. Of them 60% are endemic. When the endemic individuals are considered the percentage is even higher. These endemics include most of the dominant trees in the forest. So far only the trees are being systematically studied but it is almost certain that there will be a high percentage of endemics even among the shrubs and herbs. The bulk of the forest therefore is comprised of endemics; this makes our rain forests quite exclusive to the island and no where in the world is there, this combination of species in a rain forest. When the density distribution of the species was considered it was found that as many as 89 of the 143 species had less than 10 individuals in the 10 acres sampled. Actually 40 species were recorded only once in this area. The medicinal and agricultural potential of these endemics have never been studied. Should research determine the presence of a single chemical compound of medicinal value among these endemics, then the very fact that it is only found in Sri Lanka and no where else, would greatly benefit this country.

Another biological aspect is this. The vegetation in Sri Lanka has remained relatively unchanged for a very long time *i.e.* some of it may be a relict of the flora which existed when the island was a part of the Gondwana land. Sri Lanka having separated as an island millions of years ago, its wet zone forests have remained quite isolated, without much competition from other tropical rain forest floras, and this may have favoured the evolution of new species, and may explain why 25% of our flora is endemic. To students of the tropical rain forest our wet zone forests which include Sinharaja could offer a wealth of information.

Sinharaja is also a gene pool of tropical species not only plants, but also animals and microorganisms. The plants that constitute the forest today, have withstood much competion, both intraspecific and interspecific. They have also built up natural resistance to locally prevalent diseases over millions of years. Consequently these plants in the rain forest are the best of its kind, and would be ideal material for plant breeding *e.g.* most of the related species of todays cultivated plants are found in the forest and they could be used either to produce more disease resistant and higher yielding varieties or even new agricultural species. At Sinharaja there are over 20 natural orchid species. These may be used to obtain new varieties, at least some of which could prove to be economically important.

Another attribute of Sinharaja which is typically a wet lowland forest is this. With the rapid increase in the islands population, agricultural land per capita will decrease, and the available land will have to be intensively cultivated to solve the food crisis. Multicropping therefore will be indispensable for the future. The forest, if one stops to think about it , is nature's own model for multicropping, where every space in the system is packed with plants. Investigating the different plants, in the different strata of the forest one can simulate them in multicropping agriculture, *e.g.* in the rain forest most of the members of the family Rubiaceae grow in the understorey while related species of Cardomoms thrive in the ground layer. Further, members of the Anacardiaceae, which include the Etamba, the Moraceae which include the Bedi-Del and the Bombaceceae which include the Wal-Durian are all light loving canopy trees. On the other hand, the members of the Guttiferae which includes the Wal-Goraka Myrtaceae which includes the Wal-Jambu, and the Myristicaceae which include the wild Nutmeg occupy the lower stratum. Thus it might be possible to simulate an agricultural forest where Mango, Jak and Breadfruit form the dominants with Goraka, Nutmeg, Cloves and Coffee as subdominants. The ground layer could be grown with Cardomoms, Ginger and Aroids while Vanilla, Pepper, Waniwel-geta and Bulath could be grown as climbers.

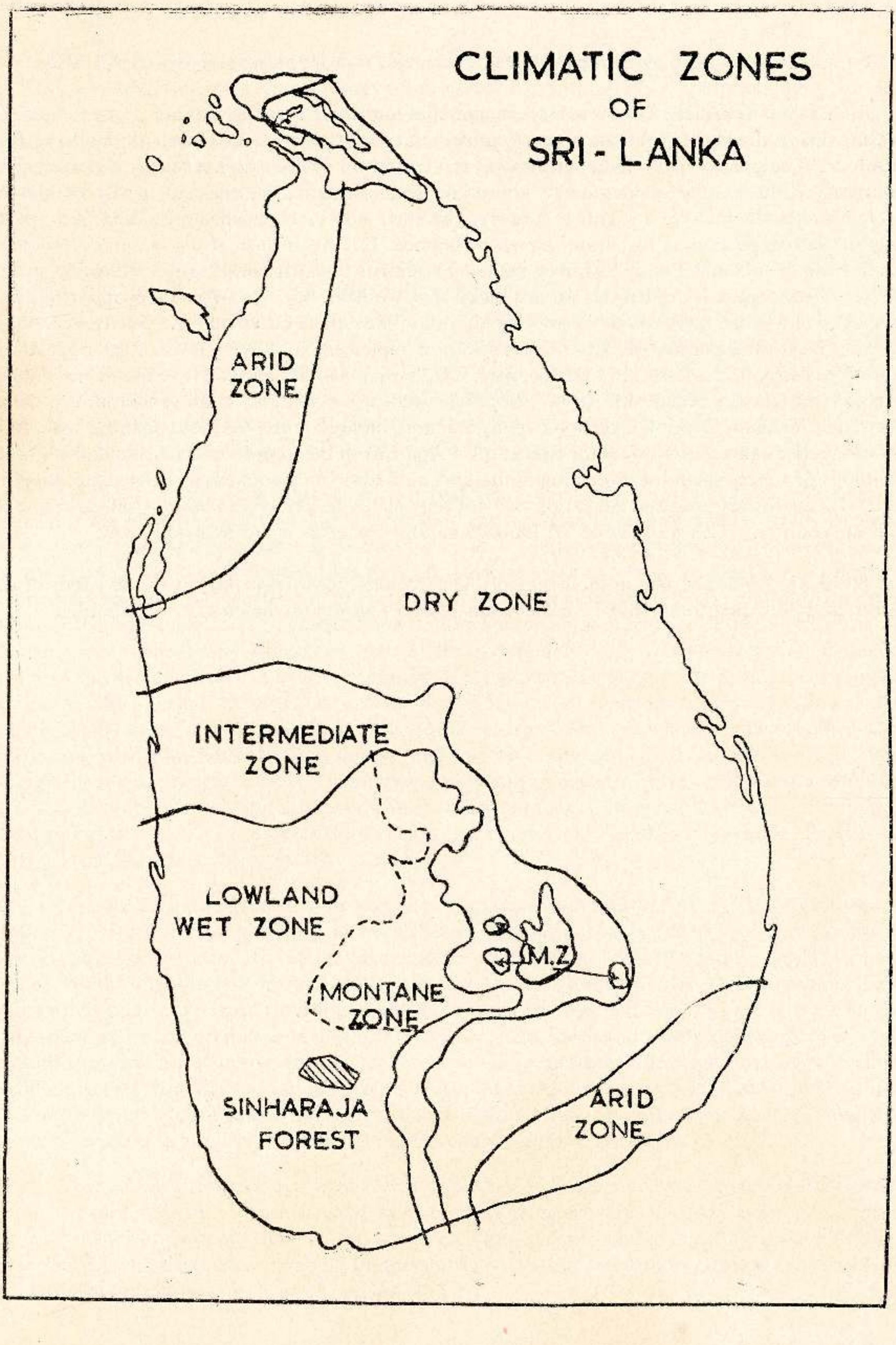
Just like the natural forest, these multicropping systems should need no agrochemicals to support them. How this could be achieved is exemplified by the forest. In the forest, the entire fertility of the system is in the vegetation, the soil having hardly any nutrients. Consequently no leaching can take place. With regard to the nutrient status, the forest is a closed system, requiring no inputs, and its success depends on the rapid recycling of nutrients by soil microorganisms, who are responsible for the conversion of locked up nutrients in leaf litter and organic debris to forms usable by plants. In agriculture the addition of agrochemicals makes these soil organisms redundant, and might eliminate them altogether from the soil system. With continued agriculture they could even become extinct and will not be available for future use, unless they are allowed to survive in some kind of refugia. For the wet, low country soil micro-flora, Sinharaja could well provide such a place.

Most of the forest species also have certain fungi, which are called mycorrhiza, closely associated with their root systems. These mycorrhiza obtain the necessary nutrients from the soil inorganic and organic matter and supply them to the plants enabling them to thrive even in highly infertile soils. If such mycorrhizal associations could be introduced to agricultural plants, then their artificial fertilizer requirements could be greatly or altogether reduced.

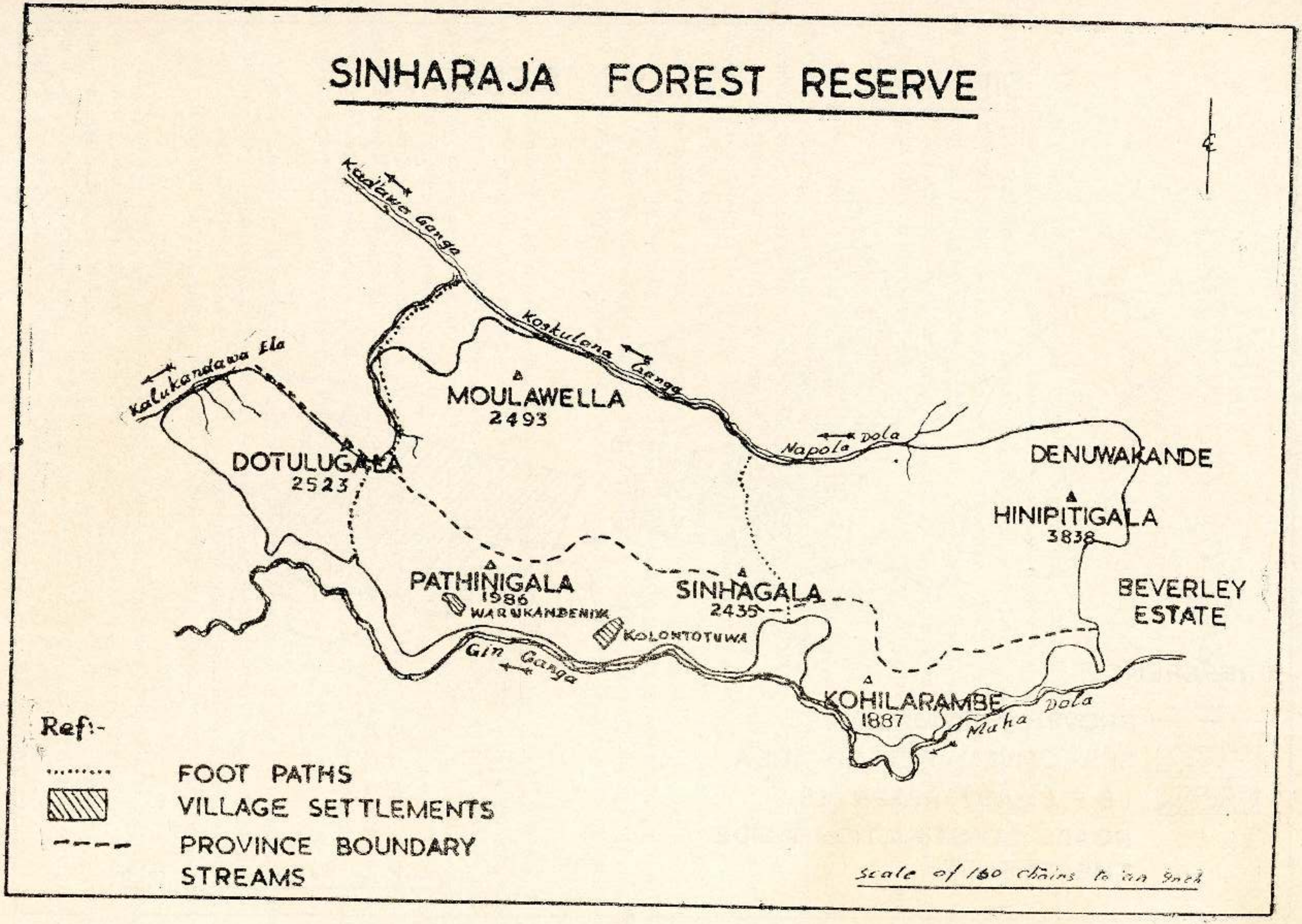
So much for the biological importance of Sinharaja, now let us consider its conservation.

Sinharaja is vested in the Forest Department, and at present they are making a great effort, by increasing their cadre in the Sinharaja range, to protect this forest ; but for how long will this protection be ensured ? The answer lies with the scientists of this country. Those who have never had a scientific background or the natural inclination to appreciate and safegurard nature, can hardly be blamed for the mistakes they make. Scientists however, by their non-involvement and indifference, particularly in matters pertaining to nature, are to be blamed for this misuse of our natural resources. Further, little or no contribution has been made by scientists towards conservation education in this country. With regard to Sinharaja, we are lucky that we have been given another opportunity to conserve it, but whether there will be yet another after this time is quite questionable. Such an occassion need not arise if conservation education is successfully implemented at every level of the population, irrespective of age, or profession, in this country. Only then will Sri Lanka make use of her natural resources wisely for the benefit not only of the present generation, but also of all generations to come. A start could be made at the University level by teaching biology in the field and making maximum use of Sri Lanka's natural resources for education. Apart from the long-term benefits detailed above. the millions of rupees spent on protecting Sinharaja could also bring some more immediate, tangible results. Its use for research and education will not only justify its protection but it would also greatly benefit the country. This way one of Sri Lanka's natural resources could be wisely used.

