THE SOILS AND ECOLOGY OF THE WET EVERGREEN FORESTS OF CEYLON—II.

R. A. De ROSAYRO, B.A., B.Sc. (Oxon), B.Sc. (Lond.),
ASSISTANT CONSERVATOR OF FORESTS

PART II.

ECOLOGY AND FOREST TYPES.

GENERAL.—The vegetation of the south-western portion of the Island, corresponding roughly to the region of highest rainfall, 100 to 200 inches and over, is Tropical Wet Evergreen or Rain Forest. Slight modifications in the general type of vegetation are found with the merging of this "wet zone" into the "montane zone" (roughly above 3,000 feet altitude) on the lower slopes of the central mountain mass proper on the one hand, and into the "dry zone" (roughly below 75 inches rainfall) on the south-eastern escarpment slopes of the second peneplain on the other. The montane zone is characterized by Sub-Tropical or Temperate Wet Evergreen Forest and the dry zone by Dry, Semi-Deciduous Forest.

The Wet Evergreen Forests are similar in type to the Wet Evergreen Forests of India, Burma and Malaya. There are usually four or five well marked tiers of vegetation which may be referred to as (*a*) the *tree layer* consisting usually of two tiers (i) a *dominant layer* composed of tall and often including deciduous tree species which may in the climax forests reach a height of as much as 150 feet and (ii) a *second layer* of sub-dominant tree species, consisting entirely of evergreen species; (*b*) a *shrub layer* usually divisible into *tall* and *low shrub* layers and including bamboos and canes, and, finally, (*c*) a *ground layer* consisting of grasses, ferns, herbs and mosses. In the natural climax types, the dominant layer forms a more or less closed canopy. Where the cover is not too dense, often as a result of biotic interference, there is often a rich undergrowth of evergreen shrubs, ferns and grasses and the ubiquitous *bata* bamboo—*Ochlanda stridula*, Thw. Epiphytes, lianes and climbers occur usually in profusion on the tree trunks. The leaves of most species are usually thick, firm and glossy with characteristic drip-tips (10). The bark of tree species is generally smooth. Plank buttresses are characteristic of some of the larger tree species, *e.g.*, *kekuna*—*Canarium zeylanicum*, Bl., *netaw*—*Xylopia parviflora* Hk. f., and *tiniya*—*Doona congestifolia*, Thw. There are two flowering and fruiting seasons, roughly from March to June and from October to December, corresponding with the incidence of the controlling south-west and north-east monsoons respectively. The former period is more important for regeneration, the latter is contributory to its establishment.

Origin of the Wet Evergreen Forests—Succession.—The origin of the Wet Evergreen forests appears to have been in a *hydrosere*. Early stages of a *prisere* are difficult to differentiate as such, from those of a *sub-sere* which occurs under similar conditions on alluvial soils of river and stream banks. The climax type of forest which may be designated *high forest*, the general characters of which have been described above, has become profoundly altered in composition by biotic interference, chiefly by man, so that only a few communities confined to relatively inaccessible forest may be considered as true climaxes. F. D'A Vincent in his Report on the Forest Administration of Ceylon—1882, states that the past history of the Island " forces us to the conclusion that a large proportion of the existing forests, usually spoken of as virgin or original, are but a secondary growth which sprang up on the disappearance of a large population, sometime between the eighth and thirteenth centuries " (11). In several of the more accessible forests, *chena* (shifting) cultivation has been the primary cause of the replacement of high forest by an inferior scrub growth in more recent instances, or by a " low-jungle " type consisting of stunted and poorly stocked forest, in the case of older cultivation. Unsystematic exploitation also has taken heavy toll of fine stands of forest; cases are on record where forests well known in the past for their contents of such species as *hora—Dipterocarpus zeylanicus*, Thw., or *yakahalu-dun—Doona trapezifolia*, Thw., now contain only vestiges of previous good growth and stocking, *e.g.*, Talawitiya, Nahitiya and Nuwagankande forests in the Ratnapura District (12).

Wet Evergreen Forest Communities.—From an analysis of one per cent. enumerations carried out in forests examined under Working Plans investigations, it has been possible to distinguish important communities (associations) of tree species. These communities and the corresponding communities of the shrub and ground layers are considered together and related as far as possible to the site (generally soil) conditions. In the following descriptions of Wet Evergreen forest communities, the terms " *high forest* ", " *low jungle* " and " *scrub jungle* " which are of common usage have been adopted. The distinction between *high forest* and *low jungle* though not precise, is useful in conveying a general impression of two types of vegetation which differ strikingly in the height growth of the dominant trees, in the crop form and stocking. The characteristic features of typical *high forest* have already been described. In typical *low jungle* the dominant layer is not so well developed, the dominant height growth being restricted to below 60 feet ; the trees usually have a characteristic stunted and stag-headed appearance and the stocking is relatively poor. *Low jungle* communities

are for the most part of secondary origin, while the best developed *high forest* communities may be considered true climax types. The term "*scrub jungle*" is applied to an early stage of secondary succession in which tree species are usually absent and shrub species predominate.

Plant Lists.—In the description of each community, plant lists of important species have been prepared. Frequencies have been indicated by the following symbols: 4=*very abundant*, 3=*abundant*, 2=*frequent*, 1=*occasional*. In the case of tree species in the *dominant layer*, it has been possible from the analysis of enumerations to give a numerical significance to these otherwise arbitrary frequencies. In the case of the *undergrowth* species, corresponding degrees of frequency are expressed qualitatively (13).

Frequency.	Symbol.	Tree species.	Undergrowth species.
very abundant	4	over 50%	forming a carpet or nearly so
abundant	3	over 25% to 50%	in groups and individuals regularly distributed
frequent	2	over 5% to 25%	in scattered groups and individuals
occasional	1	over 1% to 5%	in scattered individuals

On account of the great variety of tree and undergrowth species, species which occur rarely, *i.e.*, below one per cent. in distribution or only in a few isolated individuals, have been omitted from these lists as their inclusion would make the plant lists unwieldy, apart from the fact that they have no particular significance.

IMPORTANT HIGH FOREST COMMUNITIES.

I. The Dipterocarpus Community.

This community is recognized by the predominance of a single species, *hora—Dipterocarpus zeylanicus*, Thw., or rarely *bu-hora—Dipterocarpus hispidus*, Thw. The latter species is however less gregarious in its distribution. This community is the most striking of the Wet Evergreen forest communities, in that in the dominant tree layer, *hora* may form as much as one-half of the entire tree species and the proportion of the other commoner associates of the community is relatively less. In the near vicinity of rivers and streams, it has been observed forming an association with *diya-na—Mesua thwaitesii*, Planch. and Trim., especially in the forests of Region III, associated with the Adam's Peak range and Rakwana hill country. This association belongs more properly to the next important community (the *Mesua-Doona* community) described later.

In the more bouldery and steeper sites, *hora* has sometimes been observed in association with *kataboda—Durio zeylanicus*, Gardn., though the latter often assumes predominance forming

a faciation (described later). The other commoner sub-dominant species are *milla—Vitex pinnata*, L., *hedawaka—Chaetocarpus castanocarpus*, Thw., *godapara—Dillenia retusa*, Thunb., *diyapara—Wormia triquetra*, Rottb., *malaboda—Myristica dactyloides*, Gaertn., *badulla—Semecarpus gardneri*, Thw., and *yakahalu-dun—Doona trapezifolia*, Thw., all of which are ubiquitous in distribution. *Godapara* is however more confined to the forests of the extreme south-west (Kalutara, Galle and Matara districts) and *diyapara* to sub-region ii of Region II in the vicinity of the Adam's Peak Range (Ratnapura district).

The Dipterocarpus community is usually well-stocked especially with large sized trees. The height growth is perhaps the best of all Wet Evergreen forest communities, reaching a dominant height of as much as 150 feet. The boles of *hora* are characteristically straight with well formed compact crowns. (*vide* photographs 1, 2, and 3 on Plates 9 and 10.)

The predominance of *hora* in the *second layer* is less marked; of the commoner associated species in the dominant layer, *godapara*, *diyapara* and *hedawaka* now often assume predominance. Other species which are confined to this layer and also well represented are *otha—Macaranga digyna*, Muell, Arg., and less frequently *walla—Gyrinops walla*, Gaertn. In well stocked areas, the *undergrowth* is usually scarce, and a thick leaf litter of *hora* may be found. The commoner shrub species are *peratambala—Gaertnera vaginans*, Merr., and *tapassara-bulath—Apama siliquosa*, Lamk.

Regeneration of *hora* is usually prolific in the seedling stage but a curious feature is that advance growth and pole stages are lacking in most *hora* communities. *Hora*, in common with other Dipterocarpus species, is a pronounced light demander; under the closed canopy which is typical of the community, *hora* does not obtain sufficient light for establishment. A sufficiently open canopy appears to be necessary for its establishment and where such openings have been made experimentally, *e.g.*, in Badulukele forest in the Matara district, a young dense pole crop of *hora* results. Regeneration of the other commoner tree species is good.