Sinharaja yesterday, was in the hands of the exploiters, Sinharaja today is in the hands of the foresters, and Sinharaja tomorrow, is in the hands of every nature loving citizen in Sri Lanka.


CLIMATIC ZONES
OF
SRI - LANKA
ARID ZONE
DRY ZONE
INTERMEDIATE ZONE
LOWLAND WET ZONE
MONTANE ZONE
M.Z
SINHARAJA FOREST
ARID ZONE

SINHARAJA FOREST RESERVE

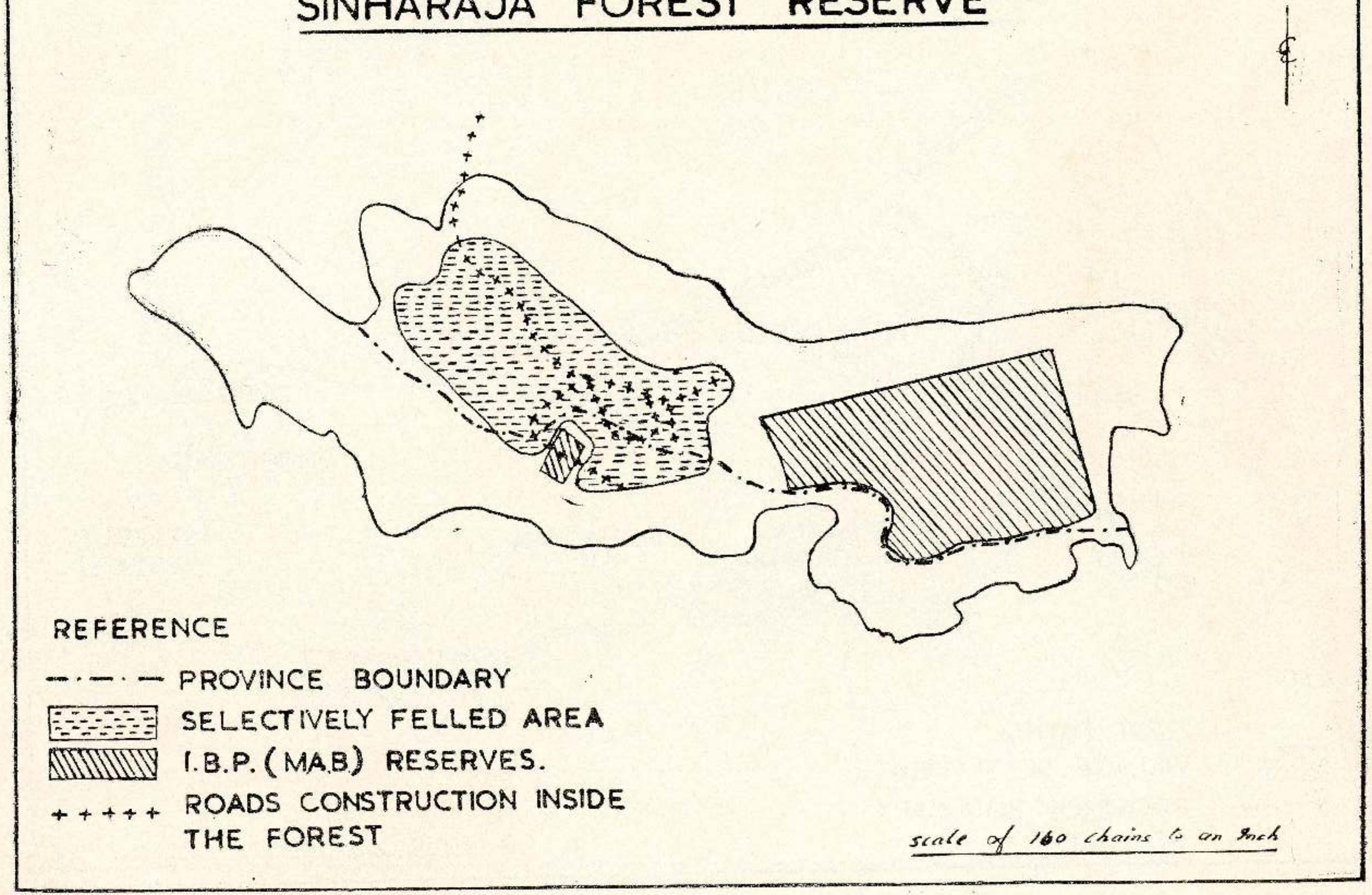


Ref:-

- .... FOOT PATHS
- ▨ VILLAGE SETTLEMENTS
- ---- PROVINCE BOUNDARY
- STREAMS

Scale of 160 chains to an Inch

SINHARAJA FOREST RESERVE



The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January-December, 1978

INSECT INJURY TO PLANTS

NALINI B. RATNASIRI
(Research Officer, Entomology)

INSECTS are important members of Forest Communities where they feed and live on trees, sometimes damaging them. Trees and insects have evolved together and are adapted to one another to such an extent that under natural conditions, for example in the natural forests, these insects live and feed on the trees without causing any appreciable damage. That is, there is a perfect ecological balance between the insect population and the trees. Man in his effort to maximise the gain from the natural forest has upset this delicate balance and today we are faced with a situation where the ravages of insect pests on trees can be devastating. Under these circumstances remedial action must be resorted to.

When one observes injury to a plant that warrants remedial action he must first detect and identify the insect that causes the damage as identification of a Pest species is the first step in scientific pest control. It provides a key to published information on the life history, behaviour and ecology of the insects and to other data important in the development of control measures. Identification of insects is easy enough if they can be made available. Since insects are very mobile and secretive they are not available as and when the injury to the tree is observed. Very often one is confronted with an injured plant but no pest. Therefore it is very important that one should be able to identify the insect that caused the damage by merely examining the damage they cause and any other available information. When the casual agent is absent or is difficult to observe the diagnosis depends entirely on the symptoms and signs of damage. Under these circumstances experience becomes the greatest asset,

The symptoms of an injury such as unusual colouring, missing foliage, malformations, etc. are pointers that something is wrong with the tree. These symptoms are helpful in diagnosis and often give some clue to the probable causes, but are seldom relied on entirely because many insects, disease causing agents, etc., produce similar symptoms. Symptoms can also change. Yellow foliage may become brown and later give way to missing foliage if the tree or affected part dies. Moreover **2** or more agents may injure the tree simultaneously producing apart from their normal symptoms new symptoms from their interactions. Sometimes a primary agent that has unrecognizable symptoms may weaken the host tree, then a secondary insect or disease invades and destroys the host while showing only their symptoms.

Signs of attack on the other hand are more useful for identification than symptoms and are often the only way to distinguish and separate one type of agent from another. Signs include artifacts (like webs, cases), debris (cast skins), excretions, pitch exudations, galleries, associated insects and fungi, etc. If **2** insects have the same symptoms and signs, then the agents themselves must be identified.

The primary agent becomes more difficult to identify as time elapses after injury because both symptoms and signs change with time. If the growth of the tree is vigourous, it will try to heal itself and in the process may mask and outgrow the injury, if the tree is weak it will suffer attack from other insects and fungi. Signs such as webs, excrement, cast skins, also deteriorate with time but some may remain intact for a year or more.

Discolouration of foliage is a symptom caused by injury anywhere in the tree—roots, trunk, branches or leaves. Discoloured single leaves or small groups of leaves usually indicate that the injury is on the leaf itself. When a cluster of leaves is discoloured, the injury is likely to be found within or at the base of the discoloured section of the twig or the branch. This could also arise from root injuries inflicted by certain insects and diseases or from nutrient deficiencies. Blackened foliage and bark is indicative of soft scales, aphids or spittle bugs. The black colouration is caused by a sooty mould fungus that grows on the sugary honey dew and spittle of these insects. At times the discolouration of leaves and shoots can be due to the bodies of insects themselves. In this case the insects can be identified direct.

Missing foliage results from insect feeding, adverse climatic conditions and insect or disease injury on other parts of the tree. Skeletonization, mining, etc., are signs of direct feeding. A cluster of missing leaves may indicate a defoliator if the surrounding foliage or area beneath the injury show frass, webs, cocoons or cast skins. The pattern of defoliation is diagnostic for some defoliators. However they are sometimes difficult to identify from the signs alone.

Galls, swellings and fasciations are abnormal growths on leaves, shoots, stems and roots, that result directly from recent injuries. Excessive branching, forking and crooking are symptoms of past injury. Reduced tree growth or stunting can result from injury anywhere in the tree. Stunting may occur gradually or be delayed until a year after the insect causing it has moved out.

Although exudates, artifacts, and excretions are not signs as such, they are useful in locating the site of injury and pinpointing the insect pest. Insects tunneling and feeding in the shoots or stems of living plants have exudates flowing from their point of entry. Insects living in dying or dead stems or shoots of trees eject fine saw-dust or coarse wood shavings. Piles of this material on the gound or streaks of it adhering to the bark pinpoint the location of the tunnel. Small pellets of frass (insect excrement) occur in the vicinity of or beneath areas in which damage by defoliators occur. Several species of defoliators construct protective artifacts such as bags, cases, or webs that are distinctive.

As insects develop and grow they shed their outer skins periodically. Sometimes these cast skins may be present near the point of injury and become useful in diagnosing the pest concerned.

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January–December, 1978

Retention of Viability of Mahogany Seed Through Cold Storage

K. VIVEKANANDAN

(*Research Officer, Silviculture*)

SUMMARY

Seeds of broad-leaved Mahogany (*Swietenia macrophylla* King) lose their viability rapidly when stored at room temperature (30°C).

Investigations were carried out with two lots of seeds by storing them in sealed polythene bags at O°C° 15°C and 30°C and testing the germination percentage at monthly intervals.

The study revealed that—

(*a*) the seeds can be stored at 15°C without much loss in viability for a period of 9 months ;

(*b*) the seeds stored at O°C and 30°C lose their viability after 3 months ;

(*c*) the germination percentage of one seed lot stored at 15°C did not significantly change even after 9 month storage, while the germination percentage of the other seed lot was reduced by 50% after 9 month storage at 15°C.

For the retention of viability of Mahogany seed storage in sealed polythene bags at 15°C is recommended.

INTRODUCTION

The seeds of broad-leaved Mahogany (*Swietenia macrophylla* King) lose their viability rapidly and have to be sown within a month or two after collection to obtain the best results.

Mahogany is usually propagated through striplings which are normally obtained from natural regenerations in plantations. About 3 years ago, however the Reforestation and Silviculture Section decided to carry out trials on the underplanting of young *Albizia* plantations with mahogany. This was done by spot sowing Mahogany seeds in-between the *Albizia* with the rains.

The trial proved a success and it was decided to extend this on a large scale to other areas. One limiting factor for the extension of this trial was the non-availability of sufficient fresh seeds at the time of sowing.

This necessitated the collection of sufficient seeds well in advance and storing them until use. This practice, however, did not yield the desired result because it was found that the germination capacity of the seeds stored at room temperature declined rapidly and approched almost zero at sowing time.

This prompted the Silviculture Research Branch to carry out investigation on the low temperature storage of seeds and its effect on viability. In this paper the results of this investigation are reported.

MATERIALS AND METHODS

Two fresh consignments of seed were received from Kurunegala (lot No. 243) and Kegalle (lot No. 245) in March, 1974. On receipt the number of seeds per pound was determined for each seed lot and the initial germination capacity assessed by sowing a known weight of seed (½ lb.).

The seeds from each lot were then divided into three batches and were stored in polythene bags at O°C, 15°C and 30°C. The polythene bags were sealed to make them air-tight before storage.

Half-pound samples were drawn from each batch of seed at monthly intervals, the number of seeds per sample was counted, and the seeds were then sown in germination boxes. Germination percentage was recorded separately for the two seed lots and three storage temperatures. The test was carried out for a period of 9 months.

RESULTS

The results of the germination test are summarized in Table I.

TABLE 1

Monthly Germination Percentage for Seed Lots 243 and 245 Stored at 0°C, 15°C and 30°C

Month	*Number of months after collection*	*Germination per cent.*					
		Lot No. 243			*Lot No. 245*		
		0°C	*15°C*	*30°C*	*0°C*	*15°C*	*30°C*
March	0	—	—	39	—	—	81
April	1	29	34	32	38	78	55
May	2	23	35	30	40	64	35
June	3	17	34	30	34	62	30
July	4	13	33	4	1	57	6
August	5	9	34	0	2	60	4
September	6	0	30	0	0	61	2
October	7	0	32	0	0	60	0
November	8	0	31	0	0	52	0
December	9	0	30	0	0	42	1

CONCLUSION

From the results it will be observed that in both seed lots the germination percentage drops drastically after 3 months when stored at 0°C (very low temperature) and 30°C (room temperature). But the seeds stored at 15°C show only a gradual decline in germination capacity and can be kept stored at this temperature for a period of 9 months without appreciable loss in viability.

It can, therefore, be concluded that seeds of Mahogany can be kept stored at room temperature (30°C) for only a period up to 3 months. If storage is necessary after this period it is essential to store them in sealed polythene bags at 15°C.

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January–December, 1978

Pretreatment to Improve the Germination of Lunumidella Seed

K. VIVEKANANDAN
(Research Officer, Silviculture)

SUMMARY

THE seed of Lunumidella (*Melia composita*) does not germinate readily. The standard pretreatment now used is to scorch the seed before sowing.