Site Conditions and Ecological Status.—This community is rarely observed at higher elevations, above approximately 2,500 feet and as characteristic of other *Dipterocarpus* communities of the hygrophilous type in the Indo-Malayan region (14) finds its best development in moist alluvial riverain soils and along valleys and depressions. When found on slope or ridge sites, the predominance of *hora* may be attributed to relatively good moisture conditions consequent on a high water table and good drainage; the soils thus associated with *hora* are typically Series I, Series II and the Sub-series i. (the better drained

soils) of Series III. There is, however, every indication that this community was far more widespread in the past, under the usually very moist soil conditions associated with a moist climate generally prevailing over the whole Wet Evergreen forest tract. The deterioration of the soil conditions as a result of soil exposure by *chena* cultivation and to a lesser extent over-exploitation, has now relegated this species from its gregarious distribution to one of sporadic occurrence on such soils. From this view point the *hora* community may be regarded in the broad sense as a true climax or more precisely as a *post-climax**.

List of Species in order of predominance.—Degrees of frequency are shown. Silvicultural dominants shown thus : D. Species confined to the second layer indicated thus : s. l. Low shrubs indicated thus : l. s.

Tree Layer.		
hora—Dipterocarpus zeylanicus, Thw. or *bu-hora*—Dipterocarpus hispidus, Thw.	3–4	D
milla—Vitex pinnata, L.	2	
godapara—Dillenia retusa, Thunb.	2	
hedawaka—Chaetocarpus castanocarpus, Thw.	2	
na—Mesua ferra, L.	2	
diya-na—Mesua thwaitesii, Planch. and Trim.?	2	
kataboda—Durio zeylanicus, Gardn.	2	D
diyapara—Wormia triquetra, Rottb.	2	
malaboda—Myristica dactyloides, Gaertn.	1	
badulla—Semecarpus gardneri, Thw.	1	
yakahalu-dun—Doona trapezifolia, Thw. *dun*—Doona zeylanica, Thw.	1	D
welipenna—Anisophyllea cinnamomoides, Gardn. and Champ.	1	
etamba—Mangifera zeylanica, Hk.f.	1	
ipetha—Cyathocalyx zeylanicus, Champ.	1	
kirihembiliya—Palaquium petiolare (n) Engl.	1	
kina—Calophyllum tomentosum, Wight.	1	
walla—Gyrinops walla, Gaertn.	1	s. l.
otha—Macaranga digyna, Muell, Arg.	1	s. l.
aridda—Camnosperma zeylanicum, Thw.	1	
gulu-mora—Cryptocarpa wightiana, Thw.	1	
tiniya—Doona congestifolia, Thw.	1	D
uruhonda—Lasianthera apicalis, Thw.	1	
peleng—Kurrumia zeylanica, Arn.	1	
madol—Garcinia echinocarpa, Thw.	1	
netaw—Xylopia parviflora, Hk.f. and Th.	1	
bokera—Ochna wightiana, Wall.	1	s. l.
Shrub Layer (including bamboos, canes and rushes)		
kekiriwara—Schumacheria castaneaefolia, Vahl.	2	D
peratambala—Gaertnera vaginans, Merr.	2	D.
tapassara-bulath—Apama siliquosa, Lamk.	2	l. s.
bata (bamboo)—Ochlanda stridula, Thw.	2	

(*Note.*—*The terminology of Clements (15) has been adopted throughout this paper in accordance with the mono-climax theory of succession).

galkaranda—Humboldtia laurifolia, Vahl. 1
kebella—Aporosa lindleyana, Baill. 1
pinibaru—{Memecylon arnottianum, Wight. / Eugenia phillyraeoides, Trim.} 1
baludan—Syzygium sp. 1
wewel (cane)—Calamus zeylanicus, Bedd. 1
olodiya—Draecaena thwaitesii, Regel. 1
dunukeiya (rush)—Pandanus foetidus, Roxb. 1
okeiya (rush)—Pandanus zeylanicus, Solms. 1

Ground Layer.

(*a*) Herbs—*niya*—Alipinia sp. (?) 2
walensal—Elettaria cardamomum, Mat. 2
(*b*) Grasses—Hypolytrum latifolium, Rich. 1
Fimbristylis dura, Alston 1
(*c*) Ferns.—Hemetelia walkerae (large tree fern) 1
Angiopteris evecta (small tree fern) 1
Nephrolepsis exaltata, Schett. 1
Blechnum orientale 1
Lindsaya Lancea L. 1.

Climbers.

potowel—Pothos ceylanicus 1
rilapan—{Freycinettia walkeri, Solms. / Freycinettia pycnophylla, Solms.} 1
bambarawel—Dalbergia Championii, Thw. 1
banwel or *kahawel*—Coscinium fenestratum, Coleb. 1
radaliyawel—Connarus macrocarpus, L. 1

II. The Mesua–Doona Community.

The *Mesua-Doona* community, like the *Dipterocarpus* community, is also a well defined one. The predominant species which make up the community are *na—Mesua ferrea*, L., *diya-na—Mesua thwaitesii*, Planch. and Trim., *dun—Doona zeylanica* Thw., and *yakahalu-dun—Doona trapezifolia*, Thw. In the association, either or both the *Mesua* species may be present and similarly either or both *Doona* species. The community is for the most part confined in its distribution to bouldery, steep and moist areas occurring at the higher altitude of sub-region ii of Region II and is especially characteristic of the forests of the Adam's Peak Range and Rakwana hill country. *Hora—Dipterocarpus zeylanicus*, Thw., or *bu-hora—Dipterocarpus hispidus*, Thw., is often an associate of the community occurring with *diya-na* which is more a dominant species of the second layer. *Kataboda—Durio zeylanicus*, Gardn., and more rarely *uruhonda—Lasianthera apicalis*, Thw., are sometimes locally co-dominant, the former especially in the ecotone between this community and the *kataboda—Durio zeylanicus*, Gardn., faciation described later. Among the other commoner associates

of the community in the dominant layer are *kirihembiliya—Palaquium petiolare* (n) Engl., *hedawaka—Chaetocarpus castanocarpus*, Thw., *etamba—Mangifera zeylanica*, Hk.f., *kian—Calophyllum tomentosum*, Wight., *milla—Vitex pinnata*, L., *malaboda—Myristica dactyloides*, Gaertn., and *tiniya—Doona congestifolia*, Thw. Of these species, the softwooded, faster growing species *kataboda*, *kirihembiliya*, *etamba*, *malaboda* and *tiniya* have a tendency to group themselves together forming a faciation. This community is comparable in stocking and growth to the *hora* community, especially in localities where *kataboda* and *hora* are co-dominants of the community. In general, however, the height growth of the dominants is somewhat less, but usually above 100 feet. (*Vide* photograph 4 on Plate 10.)

In the *second layer*, in addition to the pole stages of the principal species of the dominant layer, *madol—Garcinia echinocarpa*, Thw., a characteristic understorey species, is common. In the undergrowth, *galkaranda—Humboldtia laurifolia*, Vahl., is often predominant in the tall shrub layer, assuming the proportions of a low tree in some localities. *Beru—Agrostistachys longifolia*, Benth., is another characteristic tall shrub; *Walkopi—Lasianthus strigosus*, Wight., *kebella—Aporosa lindlayana*, Baill., and *pinibaru—Memecylon arnottianum*, Wight., and *Eugenia phillyraeoides*, Trim., are also fairly common tall shrubs. *Tapassara-bulath—Apama siliquosa*, Lamk., and canes (*wevel—Calamus zeylanicus*, Bedd.) are common in the low shrub layer. Among the commoner herbs in the ground layer are *nellu—Strobilanthes* spp. (often forming a thick carpet) and *niya—Alpinia* sp. (?). *Lindsaya lancea*, L., is a frequent fern. Regeneration of the principal species in the community is abundant, more so than in any other community of the Wet Evergreen forests. Germination is profuse under parent trees and seedlings of *na—Mesua ferrea*, L. and the *Doona* species often form a dense carpet soon after the monsoonal rains. Advance growth is also correspondingly good of the *Doona* species but less frequent of the *Mesua* species.

Site Conditions and Ecological Status.—The typical site conditions of the community are steep and bouldery slopes occurring generally at higher altitudes between the approximate limits of 1,500 and 3,000 feet. The soils associated with these sites are those of Series II and sub-series i of Series III. This community, on account of its widespread distribution and association with high altitudes may be considered a true *climax*; where, however, the character of the community is modified by an association of *diya-na—Mesua thwaitesii*, Planch. and Trim., with *hora—Dipterocarpus zeylanicus*, Thw., at the vicinity of water-courses, the community may be considered a *post-climax* related to the *Dipterocarpus post-climax*.

List of Species in order of predominance. D=silvicultural dominant, s. l.=second layer ; l. s.=low shrub.