A trial carried out under both nursery and glasshouse conditions showed that by soaking the seeds in a solution of 2 oz. slaked lime in one gallon of water for 48 hours the germination capacity can be signficantly increased.

Pretreatment with slaked lime gave seven and fifty-fold increase in germination capacity over the standard pretreatment of scorching the seed under glasshouse and nursery conditions respectively.

INTRODUCTION

The seed of Lunumidella (*Melia composita*) does not germinate readily when sown without any pretreatment. The pretreatment now used is to scorch the seeds by spreading the seeds on nursery beds, covering with a layer of straw and setting fire to it. The scorched seeds are then covered with a layer of soil and watered regularly.

Although this method is the standard one used in the local nurseries it is far from satisfactory because according to local experience the average germination percentage never exceeds 5 per cent.

In order to find better methods of pretreatment to increase the germination capacity of Lunumidella seed an investigation was carried out both under nursery and glasshouse conditions. The results of this investigation are reported here.

MATERIALS AND METHOD

The seeds used in this investigation were collected at Kuliyapitiya on 23.6.1977 and the investigation commenced on 8.7.1977.

For the glasshouse investigation 100 seeds were used for each treatment, while for the nursery investigation 10 lb. of seed were used. Each treatment was replicated twice in both the glasshouse and nursery. The glasshouse investigation was done in pots while the nursery investigation was carried out on nursery beds of the size 40′×4′.

The following pretreatments were studied :

T1 : Spreading seeds, covering with a 2 inch layer of straw and setting fire to it. After the straw was burnt the seeds were covered with a thin layer of soil.

T2 : Soaking seeds in water for a continuous period of 72 hours and then alternate drying and wetting for 12 hours each for 4 days.

T3 : Soaking seeds in water for 72 hours continuously.

T4 : Soaking seeds in a solution of 2 oz. of slaked lime in 1 gallon of water continuously for 48 hours.

RESULTS

The results are summarized below—

Mean Plant Number and Germination Percentage

Treatment	*Glasshouse*		*Nursery*	
	Mean Plant No. per 100 *seeds*	*Mean Germination Percentage*	*Mean Plant No. per* 10 *lb. of seed*	*Mean Germination Percentage* *
T 1	1	1	4	0.17
T 2	2	2	2	0.08
T 3	3	3	17	0.70
T 4	7	7	229	9.74

* Mean germination percentage is calculated on the basis that a pound of seed contains an average of 235 seeds.

CONCLUSION

The results of this investigation clearly indicate that treatment of Lunumidella seed with slaked lime solution increases the germination capacity substantially and it is far superior to the standard pretreatment of scorching the seed.

Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January–December, 1978

Variation in Density in Eucalyptus Camaldulensis

K. Vivekanandan

(*Research Officer, Silviculture*)

SUMMARY

THE variation in density in five trees of *Eucalyptus camaldulensis* from a 10-year old plantation in Vakaneri was studied.

The study showed that—

(*a*) the density (basic and air-dry) decreased with height, and

(*b*) the mean basic density varied from 0.61 g/cc. to 0.64 g/cc. and the density at 15% moisture content varied from 0.77 g/cc. to 0.85 g/cc.

INTRODUCTION

Eucalyptus camaldulensis is the second largest constituent of the plantations in the dry zone of Sri Lanka. Annually 1,500 acres are planted with the objective of meeting future requirements of lumber and fuelwood. In addition it is also envisaged that, in future, a part of it will be used for the production of pulpwood for the local paper industry.

As this species is a recent introduction to the dry zone there is hardly any information on its wood properties.

The study reported here was undertaken to gather information on the variation in density of the locally grown *Eucalyptus camaldulensis* in the dry zone.

MATERIALS AND METHODS

Sample Trees

The trees selected for the study were from a plantation in Vakaneri, near Batticaloa (dry zone) established in 1967. For the study five trees were selected at random and their breast height girth (BHG) and total height were recorded.

The trees were felled and from each tree 5 inch discs were cut at 0, 10, 25, 50 and 75 per cent. height.

From each disc a radial sample was cut through the pith and split into two sub-samples at the pith to serve as 2 replicates. Each sample was approximately one inch in width and thickness.

Density determination

The samples were air-dried for two weeks and their volume and weight were determined. To ascertain the moisture content the samples were oven-dried at 105°C±3°C and weighed.

For basic density determination the samples were soaked in water until saturated and volume determined by displacement method. The dry weight was determined by drying the samples to constant weight at 105°C ± 3°C. Densities were calculated as follows :—

$$\text{Density at 15\% m.c. (g/cc.)} = \frac{\text{Air-dry weight (g)}}{\text{Air-dry volume (cc)}}$$

$$\text{Basic density (g/cc.)} = \frac{\text{Oven-dry weight (g)}}{\text{Green (soaked) volume (cc)}}$$

RESULTS

Particulars of Trees

Tree No.	*BHG (cm)*	*Total Height (metres)*
1	56	14.5
2	64	18.0
3	38	12.3
4	48	13.5
5	73	16.3

Density at 15% Moisture Content

Tree No.	*Mean Density at 15% m.c. (g/cc)*					
	Percentage height					
	0	10	25	50	75	*Mean*
1	*	0.80	0.80	0.78	0.71	0.77
2	0.91	0.88	0.87	0.81	0.80	0.85
3	0.81	*	0.80	*	0.78	0.80
4	0.82	0.80	0.80	0.79	*	0.80
5	*	0.86	0.85	0.84	*	0.85

* Not determined as code numbers were obliterated.

Basic Density

Tree No.	*Basic Density (g/cc)*					
	Percentage height					
	0	10	25	50	75	*Mean*
1	*	0.63	0.63	0.63	0.56	0.61
2	0.70	0.68	0.66	0.60	0.59	0.64
3	0.64	*	0.64	*	0.61	0.63
4	0.63	0.63	0.62	0.60	*	0.62
5	*	0.66	0.65	0.61	*	0.64

* Not determined as code numbers were obliterated.

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January-December, 1978

Variation in Basic Density and Fibre Length in Pinus Caribaea

K. VIVEKANANDAN
(*Research Officer, Silviculture*)
&
T. L. CHANDRARATNE
(*Dept. of Botany, Peradeniya Campus*)

SUMMARY

THE variation in basic density and fibre length in four trees of *Pinus caribaea* from a 24-year old plantation in Sri Lanka was studied.

The study revealed that—

(*a*) the basic density decreased with height ;

(*b*) the fibre length increased up to half the height and then decreased ;

(*c*) the mean basic density ranged from 0.37 g/cc to 0.47/g/cc and the mean fibre length from 2.6 mm to 3.3 mm.

INTRODUCTION

Pinus caribaea is one of the important plantation species in Sri Lanka. It is grown in the wet lowlands and the highlands up to about 5,000 feet elevation. It is raised with the main objective of meeting the future long fibre requirements of the local pulp and paper industry. Annually, 3,500 acres are planted with this species.

Data on basic density and fibre length are essential to determine the suitability of locally grown *Pinus caribaea* for paper pulp. Up to now there has been a lack of information on basic denisty and fibre length with regard to locally grown *P. caribaea.* The study reported in this paper was undertaken to investigate the variation in basic density and fibre length of trees in one of the oldest sample plots in Sri Lanka.

MATERIALS AND METHODS

Samples

The samples used in this investigation came from a sample plot planted in 1952 at Erabedde in the Montane Zone.

Four trees were randomly selected and their breast height girth (BHG) and total height were recorded. From each tree discs were cut at 0, 10, 25, 50 and 75 per cent height.

From each disc one radial sample was cut, through the pith so that the samples were one inch in width and thickness. The samples were again cut into two at the pith so that the two halves of the sample served as 2 replicates.

Basic density determination

The samples were soaked in water until they were saturated and the green volume determined by displacement method. The oven dry weight was determined by drying the samples to constant weight at 105° C ± 3°C. The basic density was calculated as follows :

$$\text{Basic density (g/cc)} = \frac{\text{Oven dry weight (g)}}{\text{Green (soaked) volume (cc)}}$$

Fibre length

Slivers from each sample were macerated in 1 : 1 mixture of glacial acetic acid and 20% hydrogen peroxide. The macerated fibres, after staining with safranin, were mounted on a glass slide and were projected using an improvised projection microscope. For each tree 50 fibres were measured at random.

RESULTS

Data of Trees

Tree No.	*BHG (inches)*	*Total Height (feet)*
A	21.2	76
B	28.6	79
C	27.6	84
D	40.0	80

Basic Density

Tree No.	*Basic Density (g/cc)*					
	Percentage height					
	0%	10%	25%	50%	75%	*Mean*
A	0.47	0.41	0.38	0.39	0.37	0.40
B	0.43	0.41	0.37	0.33	0.33	0.37
C	0.44	0.44	0.41	0.35	0.37	0.40
D	0.54	0.48	0.50	0.44	0.38	0.47

Fibre Length

Tree No.	*Fibre Length in mm*					
	Percentage height					
	0%	10%	25%	50%	75%	*Mean*
A	2.36	2.45	2.52	3.22	2.76	2.66
B	2.35	2.66	2.72	2.90	2.67	2.66
C	2.23	2.58	2.73	2.81	2.58	2.59
D	3.19	3.23	3.56	3.25	3.22	3.29

The Sri Lanka Forester, Vol. XIII, Nos. 3 & 4, January-December, 1978

A Position Paper on Conservation of the Mahaveli Catchment Area

FOREWORD

A Position Paper on the '*Conservation of the Mahaveli Catchment Area*' was prepared by a committee of technical experts of many disciplines

Mahaveli Project plays a paramount role in the National Development.

Therefore, this paper is being published in this issue of *Sri Lanka Forester* to give wider publicity among the general public of the importance of proper conservation and management of the Mahaveli Catchment Area.

W. R. H. PERERA,
Conservator of Forests.

This Committee consisted of—

- Mr. W. R. H. Perera (Chairman), Conservator of Forests
- Mr. J. S. Gunasekera, Soil Conservation Officer
- Mr. M. Gomez, Divisional Irrigation Engineer (Hydrology)
- Mr. J. Kotalawala, Asst. General Manager, MDB (Agriculture)
- Mr. E. K. Nanayakkara, Asst. Superintendent of Surveys
- Mr. S. Sridas, Superintendent of Surveys
- Mr. S. B. Unantenna, Director (Land Use), LRC
- Dr. Gamini Gunasekera, (Secretary), Deputy Director, Ministry of Plan Implementation.

The Committee was expected to prepare a ' Position Paper ' on conservation in respect of the Mahaveli Catchment.

DEFINITION OF THE CATCHMENT AREA

The catchment area of the Mahaveli could be divided into two main areas—

(*a*) The Montane catchment area ;

(*b*) The lowland Dry Zone catchment area.

For the purpose of this study, it was decided to take into consideration the montane catchment area which is the area that is of paramount importance.

The Montane catchment area could once again be sub-divided into the area above Polgolla and the areas between Polgolla and Mahiyangana.

---

*The Annexures have been omitted for want of space. They are available for reference at the Office of the Conservator of Forests, 5, Kew Road, Colombo 2. *Editor*

According to the topography, the areas from which direct surface flow occurs into the two sections mentioned above can be determined. However, the equally important 'indirect flow'—the sub-surface flow as a result of infiltration, under ground streams, etc, and which forms a major component of the dry weather flow, into even streams feeding the Mahaveli, depend not only on land use characteristics and topography but on the geological formation. This geological formation along with the topography determines the nature and direction of infiltration (seepage) and subsequent under ground flow. Therefore, the Catchment Area could not be easily demarcated into sections that would feed the Mahaveli above Polgolla and that part of the river below Polgolla and Mahiyangana. Hence it was decided to treat the entire Montane catchment of Mahaveli as one.

The total area of the Mahaveli catchment is 1.34 million acres. The last comprehensive resource survey of this area was carried out by the Hunting Survey Corporation Ltd. of Canada in 1956. However, the land use patterns in the 20 years since then has changed drastically. The forestry reserves in this catchment area as estimated by the Forest Department in 1971 was only 110,000 acres although the Survey data in 1956 give it as 298,070 acres. The land use patterns are as follows. (Also see Annex 1.)

LAND USE DESCRIPTION (BASED ON 1956 SURVEY)

		Extent (Acres)
1.	Settlement and other associated non-agricultural lands	6,160
2.	Horticulture (Homestead Garden)	123,800
3.	Perrenial Crops (Tea, Rubber, Coconut etc.)	405,340
4.	Seasonal Crops (Tobacco, Sugar cane etc.)	265,740
5.	Paddy	104,604
6.	Grassland and Scrub jungle	111,310
7.	Woodland	298,070*
8.	Unused land (Rocks and Swamp)	4,480
9.	Roads, water bodies etc.	21,000
	Total	1,340,504

***The correct figure should be 110,000 acres.**

In studying conservation methods to be adopted in these areas for the purpose of both soil and water conservation, the subject to be dealt with under two different sections—

1. Land under Forest Cover
2. Agriculturally developed Land

HAZARDS OF POOR CONSERVATION AND AGRICULTURAL PRACTICES

Where adequate forest cover exists, and in agricultural land where intensive soil conservation practices are adopted there would be control of run-off preventing adverse effects such as flash floods, erosion, earth slips, silting of tanks etc.