Tree Layer		
na—Mesua ferrea, L.	2	
diya-na—Mesua thwaitesii, Planch. and Trim.	2	
dun—Doona zeylanica, Thw.	2	D
yakahaïu-dun- -Doona trapezifolia, Thw.	2	D
hora—Dipterocarpus zeylanicus, Thw.	1–2	D
kataboda—Durio zeylanicus, Gardn.	1–2	D
uruhonda—Lasianthera apicalis, Thw.	1–2	D
hedawaka—Chaetocarpus castanocarpus, Thw.	1	
kirihembiliya—Palaquium petiolare (n) Engl.	1	D
etamba—Mangifera zeylanica, Hk. f.	1	
kina—Calophyllum tomentosum, Wight.	1	
milla—Vitex pinnata, L.	1	
madol—Garcinia echinocarpa, Thw.	1	s. l.
malaboda—Myristica dactyloides, Gaertn.	1	D
tiniya—Doona congestifolia, Thw.	1	D
welipenna—Anisophyllea cinnamomoides, Gardn. and Champ.	1	
peleng—Kurrumia zeylanica, Arn.	1	
molpedda—Walsura piscidia, Roxb.	1	
godapara—Dillenia retusa, Thunb.	1	
wanami—Madhuca fulva, Macbr.	1	
dathketiya—Xylopia championii, Hk. f. and Th.	1	s. l.
walla—Gyrinops walla, Gaertn.	1	s. l.
bokera—Ochna wightiana, Wall.	1	s. l.
porowamara—Diospyros insignis, Thw.	1	s. l.
Shrub Layer (including canes and rushes)		
galkaranda—Humboldtia laurifolia, Vahl.	2	
beru—Agrostistachys longifolia, Benth.	2	
hin-beru—Agrostistachys coriacea	1	
wal-kopi—Lasianthus strigosus, Wight.	1	
pini-baru—Memecylon arnottianum, Wight.	1	
pini-baru—Eugenia phillyraeoides, Trim.	1	
kebella—Aporosa lindleyana, Baill.	1	
tapassara-bulath—Apama siliquosa, Lamk.	1	l. s.
galis—Gardenia latifolia, Ait.	1	
kekiriwara—Schumacheria castaneaefolia, Vahl.	1	
wevel (cane)—Calamus zeylanicus, Bedd.	1	
dunukeiya (rush)—Panadanus foetidus, Roxb.	1	
okeiya (rush)—Pandanus zeylanicus, Solms.	1	
Ground Layer.		
Herbs : *nellu*—Strobilanthes trifidus and other Strobilanthes spp.	3	
niya—Alpinia sp. (?)	2	
Grasses, Ferns and Climbers as for Community I.		

IIa. The Durio and Softwooded Species Faciation.

Within the *Mesua-Doona* community is an important and striking faciation, the *Durio zeylanicus*, Gardn., *and softwooded species* faciation. Its best development is at higher altitudes nearing the 3,000 feet limit. It is more restricted in its distribution than the *Mesua-Doona* community proper, confined with rare exceptions to the forests of Region III of the Adam's

Peak Range. *Kataboda—Durio zeylanicus*, Gardn., is the predominant species in the faciation and is somewhat comparable in its predominance to *hora—Dipterocarpus zeylanicus*, Thw., in Community I, although its frequency within the faciation does not exceed one-fifth of the entire stock. Characteristic associates are *tiniya—Doona congestifolia*, Thw., *malaboda—Myristica dactyloides*, Gaertn., and *kirihembiliya—Palaquium petiolare* (n) Engl. ; *tiniya* occurs at the highest altitudes on the summits and upper slopes of ridges. As the principal species are all softwooded, the faciation may be considered essentially a "softwood" type. The other commoner species in the dominant layer are *hedawaka—Chaetocarpus castanocarpus*, Thw., *kina—Calophyllum tomentosum*, Wight., *diyapara—Wormia triquetra* Rottb., and *liyan—Homalium zeylanicum*, Benth. The second layer and undergrowth show no salient differences in composition from the community proper. Regeneration of *kataboda* and *tiniya* is profuse under parent trees, usually forming a carpet in the seedling stage.

III. The Camnosperma and other Species Community.

This community is of restricted occurrence, being confined to the forests of the Adam's Peak Range in sub-region ii of Region III, chiefly in a part of the extensive forest of Bambarabotuwa situated in the Ratnapura district. Here *aridda—Camnosperma zeylanicum*, Thw., forms a consociation representing a little over one-half of the total stock. No other species is constantly associated with *aridda* ; *malaboda—Myristica dactyloides*, Gaertn., *hedawaka—Chaetocarpus castanocarpus*, Thw., *panudan—Syzygium neesianum*, Arn., *diyapara—Wormia triquetra*, Rottb., and *kirihembiliya—Palaquium petiolare* (*n*) Engl., may be considered the chief species among others observed in the dominant layer. The stocking of *aridda* is exceptionally dense and pole stages of this species are frequent in groups. The dominant height growth, however, does not exceed 100 feet and the maximum girth at breast height is below 6 feet. A curious feature is also the high incidence of dying back of *aridda*, associated with some form of unidentified fungus damage at the bases of the trees. It is probable that the origin of the decay is physiological (*vide* Site Conditions described below).