However, the more important aspect is the retention of water in the soil with subsequent infiltration and the maintenance of an adequate dry weather flow of the Mahaveli. A forest cover helps in protecting the soil, preventing excessive run-off of water, retaining and absorbing it in the soil. This water would subsequently flow into the Mahaveli gradually by way of underground streams etc.

Intensive soil conservation methods adopted in agricultural land would in addition to other benefits contribute to augmenting the dry weather flow.

According to the Mahaveli authorities the flow of water in the lower reaches will ultimately be controlled by a cascade of reservoirs to be built at Kotmale, Victoria Falls and Randenigala. If these reservoirs are to retain sufficient water throughout the year to feed the lower reaches, then once again the catchment areas of these reservoirs should be protected and the dry weather flow into these reservoirs should be assured. This could only be done by an adequate forest cover on land under Forest Management and intensive soil and water conservation practices on developed agricultural lands.

In the absence of these conditions, a major part of the rainfall would dissipate itself in the form of surface flow and over-flow from reservoirs and reach the sea in the shortest possible time with dire consequences during the dry season. The observations of the Irrigation Department, on the adverse effects of poor conservation in the Mahaveli catchment is given in Annex 2.

FORESTRY

There is already an existing Cabinet decision that forest land in the wet zone should not be released for any kind of alienation. This decision should be scrupulously adhered to. In addition, degraded agricultural lands and grasslands not required for animal husbandry purposes should also be reforested. The Cabinet decision is given in Annexe 3.

For the development of forestry reserves in the catchment area, their management and protection it is absolutely essential that the existing resources which are very limited be adequately strengthened. It is also necessary that all forest officers be given adequate training in forestry.

The present legislation to protect the forests (except for the time that lapses between filing action in courts and ejectments) is adequate. The main drawback is that when prosecutions or ejectments are being made administrative decisions are taken either to take long dates or to postpone ejectments. What is lacking is the staff and resources to implement the provisions of the Ordinance apart from the administrative problems referred to above.

Staff and Training requirements are given in Annexe 4, and the list of reports on conservation of forests is given in Annexe 5. The position in respect of Other Crown Forests (now State Forests) is given in Annexe 6.

SOIL CONSERVATION

(a) Importance and purpoes of Conservation

Productive land is basic to the sustenance and welfare of a nation's people. The purpose of soil conservation is to ensure that land resources are utilised without impairing the productivity or creating problems on other lands in the watershed and also to improve land that has been impoverished by erosion and misuse. Some of the land use that prevails today results in a progressive decline in productivity and in some cases of eventual abandonment. Further uncontrolled erosion has caused adverse effects on community and public utility projects such as reservoirs, sources of water supply, roads, irrigation and drainage channels, while hazards from earth slips, flood and droughts have increased and become recurrent features.

While it is necessary that development programmes be arranged to increase production in the food front, save exchange by import substitutes of food and other commodities and increase foreign exchange by increased exports of primary products ; it is equally important to see that the productive base of these will be protected and prevented from damage by erosion and production thereby sustained.

A soil conservation programme should therefore be based on the principal of optimal utilisation of land and allied resources for maximum production over a long period of time. It is to be lchieved by identifying the differences in land according to their inherent characteristics using different aand units according to their capability and treating them to their needs.

(*b*) Historical evidence as to damage to land and downfall of nations due to erosion

Erosion the land it effects, and man that aids and accelerates such effects, are the products of nature and governed by the forces of nature. It is therefore the story of man in relation to his environment and adjustment or maladjustment to it. How successfully or unsuccessfully he has been able to achieve this either in harmony with these forces or against them has determined his rise or fall. This is because the existence and survival of man is dependant on the few inches of top soil he is, precariously perched on.

The pages of world history gives ample evidence and graphic illustrations how Empires have risen, flourished only to fall with the loss of soil. Thus the potent forces of erosion has been compared to modern warfare. Whereas the destruction by force of the atom bomb is sudden, swift and spectacular, the creeping power of erosion has been causing more damage and lasting devastation for many centuries in the past.

Reference to such instances and locations will cover many pages. Suffice here to give passing mention to lands to Mesapotamia, Valley of the Tigris and Euphrates andEastern States of the Mediterrannean, Syria, the North Africa States, Gobi desert area of China which bear manifestation to this. These could be multiplied. Graphic description of this have been given by Jackson and White in 'Rape of the Earth' Vogt " The Road to Survival ". Hyme " Top Soil and Civilisation " Osborn " The Plundered Plant and Cole " " Man and Environmental Crisis ".

There is ample evidence of what has taken place and what could take place. To ignore it altogether and not be alive to it, that such catastrophe could befall us, is indifference, callousness and a folly. Writers have referred to that as a factor for the downfall of the ancient civilisations in Sri Lanka.

(*c*) Sequences of events leading to attention to this subject

The seriousness of the problem of erosion and the necessity for a conservation plan and erosion control measures had received the attention of Government since it was first pointed out to Government over a 100 years ago. Since then the problem received the attention of the Government through a series of reports and commissions and committees on the subject. In recent years the attention of Government was drawn to this probelem by the—

Kandyan Peasantry Commission Report
Gal Oya Reconnaissance Survey Report
Kotmale landslips report 1952
Walapone-Uda Hewaheta landslip damage reports 1957

River Valley Basin Reports

Land Utilisation Committee Report, and

Report of the Special Committee on the Conservation of Forests in the Wet Zone.

The problem was considered urgent and important and this received the attention of the Government and included as a Cabinet decision under the Post-War Development Proposals in 1946.

In 1947, the year following the Cabinet decision, high intensity rain storms were experienced in many parts of the country, particularly in the central highlands resulting in severe floods and extensive damage. Earth slips and subsidence occurred in many parts particularly in the Kotmale valley which came to be known as the Valley of Terror, resulting in extensive damage to both life and property resulting in evacuation, and rehabilitation of those affected elsewhere.

Immediate consideration was given to the problem and the framing of soil conservation legislation was taken in hand along with the recruitment of a Soil Conservation Expert from abroad and the creation of a Soil Conservation Division in 1950.

Draft legislation for Soil Conservation was prepared and submitted as a Cabinet Paper by the Minister of Agriculture and Lands.

In the light of events of 1947 and a resolution and a request of the District Agricultural Committee of Nuwara Eliya, action was taken under Section 3 of the Soil Conservation Act to declare the Kotmale and Kehelgamuwa-Maskeliya Oya Catchment as an erodible area in 1953.

At the request of the Agricultural Committee, Nuwara Eliya, the remaining section of the District Walapane, Uda Hewaheta was declared as erodible area in 1961. Regulations under the Act were then presented in Parliament and passed by Parliament to cover these areas.

On a further resolution adopted and at the request of these two bodies and accentuated by continued damage by slip erosion during 1957 rains, general regulations to cover a number of items of erosion control particularly landslips grassland fires and siltation was prepared. These were discussed at an inter-departmental conference and a special sub-committee appointed by S/A.L.I. & P. to go into the question. It was also discussed by a Departmental Committee and a revised set of draft regulations were got ready (Annexe 7).

Since then the hazards of erosion and its ravages and resultant related effects like landslides and overflow, and droughts have left their marks in the recent years. To mention a few, specially they are—

Haldumulla landslips in 1965

The December rains in N'Eliya District

Floods in the Gin Ganga and Nilwala Ganga basins

Recent landslip damage in the Uda Hewaheta area

II. Present Aspects and Status of Soil Conservation work and future needs

The soil conservation work has been mainly concentrated in these parts of the hill country that have been proclaimed ' erodible areas ' under the Soil Conservation Act. They comprise of the upper catchments of the Mahaweli (above Minipe) and the Kelani (above Kitulgala) which covers the N'Eliya and Kandy Districts. Here too work has been chiefly confined to lands under tea forming the catchments of the H.E.S. reservoirs and lands under tobacco. In recent years considerable, attention has been devoted to technical assistance given in locations where lands are opened up under special leases, youth settlement schemes and other Agricultural enterprises and pilot projects areas under the R.V.D.B. Mahaweli Board and the Agricultural Diversification Project.

The main aspects for soil conservation consists cheifly of erosion and conservation surveys. These are followed by the planning, programming and a programme effectuation of conservation work under different projects. Next is the implementation of conservation work under different projects. In addition to the implementation soil conservation regulations have been endeavoured where possible. Besides, advice and technical assistance have been and are given (on numerous occasions) to miscellaneous requests and problems posed by Government and other Agencies. Further it has provided and been engaged in as intensive programme of training soil conservation personnel whereby a group of trained soil conservationists was made available by the Government.

The major types of activity of the soil conservation division are therefore investigating erosion problems and conservation needs, planning and programming of S.C. projects and providing technical assistance for the planning and implementation of soil conservation measures.

III. Legislation in Soil Conservation and the Soil Conservation Acts

Legislation for soil conservation exists under the provision of an Act of Parliament called the Soil Conservation Act No. 25 of 1951. providing legislation through which Government may call upon land owners to carry out soil conservation measures prescribed by regulations made under the Act ; while failure to comply with such regulations makes a land owner liable upon conviction before a Magistrate to a fine not exceeding Rs. 500/-.

This legislation is most desirable because in soil conservation it is sometimes and even often necessary to look beyond immediate short terms gains, towards a more long term and larger benefit.

Before other methods of persuading certain land owners to adopt soil conservation measurse have not been successful, notifications informing them of the legal necessity of doing such work have often resulted in the adoption of these measures. This is invariably true in the case of the larger plantations.

However in the implementation of these regulations consisderable difficulties have arisen. Some of these are natural and unavoidable under prevalent economic conditions with respect to land and population pressure. Some are self imposed and therefore avoidable if better discipline, correct attitudes and restraint towards misuse of land is maintained by the people and their representatives use their influences and good offices in this connection.

Further the Government and the D.A.CC. have not favoured the use of the Act for punitive purposes (see Minutes of D.A.C. Meeting at N'Elliya on 10.8.62 and D.A.'s letter No. AG/1/1/162 of 2.12.62 attaching Hon. M/L.I. & P's directive and my No. SCP/TC of 18.12.62 and 18.10.62). Extract of the Hon. Minister's directive is as follows —

IV. " Item 88—Application of the Soil Conservation Act in N'Eliya

Hon. Minister wanted the regulations that had been tightened up two years ago to be relaxed to a certain extent in order to encourage tobacco cultivation " (dated 1962)

The Act in itself as presently constituted is purely punitive and leaves much to be desired. These shortcomings are discussed below.

However, action has never been filed in a Court of Law against defaulters as this line of approach was not favoured by the Government. Further it is very unlikely that the penal provisions of the Soil Conservation Act would materially help, other than in plantations sections in achieving substantial soil conservation unless the major shortcomings are rectified namely—

(1) Soil Conservation measures applied on isolated farming units are not fully a ffacted (particularly where farming units are very small as in the case of the present sector lands). Unless there is provision to intergrate the application of soil conservation measures in individual farming units on a watershed basis.

(2) There are no strong incentives for incurring large capital outlays where some of the benefits accure over a period of many years and are off, site on adjacent and neighbouring lands of a watershed. A scheme of financial assistance was formulated for the Nuwara Eliya District and submitted to Government which however did not materialise.

However, recently particularly as a result of erosion damage during the recent rains in the Uda Hewaheta-Walapane area there has been a desire and even suggestion by the Government Agent and the peoples' representatives to enforce legislation on conservation.

A more positive type of legislation can be formulated with the rectification of the above shortcomings. See draft regulations in this connection as given in Annexe 7.

As such there are many Departments or agencies concerned with the problem and who should get about treating the problem in their own way according to the importance and priority given to it. Sometimes the assistance and the advice of the Soil Conservation Division is sought. Often they are not. This may be recognised by name only and mere *ad hoc* treatment given to the problem by some while others give no concern or attention to it at all.

V. Areas for immediate attention

The soil conservation programme under the scheme will be application to the island as a whole. However, in the first instance it may be desirable to have a concentration of effort and concerted action in some particular or specific areas or locations which need special consideration. The priority locations where conservation will be concentrated and operative in the first instance are—

(1) Locations where erosion hazards are greatest due to particular type of land use (like tobacco) and other seasonal cultivation steep slopes of tea in small holdings and many plantations with their adverse effects on other lands and community works in the locality. Also in view of their situation and effects in relation the development projects located down stream in the watershed.

(2) It will also be focussed and received proirity in new lands being opened up and developed both by the public and private sector. By the public sector youth settlement scheme, colonisation acheme co-operative farms and projects, so as to prevent damage by erosion and plan the conservation of the land from the inception.

(3) Further a few pilot watershed conservation projects will have to be developed as bench marks to as overall island plan. They will serve as an example and demons tration of multiple land use and conservation where sound land management is practised to keep lands in a permanent productive conditioin. Particulars in Appendix.

(4) Erodible areas—the section of the hill country comprising N'Eliya and Kandy Districts comprising the upper catchment of the Mahaveli and Kelani which have already been proclaimed under the Act and S. C. regulations framed. Areas proposed erodible under the Act. The upper catchments of the Kelani, Walawe and the Mahaveli River Uva Basins.

(5) Kandyan peasantry rehabilitation areas. The areas have been subject to severe erosion due to prevalent land use practices, change in land use and resultant besides. demographic conditions. Most of these areas will however come under 1,2, and 4 above.

VI. Areas of Erosion Hazard—Authorities concerned and Priorities

The problem of erosion and field of conservation covers a wide area comprising a good part of the island, It concerns (confine of the island) its entire land area and associated water bodies and vegetation (cover). It therefore includes all the various land uses both natural and substituted. This would include both private and public sector property whether central or local and Government controlled. As such and as presently constituted it has become the concern of a number of Departments. The chief among these are the—

(1) Agricultural Department in the case of private agriculture lands and the Department's own farms and project areas

(2) The Land Commissioner's Department in the case of State, Colonisation and Settlement Schemes, L. D. O. Allotments and other State lands

(3) The Land Development Department and Army where clearing is being undertaken

(4) The Plantation Ministry with respect to the plantation sector lands

(5) The Minor Export Crops Department with respect of M. E. C. and Agricultural diversification land

(6) The Forest Department with respect to the Forest lands

(7) The Wild Life Department with regard to Wild Life areas

(8) The Tea Commissioner's Department with respect to the Tea and Rubber small holdings

(9) The Coconut Cultivation Board with respect to coconut lands

(10) The Sugar Corporation

(11) The Land Reform Commission and Janawasama

These agenices together cover most of the land areas and major land uses. There are however a number of other Departments or Agencies that are confronted with these problems both directly and indirectly and therefore concerned with it such as—

(12) Irrigation Department with respect to siltation of irrigation canals due to misuse of land above and the sedimentation of tanks due to misuse of land in the catchments of the same.

(13) Electricity Board with regard to sedimentation of reservoirs already built and proposed under the Hydro Electric Scheme.

(14) The Highways Department with respect to both road erosion and wash away to the roads and quarry areas and burrow pits.

(15) The Ceylon Tourist Board with respect to tourist areas, scenic routes and nature conservation.

(16) The Local Government Department and bodies with respect to Municipal, U. C. and T. C. lands.

(17) Town and Country Planning Department

Further details are given in the following Annexes—

(1) Specific examples of poor conservation and their effects—Annexe 8, 8a.

(2) Special types and forms of erosion—Annexe 9.

(3) Soil Conservation Erosion in relation to Land Use—Annexe 10.

(4) Specific Sites for Inspection—Annexe 11.

(5) Financial Assistance for Soil Conservation—Annexe 12.

(6) Soil Conservation Legislation (particulars)—Annexe 13.

(7) Soil Conservation Training—Annexe 14.

(8) Soil Conservation Staff—Annexes 15 and 15a.

(9) Mahaveli Catchment—Annexes 16 and 16a.

(10) Soil Conservation Reports—Annexe 17.

MAHAVELI GANGA CATCHMENT

The position of the Mahaveli Development Board in relation to Conservation in the Catchment Area is given below—

"The specialists report on land use in the Mahaveli Project area stresses the importance of conservation of forest in the montane catchment of Mahaveli Ganga.

The Mahaveli Act does not envisage any activities for water and soil conservation in the montane catchment area (watershed). However, Section 7(3) covers functions and duties of the Board to be exercised (etc.) states as follows :—

> "Notwithstanding anything to the contrary in this Act, the Board may, acting under the authority granted by the Minister by order under his hand, execute outside any special area any such work specified in the order as may be necessary for the discharge of its functions under this Act."

The sub-section(3) has provision for the Minister of Irrigation, Power and Highways to take over any special area outside the presently defined areas for the discharge of its functions. In Section 8 it defines the functions in the Board, Sub-section (a) given below includes flood control and control of soil erosion.

> "To promote and operate schemes of irrigation water supply and drainage, flood control and control of soil erosion."

So far the activities of the Mahaveli Development Board were centred mainly on the construction works below Polgolla dam, settlement of farmers and development of agricultural activities in the area benefitting from this diversion. The damage that may be caused in the exploitation of the catchment area for food production and for timber and firewood, and the consequent soil erosion and flood hazards have not been considered by the Board as most of it is outside its present area of authority.

"The Mahaveli Board is completely in agreement with the proposal to conserve forests in the catchment area, soil and water in the cultivated areas. "

Mahaveli Catchment falls into several districts. These districts are listed in Annexe 18. The catchment is covered by several topographical sheets. These are given in Annexes 19. Potato vegetable and tobacco cultivation in the catchment area is given in Annexes 21, 22 and 23. District wise distribution of tea small holdings is reported in Annex 20.

Maps delineating the catchment area is attached to the copy submitted to the Chairman of the Committee.

THE PROBLEM IN A WIDER PERSPECTIVE

However the prime cause of the present situation—is the population expansion and the population pressure in certain areas. Unless these problems are solved—the consequences would indeed be dire.

Limiting the family till the population is stabilised, shifting excess population from areas in the wet zone, where there is land hunger—to development schemes in the dry—will have to be given top priority.

RECOMMENDATIONS

1. The last Land Use Survey was carried out in 1956. Since then land use patterns have changed, considerably. Therefore, it is recommended that the Survey Department be requested to embark on a programme of land use mapping based on a new aerial photographic survey.

2. Strict adherence to the Cabinet decision that no forest reserves in the Wet Zone be alienated for any purpose whatsoever.

3. To provide adequate staff and resources to the Forest Department to give effect to forest conservation, development and management.

4. Delegate and apportion the responsibility of soil conservation to different departments, agencies and other organisations concerned with respect to their particular areas of activity.

5. Soil Conservation aspects be given due consideration and included in settlement planning and implementation in Colonization Schemes, Settlement Schemes, Co-operative farm,s and villages and L. D. O. and village expansion lands and land under M. P. C. SS., Electoral Boards, Co-operative Societies, LRC and Janawasama etc.

6. Soil Conservation be closely linked to and included in all aspects of agricultural extension activities as it is fundamental to sound agricultural practice and sustained porduction.

7. Training staff engaged in agriculture and other aspects of land development in different organisations and agencies in principles and practise of soil conservation.

8. To provide staff at the directorate, supervisory and field level in executing the Soil conserva tion programme to all organisations and agencies responsible for soil conservation.

9. Any set of recommendations on conservation of soil, water and forest would bear tangible-results only if implemented with strict population control in the country.

Sri Lanka Forester (New Series)

Index To Volumes I-XIII

AUTHOR INDEX

		Vol.	*No.*	*Page*
De Rosayro, R. A.	The Application of aerial photography to the management of watersheds in the tropics	III	(2)	128
Do.	The climate and vegetation of the Knuckles Region of Ceylon	III	(3&4)	201
Do.	The Field characters of trees of the tropical wet evergreen forests of Ceylon (I)	I	(1)	25
Do.	The Field characters of trees of the tropical wet evergreen forests of Ceylon (II)	I	(2)	67
Do.	The Place of forestry in the Dry Zone (Ed.)	IV	(1)	1
Do.	The Place of forestry in the Wet Zone (Ed.)	IV	(2)	99
Do.	The Silviculture and management of Tropical rain forest with special reference to Ceylon	II	(1)	5
Do.	Tropical ecological studies in Ceylon	II	(4)	168
De Silva, C. P.	Soil Conservation in land management	III	(1)	13
De Silva, J. A.	Forest Policy	I	(2)	54
De Silva, W. A.	A contribution to Sinhalese plant lore	I	(4)	89
Decamps, Andre	The Forest in relation to man	I	(1)	4
Deraniyagala, P. E. P.	Extermination of the races of Elephas maximus throughout Asia	II	(1)	30
Dombois, D. Mueller	*See* Mueller—Dombois, D.		—	
Eriyagama, G. J.	The Semi-arid vegetation in Mannar Region	IV	(1&2)	66
Do.	*See also* De Alwis, K. A. and....		—	
Farmer, B. H.	Society and the land, with special reference to Ceylon	II	(3)	102
Fernando, A.	Fish breeding	III	(1)	94
Fernando, D. F. S.	Computation of girth increment rates for Dry Zone species—Satin, Ebony, Milla and Palu	V	(4)	393
Do.	Investigation of the relationship between the specific gravity and the maximum compression stress of Satin	V	(4)	203
Fernando, S. N. U.	Fertilization of Teak Nurseries	VII	(3&4)	103
Do.	Insects commonly found in the Teak Nurseries of Ceylon	VII	(1&2)	54
Do.	Teak in Ceylon Nurseries	VII	(1&2)	57
Do.	Some observations on raising *Dendrocalamus strictus* in the nursery	VI	(3&4)	134
Fernando, X. M.	Beedi wrappers	IV	(1)	84
Do.	Notes on Ceylon timbers	II	(1)	45
Do.	do.	II	(2)	85
Do.	do.	II	(3)	131
Do.	do.	IV	(1)	87
Do.	do.	IV	(2)	227
Ganesan, K.	A Note on the performance of the ' Forestiere C. D. 4' band saw Mill	II	(4)	226
Do.	Electrical determination of the moisture content of 6/4 maple lumber during kiln seasoning	III	(1)	73
Do.	The Steam-bending of sweetgum fortified with birch and Douglas—fir veneer	IV	(1)	53
Goonewardene, W. E. S.	Azadirachta indica	IV	(1)	97
Do.	Notes on Ceylon timbers	III	(2)	187
Do.	The Control of lantana in a plantation of eucalyptus spp. (Research notes)	I	(2)	123
Gorrie, R. M.	*see* Worthington, T. B. and			
Gopalasingham, E.	Farewell speech to Mr. & Mrs. J. A. de Silva	III	(2)	189
Do.	Notes on circulars, rulings ans supreme court decisions, &c. of special interest to forest management	III	(1)	95
Do.	The Role of protection in forestry	IV	(2)	201

		Vol.	No.	Page
Gunatilleke, C. V. S.	Sinharaja today	XIII	(3 & 4)	57
Hettiarachchi, D. J. M.	The tree is a friend to the photographer	III	(2)	174
Holmes, C. H.	Industrial uses of wood	III	(3 & 4)	1976
Do.	Moisture relations in forestry practice	I	(1)	6
Do.	Notes on a tour in Kashmir (4th World Forestry Congress)	II	(2)	91
Do.	Recommendations of the Fourth World Forestry Congress (extract from a report by the author)	II	(2)	63
Do.	Science and life today	II	(3)	111
Do.	Seed germination and seedling studies of timber trees of Ceylon	I	(3)	3
Do.	The Broad pattern of climate and vegetational distribution in Ceylon	II	(4)	209
Do.	The Natural regeneration of the Wet & Dry Evergreen forests of Ceylon, (p. 153) Chapter I : Introduction. Chapter II (p. 160) Foliar changes ; flowering, fruiting and seed germination	II	(4)	153
Do.	The natural regeneration of Wet & Dry evergreen forests of Ceylon. Chap. III fundamental investigstions	III	(1)	15
	Chapter IV : Special investigations and conclusions therefrom on problems of natural regeneration of dry evergreen forests	III	(1)	27
Do.	The natural regeneration of Wet & Dry evergreen forests of Ceylon. Chap. V : Special investigations in Wet Evergreen forests	III	(2)	111
Iriyagama, G. J.	*See* Eriyagama, G. J.			
Jayanetti, D. L.	All wood paristaltic pump	XI	(1 & 2)	32
Do.	Some methods of preservative treatment of bamboo	XII	(2)	101
Jayasinghe, L. H. Tambiah, M. S. *and* Tisseverasinghe, A. E. K.	Observations on the mycorrhizas of *Pinus patula* and an attempt to culture and identify the fungus	IX	(1 & 2)	15
Jayatilleke, M. P. A.	*See* Tisseverasinghe, A. E. K. and			
Jayaweera, G.	Of Nellu, bees and honey	I	(3)	75
Joseph, P. V.	A Note on the silviculture of—I. Salmalia malabarica, II. Alstonia scholaris, III. Aluerites triloba	V	(1 & 2)	113 114 115
Kamra, S. K.	Forestry Seed problems of some developing countries of Asia	XI	(1 & 2)	5
Do.	Some X-ray films for radiography of seeds	XII	(1)	8
Koelmeyer, K. O.	A Climatological basis for the introduction of exotic forest species into Ceylon	I	(2)	91
Do.	Climatic classification and the distribution of vegetation in Ceylon	III	(2)	144
Do.	Climatic classification and the description of vegetation in Ceylon	III	(3 & 4)	265
Do.	Research Notes : A study of the girth increment of Dipterocarpus zeylanicus (Hora)	I	(3)	76
Do.	Silvicultural notes on trees—Ebony	I	(4)	159
Do.	Silvicultural notes on trees-Halmilla	I	(1)	35
Do.	Silvicultural notes on trees-Satin	I	(3)	59
Do.	Teak plantations in Ceylon	III	(2)	178
Do.	The Periodicity of leaf change and flowering in the principal forest communities in Ceylon	IV	(2)	157
Do.	The Periodicity of leaf change and flowering in the principal forest Communities of Ceylon	IV	(4)	308
Koelmeyer, K. O., *and* Wijewantha, R. T.	A Selected subject index—The Ceylon Forester Volume I-III (1895-1897)	I	(1)	45
Lovell, W. A.	A few points for the guidance of forest rangers in dealing with forest offences	II	(3)	138