In the *second layer* in addition to the commoner species of the dominant layer, *angana—Nelitris jambosella*, Gaertn., and *bokera—Ochna wightiana*, Wall., are common. In the *undergrowth*, the shrub layer is characterized by the predominance of a species mostly confined to this locality, *val-weraniya—Lasianthus oliganthus*, Thw. Among the other commoner shrub species are the ubiquitous *peratambala—Gaertnera vaginans*, Merr., *kekiriwara—Schumacheria castaneaefolia*, Vahl., and *tapassara-bulath—Apama siliquosa*, Lamk. Regeneration and advance growth

of *aridda* is poor in comparison to its proportion in the dominant layer. Regeneration of *kirihembiliya—Palaquium petiolare* (n) Engl., *yakahalu-dun—Doona trapezifolia*, Thw., *walu-kina—Calophyllum bracteatum*, Thw., and *diyataliya—Mastixia tetrandra* var. *thwaitesii*, Clarke, is the most frequent.

Site Conditions and Ecological Status.—The characteristic feature of the part of the Bambarabotuwa forest where the community is best represented is the presence of slab-rock which outcrops throughout the area ; even on the more shallow soils in the vicinity of exposed slab-rock, *aridda* often predominates though showing poorer growth. The soil belongs to subseries ii of Series III with a fairly high humic content in the A horizon. The community appears to be at least partly conditioned by a restricted development in the soil profile, and may therefore be considered a *sub-climax.*

List of Species in order of predominance. D=Silvicultural dominant ; s. l. = second layer ; l. s. = low shrub.

Tree Layer.

aridda—Camnosperma zeylanicum, Thw.	3–4	D	
malaboda—Myristica dactyloides, Gaertn.	2	D	
hedawaka—Chaetocarpus castanocarpus, Thw.	2		
panudan—Syzygium neesianum, Arn.	1		
diyapara—Wormia triquetra, Rottb.	1		
kirihembiliya—Palaquium petiolare (n) Engl.	1	D	
welipenna—Anisophyllea cinnamomoides, Gardn. and Champ.	1		
gulumora—Cryptocarya wightiana, Thw.	1		
badulla—Semecarpus gardneri, Thw.	1		
etamba—Mangifera zeylanica, Hk. f.	1		
bokera—Ochna wightiana, Wall.	1		s. l.
angana—Nelitris jambosella, Gaertn.	1		s. l.
peleng—Kurrumia zeylanica, Arn.	1		
uruhonda—Lasianthera apicalis, Thw.	1		
milla—Vitex pinnata, L.	1		
waljambu—Syzygium aqueum (Burm. f.) Alston.	1		
yakahalu-dun—Doona trapezifolia, Thw.	1		
otha—Macaranga digyna, Muell, Arg.	1		
walla—Gyrinops walla, Gaertn.	1		s. l.
madol—Garcinia echinocarpa, Thw.	1		s. l.
walu-kina—Calophyllum bracteatum, Thw.	1		
diyataliya—Mastixia tetrandra var. thwaitesii, Clarke	1		s. l.

Shrub Layer.

val-weraniya—Lasianthus oliganthus, Thw.	3–4	D	
galkaranda—Humboldtia laurifolia, Vahl.	2–3		
kekiriwara—Schumacheria castaneaefolia, Vahl.	1		
peratambala—Gaertnera vaginans, Merr.	1		
tapassera-bulath—Apama siliquosa, Lamk.	1		l. s.
wal-bombu—Symplocus spicata, Roxb.	1		
peradomba—Syzygium sp.	1		
dunukeiya (rush)—Pandanus foetidus, Roxb.	1 in moist sites.		

Ground Layer.

(*a*) Herbs—*niya*—Alpinia sp. (?)	2
nellu—Strobilanthes spp.	2 } in moist sites.
(*b*) Ferns—Hemetelia walkerae (tree fern)	1 in moist sites.
Lindsaya lancea L.	1
Gleichenia linearis (*kekilla*)	1 in dry exposed situations.