		Vol.	*No.*	*Page*
Masani, N. J.	Fire hazard in timber structures	III	(3 & 4)	261
Do.	Timber as structural material in modern timber engineering practice	III	(1)	42
Do.	Timber engineering in Europe and its application to India and Ceylon	III	(2)	140
Mathews, W. S. A.	*see* Robbins S. R. J. and			
McVeigh, J. *and* Ganesan, K.	Standard wood working tests	II	(4)	201
Mead, Albert R.	The Giant African (Kalutara) Snail in Ceylon	II	(1)	47
Macijer, W.	Botanical notes on Ceylon trees—I *Soymida febrifuga*	IX	(3 & 4)	95
Do.	Botanical notes on Ceylon trees—II. Meliaceae, Sapindaceae and Anacardiaceae	IX	(3 & 4)	142
Do.	Field keys to genera and species of Dipterocarpaceae in Ceylon	XI	(1 & 2)	58
Merritt, V.G. *and* Ranatunga, M.S	Aerial photographic survey of Sinharaja Forest	IV	(2)	103
Do.	The forests of the Kirindi Oya Basin : a reconnaissance report	IV	(1)	7
Mueller—Dombois, D.	Ecogeographic analysis of a climate map of Ceylon with particular reference to vegetation	VIII	(3 & 4)	39
Muttiah, S.	A Comparison of three repeated inventories of Sundapola mixed selection working circle and future management	VII	(1 & 2)	3
Do.	A Preliminary Study on the distribution, growth and propagation of Weniwelgata (*Coscinium fenestratum*)	VI	(3 & 4)	113
Do.	An Insecticide trial for the control of Cockchafer larvae (*Anomala* sp) in teak nurseries	VIII	(1 & 2)	12
Do.	Initial observations on the introduction of *Pinus caribaea* in in Ceylon and certain rooting, transpiration and mycorrhizal studies on seedlings of the two provenances of this species under contolled conditions	IX	(3 & 4)	98
Do.	Report on a seminar on forst seed and tree improvement	VII	(3 & 4)	70
Do.	Some data on teak seed and further pre-germination treatment trials	XII	(1)	25
Namasivayam, M.	Watershed management in the U.S.A.	IV	(3)	233
Nicholas, C. W.	From the Warden's field book	I	(1)	15
Do.	From the Warden's field book : (Notes on the sloth bear)	I	(2)	72
Do.	From the Warden's field book the Ceylon elephant in antiquity, (i) the Sinhalese period	I	(3)	52
Do.	From the Warden's field book : the Ceylon elephant in antiquity (ii) the Portugese, Dutch and British Periods	I	(4)	103
Do.	The Present status of the Ceylon elephnat	II	(1)	38
Do.	Wild flowers of Yala and Wilpathu	IV	(1)	39
Packeer, A. S. A.	Wild life resources of Ceylon	V	(3)	139
Paskaran, N.	Modified calculation for preliminary characterisation of timber	XII	(1)	44
Perera, N. P.	The Ecological status of the Montane grasslands of Ceylon	IX	(1 & 2)	27
Perera, S. P.	A Cheap and effective method of eradicating Illuk	I	(1)	39
Do.	Edible fruits of the forests	I	(4)	141
Do.	*Swietenia macrophylla* and its propagation by striplings	II	(2)	75
Perera, W. R. H.	A Position paper on conservation of the Mahaveli catchment area	XIII	(3 & 4)	75
Do.	A Study of the protective benefits of the Wet Zone forestry reserves of Sri Lanka	X	(3 & 7)	87
Do.	Afforesting arid areas in the Mannar Region using the 'Methode Steppique'	V	(4)	195

		Vol.	*No.*	*Page*
Perera, W. R.H	.. An Economic study of the Up-Country forest plantations of Ceylon	V	(1&2)	82
Do.	.. Catchment areas and the protection of the environment ..	XIII	(3&4)	49
Do.	.. Forest seed problems in Asia	XI	(1&2)	2
Do.	.. Forestry development plan	X	(3&4)	62
Do.	.. Guidelines for Sri Lanka's forest policy	XIII	(1&2)	3
Do.	.. " Let the desert bloom "—a challenge to Ceylon's foresters (Ed.)	V	(4)	175
Do.	.. Research Notes : Some growth and increment studies for species grown in Up-Country forest plantations	V	(3)	162
Do.	.. Teak first thinnings for paper pulp (research note) ..	XII	(1)	50
Do.	.. Teak seed orchards	V	(1&2)	6
Do.	.. The Development of forest plantations in Ceylon since the Seventeenth Century	V	(3)	142
Do.	.. The Development of the forest resources of Sri Lanka ..	XIII	(1&2)	5
Do.	.. The Merging of forestry and agriculture (Ed.).. ..	V	(3)	125
Do.	.. The Use of Wyssen cables for extracting timber economically and their possible use in Ceylon	V	(1&2)	50
Do.	.. The value of research in forestry (Ed.)	V	(1&2)	3
Do.	.. Thotapolakanda—an environmental disaster	XIII	(3&4)	53
Phillips, W W. A.	.. Elephants in relation to agriculture and settlement ..	II	(1)	32
Pillai, A. K. ..	.. Note on Palu, (*Manilkara hexandra*, Dubrad) ..	I	(2)	78
Do.	.. The Poisoning of ficus trees in the Dry Zone (research notes) ..	I	(2)	124
Ponnampalam, R.	.. Notes on timber	VIII	(1&2)	33
Poulier, R. S. V.	.. Protection of crops against wild elephants .., ..	II	(1)	34
Pryor, L. D. ..	.. Report on afforestation with eucalyptus in Ceylon ..	VI	(3&4)	95
Raja, E. C. Tamby	.. *See* Tamby Raja, E. C.	—	—	—
Ranasinghe, B. S.	.. *See* Ranasinghe, Bernard S.	—	—	—
Ranasinghe, Bernard S.	.. Life of lumbermen of Ceylon	II	(3)	144
Ranatunga, M. S.	.. A Study of the fibre lengths of *Eucalyptus grandis* grown in Ceylon	VI	(3&4)	101
Do.	.. Notes on the planting of forest species	X	(3&4)	103
Do.	.. The Management of bamboo in India	VIII	(2&4)	98
Ranatunga, M. S. and Vivekanandan, K.	Twisted needles : a new freak in *Pinus caribaea* ..	X	(1&2)	13
Ranatunga, M. S.	.. *See also* Merritt, V.G. and	—	—	—
Rantnam, P. W.	.. *See* Rutnam, P. W.	—	—	—
Ratnarajah, A. D. R. *et al.*	.. Report on the regional training course in forstry techniques, January-February, 1962	VI	(1&2)	37
Ratnasiri, Nalini, B.	.. Insect injury to plants	XIII	(3&4)	65
Richards, P. W.	.. Research in the humid tropics. the Unesco Programme ..	II	(4)	165
Robbins, S. R. J. *and* Matthews, W. S. A.	Minor forest products. their total value is of a major order ..	XIII	(1&2)	19
Rosayro, R. A. de	.. *See* De Rosayro, R. A.	—	—	—
Ruberu, T. R. A.	.. Forest insects (defoliator of Albizzia lebbek)	II	(1)	41
Do.	.. Note on wood. rotting fungus on Sapu	II	(2)	80
Rutnam, P. W.	.. Growth of plants under the shelter of natural forest in the Dry Zone	IV	(2)	224
Sanmugampillai, M.	.. Propaganda—an essential adjunct to forestry and forest Department activity	II	(2)	72
Satchithanathan, S.	.. *See* Tisseverasinghe, A. E. K. *and*	—	—	—
Seneviratne, A. N.	.. A Great little forest ranger	V	(4)	193
Seneviratne, E. W.	.. Variation in density in wood of six species of the family Guttiferae	X	(1&2)	33

		Vol.	No.	Page
Sidorov, G.	Forests protects fields	V	(3)	158
Silva, C. P. de	*See* De Silva, C. P.	—	—	—
Silva, J. A. de	*See* De Silva, J. A.	—	—	—
Silva, W. A. de	*See* De Silva, W. A.	—	—	—
Soyza, A. M. T.	A Method for acid and alkali proofing of laboratory bench tops	X	(1&2)	51
Do.	Natural durability of twelve timbers found in Sri Lanka	XI	(1&2)	24
Sri Bharatie, K. P.	*See* Bharatie, K. P. Sri	—	—	—
Sridas, S.	Notes on a reconnaisance survey for the integrated development of the Walawe Basin of Ceylon	VI	(3&4)	121
Do.	On Forest inventories	VII	(3&4)	86
Szechowyez, R. W.	Benefits and damages to the amenities : scenic and recreational resources ; fish and wildlife	IV	(2)	207
Do.	Forests in the catchment on Gal Oya Reservoir	I	(2)	58
Do.	Some observations on the forests of Ceylon	II	(4)	192
Do.	Some observations on climate, soil and forest climate	I	(4)	131
Do.	The Savannah forest of the Gal Oya Catchment (Ceylon)	V	(1&2)	17
Do.	The Study of tropical vegetation	IV	(1)	65
Do.	Trees, superstition and religion	V	(4)	208
Thambiah, M. S.	*See* Jayasinghe, L. H.	—	—	—
Tamby Raja, E. C.	Some impressions of forestry in Japan	II	(4)	187
Tisseverasinghe, A. E. K.	A Preliminary report on the prevention of splitting in poles of *Eucalyptus grandis*	VIII	(1&2)	20
Do.	Changing objectives of forest management (Ed.)	VIII	(1&2)	1
Do.	Growing of Pines in Ceylon (Ed.)	IX	(1&2)	3
Do.	Land tenure and forest law in ancient Ceylon	II	(3)	124
Do.	Measurement, metrication and forestry practice	X	(1&2)	3
Do.	Notes on forest law	I	(4)	112
Do.	Preservative treatment of rubber (Hevea brasiliensis) wood by boron diffusion process	IX	(1&2)	17
Do.	Research note—Natural regeneration of Jak	III	(2)	71
Do.	The Bending properties of Ceylon timbers ; the bending of thin laminae	VIII	(3&4)	93
Do.	The Contribution of improved forest utilisation to productivity in developing countries	VI	(1&2)	18
Do.	The Economics of forestry in developing countries	VI	(3&4)	81
Do.	The Economics of sawing	IV	(2)	213
Do.	The Transport of preservatives thorugh green wood	XII	(2)	57
Do.	The Utilization of rubber wood	IX	(3&4)	87
Do.	Trained manpower requirements for forestry development in Sri Lanka	XII	(1)	4
Tisseverasinghe, A. E. K. *and* Jayatillake, M. P. A.	A Preliminary study of the feeding preferences of dry wood termites	XI	(1&2)	13
Do.	The Threshold level of boron preservatives against attack by dry wood termites–Cryptotermes domesticus Kalotermitidae	XII	(2)	89
Tisseverasinghe, A. E. K. *and* Satchithanathan, S.	The Management of Sundapola plantation	III	(1)	82
Tisseverasinghe, A. E. K.	*See also* Jayasinghe, L. H.	—	—	—
Vivekanandan, K.	A New technique to assess the germinative capacity of seeds of eucalypts	X	(1&2)	14
Do.	A Report on the Seminar and study tour on the protection against forest diseases and insects held in the USSR	VII	(1&2)	39
Do.	An Experiment to determine the capacity of nine wood–rotting fungi, including Polystictus sanguineus & Lentinus gigantius, to cause decay of Grevillea robusta wood	VII	(1&2)	36

		Vol.	*No.*	*Page*
Vivekanandan, K.	An Investigation of the nature and extent of insect attack on sixteen species of Ceylon timbers	VI	(3&4)	126
Do.	Control of Cockchafer grub in teak nursery	XII	(1)	40
Do.	Design and analysis of progeny tests	XII	(2)	69
Do.	Determination of basic densities of some Ceylon timbers	VII	(3&4)	107
Do.	Experimental design for progeny testing	XII	(1)	13
Do.	First year results of the *Pinus oocarpa* international provenance trial in Sri Lanka	XI	(1&2)	19
Do.	First year results of the teak provenance trial in Sri Lanka	XIII	(1&2)	31
Do.	Fourth year results of the *Pinus oocarpa* international provenance trial in Sri Lanka	XIII	(1&2)	41
Do.	Nursery response of *Albizia moluccana* to added fertilizer	XII	(1)	47
Do.	Pretreatment to improve the germination of Lunumidella seed	XIII	(3&4)	69
Do.	Retention of viability of mahogany seed through cold storage	XIII	(3&4)	67
Do.	The Present status of tree improvement work in Sri Lanka	XII	(2)	95
Do.	Third year results of the *Pinus caribaea* international provenance trial in Sri Lanka	XIII	(1&2)	35
Do.	Variation in basic density and fibre length in *Pinus caribaea*	XIII	(3&4)	73
Do.	Variation in density in *Eucalyptus camaldulensis*	XIII	(3&4)	71
Do.	Variation of seedling traits of *Pinus merkusii* provenances	XIII	(1&2)	29
Do.	*See also* Ranatunga, M. S. *and*			
Warnakula, D. A. L.	Timber grading in Singapore	VI	(3&4)	138
Weerakoon, A. C. J.	Art and our forests	II	(4)	199
Weeraratne, W. G.	An Analysis of results of some teak seed origin trials in Ceylon	II	(3)	69
Do.	Control of kekilla in the wet low country with tembusu	II	(4)	190
Do.	Hymenoptersis parasitism of bostrychid wood borers	II	(1)	27
Do.	Is forestry a sound investment ? (Ed.)	III	(1)	1
Do.	Minor forest produce (Ed.)	II	(3)	99
Do.	Potentialities of beedi leaf production in Ceylon	VI	(1&2)	12
Do.	Prevent floods with natural dams	II	(2)	66
Do.	Some growth data of teak in Ceylon	III	(2)	167
Do.	Studies on artificail propagation of the more important timber trees of Ceylon	III	(3&4)	293
Do.	Tannings from our wattles (*Acacia spp.*) for the leather industry	VI	(3&4)	73
Do.	The Ecology and biology parasitism of the Loranthaceae of Ceylon	IV	(3)	264
Do.	The Taxanomy of the Loranthaceae of Ceylon	IV	(4)	365
Do.	Timber utilization (Ed.)	III	(2)	109
Wickramanayake, E. B.	Bird nesting of Pottuvil	II	(4)	185
Wijesinghe, L. C. A.	*See* Wijesinghe, L. C. A. de S.			
Wijesinghe, L. C. A. de S.	An Experiment in the use of the improved techniques in Dry Zone logging	VIII	(1&2)	23
Do.	An Investigation of the relation between the quantity of seed sown and the outturn of stumps in teak nursery work	VI	(1&2)	31
Do.	Cable cranes as a means of timber extraction from the rain forests of Ceylon	VIII	(1&2)	4
Do.	Development of forest industries in Ceylon (Ed.)	VI	(3&4)	69
Do.	Improvement of logging techniques in Ceylon (Ed.)	VII	(3&4)	67
Do.	Pre-sowing treatment trials on teak	VI	(1&2)	4
Do.	Research notes—A study of the girth increment of Manilkara hexandra Dubard (Palu)	IV	(2)	219
Do.	Some aspects of land use in the Dry Montane grasslands	V	(3)	128
Do.	The Differential shrinkage of wood	IV	(3)	387

		Vol.	No.	Page
Wijesinghe, L. C. A. de S.	The Planning of transportation networks and extraction schemes in the Forest	VII	(3&4)	96
Wijewantha, R. T.	List of fungal sporophores in the Forest Department Herbarium	I	(2)	109
Wilson, A. W.	Forest Field Training School, Palugama	II	(3)	142
Do.	Our Research Laboratory	II	(2)	71
Do.	'U. D.'	II	(4)	227
Wilson, Albert W.	*See* Wilson, A. W.		..	
Worthington, T. B.	Trees for Trinco	I	(4)	152
Worthington, T. B. *and* Gorrie, R.M.	Notes on Eucalypts in Ceylon	I	(2)	112

ඉලංගකෝන්, ඩී. ඩබ්ලිව්.	ලංකාවේ කැලෑ	III	(1)	47
ජයනෙත්ති, ඩී. එල්.	දැව පදම් කිරීමේ මූලධර්ම	XII	(2)	105
පෙරේරා, ඒ. ඊ.	ලංකාවේ කැලෑ පිළිබඳ ගුවන් විදුලි සාකච්ඡාව	II	(4)	176
ප්‍රේමරත්න, ආර්. ඒ.	අතීතය පවසන බුරුත ගස	III	(3&4)	289
වර්ණකුල, ඩී. ඒ. එල්.	සිංහල තේක්ක හා එහි පැවැත්ම	VII	(1&2)	60
විජයසුන්දර, ඩබ්ලිව්. එම්. වයි.	ප්‍රචාරයෙන් ආරක්ෂාව	III	(2)	164
එම	වනාන්තර ජාතික වස්තුවකි	II	(3)	147
වින්සන්ට්, එස්. ඩී. ඊ.	අප ලැබූ වන විද්‍යා පුහුණුව	IV	(3)	301
විමලදැස, ඩී. එස්.	ලංකාවේ වන සම්පත	V	(3)	160

இரத்தினம், P.W.	வனபரிபாலன ஆராய்ச்சி	III	(1)	49
பொன்னம்பலம், இ.	வனத்தின் பெருமை	II	(4)	206

SUBJECT INDEX

	Vol.	*No.*	*Page*
An Investigation of the nature and extent of insect attack on sixteen species of Ceylon timbers.—K. Vivekanandan	VI	(3&4)	126
An Investigation of the relation between the quantity of seed sown and the outturn of stumps in teak nursery work.—L. C. A. de S. Wijesinghe	VI	(1&2)	31
Answers to a FAO Questionnaire on rain forest.—R. A. de Rosayro	IV	(2)	190
Application of aerial photography to the management of watersheds in the tropics.—R. A. de Rosayro	III	(2)	128
Art and our forests—A. C. J. Weerakoon	II	(4)	199
B			
Beedi wrappers—X. M. Fernando	IV	(1)	84
Bending properties of Ceylon timbers—the bending of thin laminae—A. E. K. Tisseverasinghe	VIII	(3&4)	93
Benefits and damages to the amenities ; scenic and recreational resources ; fish and wildlife.—R. W. Szechowyez	IV	(2)	207
Birds nesting at Pottuvil—E. B. Wickramanayake	II	(4)	185
Birds of Wilpattu—W. L. E. de Alwis	V	(4)	187
Birth of an elephant—W. L. A. Andiris	I	(4)	150
Botanical notes on Ceylon trees—I. Soymida febrifuga—W. Meijer	IX	(3&4)	95
Botanical notes on Ceylon trees—II. Meliaceae, Sapindaceae and Anacardiaceae—W. Meijer	IX	(3&4)	142
Broad pattern of climate and Vegetational distribution in Ceylon—C. H. Holmes	II	(4)	209
C			
Cable cranes as a means of timber extraction from the rain forests of Ceylon—L. C. A. de S. Wijesinghe	VIII	(1&2)	4
Canadian Colombo Plan survey of natural resources—J. R. T. Andrews	IV	(3)	260
Catchment areas and the protection of the environment	XIII	(3&4)	49
Ceylon elephant—(a symposium)	II	(1)	30
Classification of timber	I	(2)	129
Climate and vegetation of the Knuckles region of Ceylon—R. A. de Rosayro	III	(3&4)	201
Climatic classification and the distribution of vegetation in Ceylon—K. O. Koelmeyer	III	(2)	144
Climatic classification and the distribution of vegetation in Ceylon (*contd.*)—K. O. Koelmeyer	III	(3&4)	265
Circular saw doctoring—A. Dahanayake	III	(3&4)	291
Computation of girth icnrement rates for Dry Zone species—satin, ebony, milla and palu—D. F. S. Fernando	V	(4)	191
Contribution of improved forest utilization to productivity in developing countries—A. E. K. Tissaverasinghe	VI	(1&2)	18
Control of cockchafer grub in teak nursery—K. Vivekanandan	XII	(1)	40
Control of kekilla in the wet low coutry with tembusu—W. G. Weeraratne	II	(4)	190
Control of lantana in a plantation of eucalyptus spp. (research note)—W. E. S. Goonewardene	I	(2)	123
D			
Decay resistance of some Ceylon timbers—A. L. Bertus	V	(1&2)	116
Design and analysis of progeny tests—K. Vivekanandan	XII	(2)	69
Determination of basic densities of some Ceylon timbers—K. Vivekanandan	VII	(3&4)	107
Development of forest plantations on Ceylon since the seventeenth century—W. R. H. Perera	V	(3)	142
Development of the forest resources of Sri Lanka—W. R. H. Perera	XIII	(1&2)	05
Differential shrinkage of wood—L. C. A. de S. Wijesnighe	IV	(3)	281
E			
Ecogeographic analysis of a climate map of Ceylon with particular reference to vegetation—D. Mueller-Dombois	VIII	(3&4)	39
Ecological considerations in the management of wet avergreen forests in Ceylon—R. A. de Rosayro	I	(2)	80
Ecological status of the montane grasslands (patanas) of Ceylon—N. P. Perera	IX	(1&2)	27

	Vol.	*No.*	*Page*
Natural regeneration of the wet and dry evergreen forests of Ceylon. Chapter III : Fundamental investigations, Chapter IV Special investigations and conclusions, therefrom on problems of natural regeneration of dry evergreen forests.—C. H. Holmes	III	(1)	15
Natural regeneration of the wet and dry evergreen forests of Ceylon, Chapter V Special investigations in wet evergreen forests.—C. H. Holmes	III	(2)	111
Nature and origin of secondary vegetational communities in Ceylon.—R. A. de Rosayro ..	V	(1&2)	23
Nature notes—rain from trees.—R. A. de Rosayro	IV	(4)	381
Note on palu (Manilkara hexandra, dubard).—A. K. Pillai	I	(2)	78
Note on wood rotting fungus on sapu.—T. R. A. Ruberu	II	(2)	80
Notes on a forest tour in Australia.—K. P. Sri Bharathie	IX	(1&2)	5
Notes on a forestry tour in Morocco.—R. A. de Rosayro	II	3)	119
Notes on a reconnaisance survey for the integrated development of the Walawe basin of Ceylon.— S. Sridas	VI	((3&4)	121
Notes on a tour in Kashmir (4th World Forestry Congress).—C. H. Holmes	II	(2)	91
Notes on an excursion to the Nilgiris and Western Ghats, South India.—R. A. de Rosayro ..	II	(2)	59
Notes on birds—pigeons and doves	I	(2)	104
Notes on Ceylon timbers Bedi-del.—X. M. Fernando	II	(1)	45
Notes on Ceylon timbers.—X. M. Fernando	II	(2)	85
Notes on Ceylon timbers.—X. M. Fernando	II	(3)	131
Notes on Ceylon timbers.—W. E. S. Goonewardene	III	(2)	187
Notes on Ceylon timbers—Terminalia arjuna, Chukrasia tabularis and C. Velutina, Manilkara hexandra, Michelia champaca—X. M. Fernando, Azadirachta indica.—W. E. S. Goonewardene	IV	(1)	87
Notes on Ceylon timbers (1) Satinwood (2) Halmilla.—X. M. Fernando	IV	(2)	227
Notes on circulars, rulings and supreme court decisions, &c., of special interest to forest .. management.—E. Gopalasingham	III	(1)	95
Notes on eucalypts in Ceylon.—T. B. Worthington & R. M. Gorrie	I	(2)	112
Notes on forest law.—A. E. K. Tisseverasnighe	I	(4)	112
Notes on the planting of forest species.—M. S. Ranatunga	X	(3&4)	103
Notes on timber.—R. Ponnampalam	VIII	(1&2)	33
Nursery response of Albizia moluccana to added fertilizer.—K. Vivekanandan	XI	(1)	47

O

Observations on the mycorrhizas of Pinus patula and an attempt to culture and identify fungus.— L. H. Jayasinghe, M. S. Tembiah & A. E. K. Tisseverasinghe	IX	(1&2)	15
Of Nellu, bees and honey.—G. Jayaweera	I	(3)	75
On forest inventories.—S. Sridasa	VII	(3&4)	86
Our Research Laboratory.—A. W. Wilson	II	(2)	71

P

Periodicity of leaf change and flowering in the principal forest communities of Ceylon.—K. O. Koelmeyer	IV	(2)	157
Periodicity of leaf change and flowering in the principal forest communities of Ceylon pt. II.—K. O. Koelmeyer	IV	(4)	308
Planning of transportation networks and extraction schemes in the forest.—L. C. A. de S. Wijesinghe	VII	(3&4)	96
Poisoning of ficus trees in the Dry Zone (research note).—A. K. Pillai	I	(2)	124
Potentialities of beedi leaf production in Ceylon.—W. G. Weeraratne	VI	(1&2)	12
Present status of the Ceylon elephant.—C. W. Nicholas	II	(1)	38
Present status of tree improvement work in Sri Lanka.—K. Vivekanandan	XII	(2)	95
Preservative treatment of rubber (Hevea brasiliensis) wood by the boron diffusion procees.—A. E. K. Tisseverasinghe	IX	(1&2)	77
Pre-sowing treatment trials on teak.—L. C. A. de S. Wijesinghe	VI	(1&2)	4
Pretreatment to improve the germination of Lunumidella seed.—K. Vivekanandan ..	XIII	(3&4)	69
Prevent floods with natural dams.—W. G. Weeraratne	II	(2)	66
Proceedings of a seminar on the utilization of forest produce	VII	(3&4)	109
Proceedings of the Ceylon Natural History Society	II	(4)	229

	Vol.	No.	Page
Propaganda–an essential adjunct to forestry and Forest Department activites.—M. Sanmugampillai	II	(2)	72
Protection of crops against wild elephants.—R. S. V. Paulier	II	(1)	34