Climbers.

bambarawel—Dalbergia championii, Thw.	1
kahawel—Coscinium fenestratum, Colobr.	1
kiriwel—Ichnocarpus frutescens, Ait.	1
puswel—Entada scandens, Benth.	1
radaliyawel—Connarus macrocarpus, L.	1

IV. The Vitex-Wormia-Chaetocarpus-Anisophyllea-(Dillenia) Community.

This is essentially a very mixed community which characterizes most of the forests falling within Region I, the coastal plain and sub-region ii, *i.e.*, the lower slopes, of Region II. The species which predominate in this community are of widespread distribution being very adaptable to varying site conditions, both of altitude and soils ; in this respect, the community is therefore less well defined than the communities so far described. *Milla—Vitex pinnata*, L., *diyapara—Wormia triquetra*, Rottb., *hedawaka—Chaetocarpus castanocarpus*, Thw., and *welipenna—Anisophyllea cinnamomoides*, Gardn. and Champ., are the principal species of the community and together form about one quarter to one half of the total stock. They also assume a silviculturally dominant role within this community, whereas within the communities so far described (I–III) they are usually sub-dominants or dominants of the second layer. *Milla* is usually numerically, the most frequent species ; *diyapara*, *hedawaka* and *welipenna* are each about equally represented. *Godapara—Dillenia retusa*, Thunb., is also an equally common associate except in the Ratnapura District where it is less well represented. *Malaboda—Myristica dactyloides*, Gaertn., *badulla—Semecarpus gardneri*, Thw., *etamba—Mangifera zeylanica*, Hf. k., *aridda—Camnosperma zeylanicum*, Thw., *kirihembiliya—Palaquium petiolare* (n) Engl., and *diyataliya—Mastixia tetranda*, var. *thwaitesii*, Clarke, are also somewhat frequent associates of the community, often forming a faciation of softwooded species which is described separately below. Among the other common associates of the community which deserve special mention are *gulumora—Cryptocarpa wightiana*, Thw., the *kinas—Calophyllum* spp. including *Calophyllum tomentosum*, Wight. (*kina*), *C. calaba*, L., (*guru-kina*), and *C. bracteatum*, Thw., (*walu-kina*), *panudun—Syzygium neesianum*, Arn., *peleng—Kurrumia zeylanica*, Arn., *yakahalu-dun—Doona trapezifolia*, Thw., *uruhonda—Lasianthera apicalis*, Thw., *tiniya—Doona congestifolia*, Thw., *waljambu—Syzygium aqueum*, (Burm. f.) Alston., and *alubo—Syzygium makul*, Gaertn. The dominant height growth within

the community is somewhat poor, seldom exceeding 100 feet and in general between 75 to 100 feet. Stocking, crown and bole form are inferior to Communities I to III, and some instances may approach the appearance of low jungle. (*Vide* photographs 5 & 7 on Plates 11 and 12.)

The *second layer* is characterized by the co-dominance with the principal associates of certain other species, among which *walla—Gryinops walla*, Gaertn., may be singled out as the predominant species. The other common species are *angana—Nelitris jambosella*, Gaertn., *bokera—Ochna wightiana*, Wall., *pepaliya—Aporosa latifolia*, Thw., *dathketiya—Xylopia championii*. Hk. F. and Th., *goraka—Garcinia cambogia*, Desrouss., *madol—Garcinia echinocarpa*, Thw., *porowamara—Diospyros insignis*, Thw., and *ankenda—Acronychia pedunculata*, Miq.

The *undergrowth* is usually dense and is characterized by the predominance of shrub species. *Kekiriwara—Schumacheria castaneaefolia*, Vahl. is perhaps the commonest tall shrub species in the community. *Peratambala—Gaertnera vaginans*, Merr., in the tall shrub layer and *tapassara-bulath—Apama siliquosa*, Lamk., in the low shrub layer are also two species of frequent and ubiquitous distribution. Other shrub species are more restricted in their distribution ; among the commoner of these may be mentioned *galkaranda—Humboldtia laurifolia*, Vahl., which is more frequent on bouldery and steep slopes, *galis—Gardenia latifolia*, Ait., *pinibaru—Memecylon arnottianum*, Wight., and *Eugenia phillyraeoides*, Trim., and *wal-bombu—Symplocos spicata.*, Roxb. The *bata* bamboo, *Ochlanda stridula*, Thw., is also characteristic of the community becoming abundant in the more exposed areas under an interrupted canopy ; this species is probably a relict of an earlier successional phase, namely, the *Aporosa-Chaetocarpus-Vitex-Anisophyllea* low jungle community described later. Among the commoner grasses may be mentioned *Fimbristylis dura*, Alston., and *Hypolytrum latifolium*. Rushes, chiefly the *Pandanus* species, *dunukeiya* and *okeiya*, and canes (*wewel*), *Calamus zeylanicus*, Bedd., form a *moist faciation* in the more swampy localities. In such waterlogged or moist situations, herbs such as *thebu—Costus speciosus*, and *niya—Alpinia* sp. (?), and ferns such as *Nephrolepsis exaltata*, Schett., *Blechnum orientale* and *Lindsaya lancea*, L. are frequent. *Helminthostachys zeylanica* though less frequent may be mentioned as a characteristic fern.