R

	Vol.	No.	Page
Rain from trees *see* Nature notes.—rain from trees			
Recommendations of the Fourth World Forestry Congress.—C. H. Holmes	II	(2)	63
Report on a Seminar on forest seed and tree improvement.—S. Muttiah	VII	(3&4)	70
Report on afforestation with eucalyptus in Ceylon.—L. D. Pryor	VI	(3&4)	95
Report on the regional training course in forestry techniques, January-February, 1962 ..	VI	(1&2)	37
Research in the humid tropics—the Unesco programme.—P. W. Richards	II	(4)	165
Retention of variability of mahogany seed through cold storage.—K. Vivekanandan ..	XIII	(3&4)	67
Role of protection in forestry.—E. Gopalasingham	IV	(2)	201
Role of the forest, yesterday, today and tomorrow.—H. G. Champion	III	(1)	5

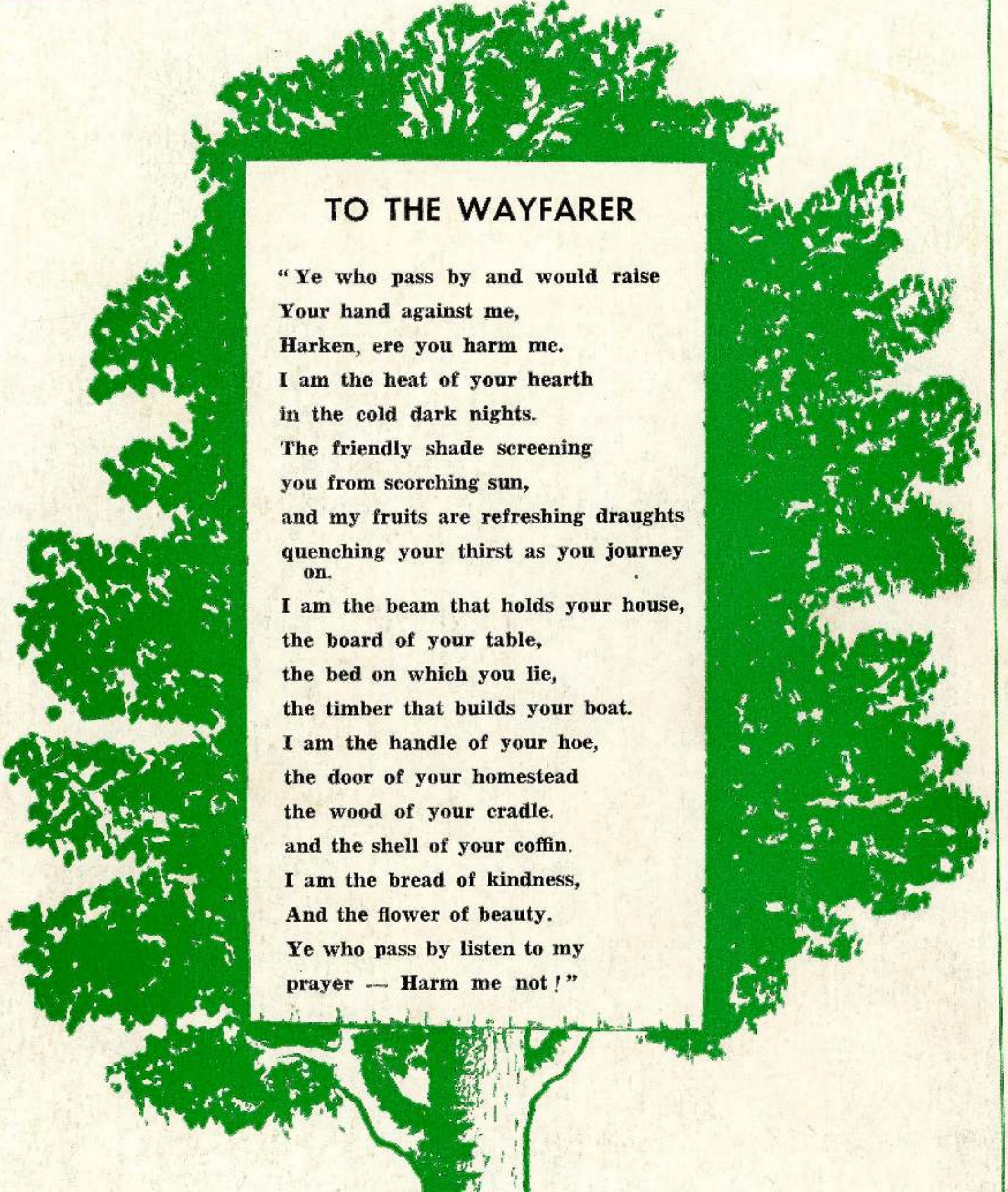
S

	Vol.	No.	Page
Savannah forest of the Gal Oya Catchment (Ceylon).—R. W. Szechowyez	V	(1&2)	17
Science and life today.—C. H. Holmes	II	(3)	111
Seed germination and seedling studies of timber trees of Ceylon.—C. H. Holmes ..	I	(3)	3
Semi-arid vegetation in Mannar Region.—G. J. Eriyagama	V	(1&2)	66
Sessional paper of the O.I.C. Forestry field training—18th Session	III	(2)	193
Significance of the indigenous flora in the areas of the Mahaweli complex.—L. H. Cramer ..	XIII	(1&2)	9
Silvicultural notes on trees—Halmilla.—K. O. Koelmeyer	I	(1)	35
Silvicultural notes on trees—Satin.—K. O. Koelmeyer	I	(3)	59
Silvicultural notes on trees—Ebony.—K. O. Koelmeyer	I	(4)	159
Silviculture and management of tropical rain forest with special reference to Ceylon.—R. A. de Rosayro	II	(3)	5
Sinharaja today.—C. V. S. Gunatilleke	XIII	(3&4)	57
Society and the land, with special reference to Ceylon.—B. H. Farmer	II	(3)	102
Soil conservation in land management.—C. P. de Silva	III	(1)	13
Some aspects of land use in the Dry Montana grasslands.—L. C. A. de S. Wijesinghe ..	V	(3)	128
Some data on teak seed and further pre-germination treatment trials.—S. Muttiah ..	XII	(1)	25
Some facts concerning elephant control in East Africa.—A. M. M. Davies	II	(2)	89
Spme growth and increment studies for species grown in the Up-Country forests plantations (research notes).—W. R. H. Perera	V	(3)	162
Some growth data of teak in Ceylon.—W. G. Weeraratne	III	(2)	167
Some impressions of forestry in Japan.—E. C. Tamby Raja	II	(4)	187
Some methods of preservative treatment of Bamboo.—D. L. Jayanetti	XII	(2)	101
Some notes from East Africa.—A. M. M. Davies	II	(1)	51
Some observations of the forests of Ceylon.—R. W. Szechowyez	II	(4)	192
Some obcservations on climate, soil and forest climax,—R. W. Szechowyez ..	I	(4)	131
Some observations on raising Dendrocalamus strictus in the nursery.—S. N. U. Fernando ..	VI	(3&4)	134
Some observations on soil vegetation relationship in the lowland Dry Zone of Ceylon.—K. A. de Alwis *and* G. J. Eriyagama	IX	(1&2)	53
Some X-ray films for radiography of seeds.—S. K. Kamra	XII	(1)	8
Standard wood working tests.—J. McVeigh *and* K. Ganesan	II	(4)	201
Stem bending of sweetgum fortified with birch and douglas-fir veneer.—K. Ganesan ..	IV	(1)	53
Studies on artificial propagation of the more important timber trees of Ceylon.—W. G. Weeraratne ..	III	(3&4)	293
Study of tropical vegetation.—R. W. Szechowyez	IV	(1)	65
Swietenia macrophylla and its propagation by striplings.—S. P. Perera	II	(2)	75

T

	Vol.	No.	Page
Tannings from our wattles (Acacia spp.) for the leather industry.—W. G. Weeraratne ..	IV	(3&4)	73
Taxonomy of the Loranthaceae of Ceylon.—W. G. Weeraratne	IV	(4)	365
Teak first thinnings for paper pulp (research note).–W. R. H. Perera	XII	(1)	50
Teak in Ceylon nurseries.—S. N. U. Fernando	VII	(1&2)	57

T	Vol.	No.	Page
Teak plantations in Ceylon.—K. O. Koelmeyer	III	(2)	178
Teak seed orchards.—W. R. H. Perera	V	(1&2)	6
Threshold level of boron preservatives against attack by dry wood termites—Cryptotermes domesticus kalotermitidae.—A. E. K. Tisseverasinghe *and* M. P. A. Jayatilleke	XII	(2)	89
Timber as structural material in modern timber engineering practices.—N. J. Masani	III	(1)	42
Timber engineering in Europe and its application to India and Ceylon.—N. J. Masani	III	(2)	140
Third year results of the *Pinus caribaea* international provenance trial in Sri Lanka. K. Vivekanandan	XIII	(1&2)	35
Thotapolakana—an evironmental disaster.—W. R. H. Perera	XIII	(3&4)	53
Timber grading in Singapore.—D. A. L. Warnakula	VI	(3&4)	138
Tortricid moth damage to Pinus seedlings in Sri Lanka.—K. P. Sri Bharathie	XII	(1)	37
Trained manpower requirements for forestry development in Sri Lanka.—A. E. K. Tisseverasinghe	XII	(1)	4
Transport of preservatives through green wood.—A. E. K. Tisseverasinghe	XII	(2)	57
Tree is a friend to the photographer.—D. J. M. Hettiarachchi	III	(2)	174
Trees of Trinco.—T. B. Worthington	I	(4)	152
Trees, superstition and religion.—R. W. Szechowyez	V	(4)	208
Tropical ecological studies in Ceylon.—R. A. de Rosayro	II	(4)	168
Twisted needles—a new freak in Pinus caribaea.—M. S. Ranatunga *and* K. Vivekanandan	X	(1&2)	13
U			
'*U. D.*' (Poem).—Albert W. Wilson	II	(4)	227
Use of Wyssen cable for extracting timber economically and their possible use in Ceylon.—W. R. H. Perera	V	(1&2)	50
Utilization of rubber wood.—A. E. K. Tisseverasinghe	IX	(3&4)	87
V			
Variation in basic density and fibre length in *Pinus caribaea*.—K. Vivekanandan	XIII	(3&4)	73
Variation in density in *Eucalyptus camaldulensis*.—K. Vivekanandan	XIII	(3&4)	71
Variation in density in wood of six species of the family Guttiferae.—E. W. Seneviratne	X	(1&2)	33
Variation of seedling traits of *Pinus merkusii* provenances.—K. Vivekanandan	XIII	(1&2)	29
Variation of fibre length and density in Eucalyptus robusta sm. grown in Ceylon.—K. Arulchelvam	X	(1&2)	19
W			
Watershed management in the U.S.A.—N. Namasivayam	IV	(3)	233
Wild flowers of Yala and Wilpattu.—C. W. Nicholas	IV	(1)	39
Wild life resources of Ceylon.—A. S. A. Packeer	V	(3)	139
World Bank Report—*See* F14.			
අතීතය පවසන බුරුත ගස.—ආර්. ජී. ප්‍රේමරත්න	III	(3&4)	289
අස ලැබූ වන විද්‍යා පුහුණුව.—එස්. ඩී. ඊ. වින්සන්ට්	IV	(3)	301
දැව පදම් කිරීමේ මූල ධර්ම.—ඩී. එල්. ජයනෙත්ති	XII	(2)	105
ප්‍රචාරයෙන් ආරක්ෂාව.—ඩබ්ලිවු. එම්. වයි. විජේසුන්දර	III	(2)	164
ලංකාවේ කැලෑ.—ඩී. ඩබ්ලිවු. ඉලංගකෝන්	III	(1)	47
ලංකාවේ කැලෑ පිළිබඳ ගුවන් විදුලි සාකච්ඡාව.—ජී. ඊ. පෙරේරා	II	(4)	176
ලංකාවේ වන සම්පත.—ඩී. එස්. විමලදස	V	(3)	160
වනාන්තර ජාතික වස්තුවකි. ඩබ්ලිවු. එම්. වයි. විජේසුන්දර	II	(3)	147
සිංහල තේක්ක සහ එහි පැවත්ම.—ඩී. ජී. ඒල්. වර්ණකුල	VII	(1&2)	60
வனத்தின் பெருமை — இ. பொன்னம்பலம்	II	(4)	206
வனபரிபாலன ஆராய்ச்சி – P. W. இரத்தினம்	III	(1)	49



TO THE WAYFARER

"Ye who pass by and would raise
Your hand against me,
Harken, ere you harm me.
I am the heat of your hearth
in the cold dark nights.
The friendly shade screening
you from scorching sun,
and my fruits are refreshing draughts
quenching your thirst as you journey on.
I am the beam that holds your house,
the board of your table,
the bed on which you lie,
the timber that builds your boat.
I am the handle of your hoe,
the door of your homestead
the wood of your cradle.
and the shell of your coffin.
I am the bread of kindness,
And the flower of beauty.
Ye who pass by listen to my
prayer — Harm me not!"