Regeneration though good and frequent cannot compare with the prolific regeneration found in Communities I. to III. Regeneration of the principal co-dominants of the community is generally good and frequent, especially that of *milla—Vitex pinnata*, L. In addition, regeneration of softwooded species, particularly *kirihembiliya—Palaquium petiolare* (n) Engl. is striking, though more properly within the softwooded species

faciation described below. Of the commoner associates, regeneration of *gulumora—Cryptocarpa wightiana*, Thw., may be singled out for special mention, as frequent and widespread. Regeneration of the other commoner associates and principal species of the second layer is generally occasional to frequent in distribution.

Site Conditions and Ecological Status.—The soils associated with the community are sub-series ii and iii of Series III. and the soils of Series IV. On account of the comparative accessibility of the areas where the community occurs, and the frequent evidence of past *chena* cultivation, *e. g.*, in the Gilimale and part of Bambarabotuwa forests in the Ratnapura District, or heavy exploitation, *e.g.*, Talawitiya and Muwagankande forests in the Ratnapura District, it is probable that the character and composition of the natural climax community has become profoundly altered by biotic interference ; the present community, under the existing conditions may be considered either as a relatively stable phase, *i.e.*, a *sub-climax*, or a successional phase, *i.e.*, a *sub-sere*. With proper control of fellings and adequate protection, it is possible on the better sites at least, that a succession to the climax communities I and II may be expected, especially within the softwooded species *faciation* described below. On the poorer sites, especially where the character of the community approaches the low-jungle type, succession to the original high forest communities cannot be expected and the community may then be considered a sub-climax.

List of Species in order of predominance.—D=Silvicultural dominant ; s. l.=second layer ; l. s.=low shrub.

Tree Layer.

milla—Vitex pinnata, L.	2–3	D
diyapara—Wormia triquetra, Rottb.	2	D
hedawaka—Chaetocarpus castanocarpus, Thw.	2	D
welipenna—Anisophyllea cinnamomoides, Gardn. and Champ.	2	D
godapara—Dillenia retusa, Thunb.	2	D
malaboda—Myristica dactyloides, Gaertn.	1–2	D
badulla—Semecarpus gardneri, Thw.	1–2	
walla—Gyrinops walla, Gaertn.	1–2	
kataboda—Durio zeylanicus, Gardn.	1–2	D
etamba—Mangifera zeylanica, Hk. f.	1–2	
aridda—Camnosperma zeylanicum, Thw.	1	
diyataliya—Mastixia tetrandra var. thwaitesii, Clarke	1	
kirihembiliya—Palaquium petiolare (n) Engl.	1	D
gulumora—Cryptocarpa wightiana, Thw.	1	
kina—Calophyllum tomentosum, Wight. *guru-kina*—Calophyllum calaba, L. *walu-kina*—Calophyllum bracteatum, Thw.	1	
pepaliya—Aporosa latifolia, Thw.	1	s. l.
angana—Nelitris jambosella, Gaertn.	1	s. l.
bokera—Ochna wightiana, Wall.	1	s. l.

dathketiya—Xylopia championii, Hk. f. and Th.	1	s. l.
goraka—Garcinia cambogia, Desrouss.	1	s. l.
na—Mesua ferrea, L.	1	
porowamara—Diospyros insignis, Thw.	1	s. l.
madol—Garcinia echinocarpa, Thw.	1	s. l.
panudun—Syzygium neesianum, Arn.	1	
peleng—Kurrumia zeylanica, Arn.	1	
yakahalu-dun—Doona trapezifolia, Thw.	1	
uruhonda—Lasianthera apicalis, Thw.	1	
ankenda—Acronychia pedunculata, Miq.	1	
tiniya—Doona congestifolia, Thw.	1	D
alubo—Syzygium makul, Gaertn.	1	
dambu—Syzygium gardneri, Thw.	1	
waljambu—Syzygium aqueum (Burm. f.) Alston	1	
dun—Doona zeylanica, Thw.	1	

Shrub Layer (including bamboos, rushes and canes)

kekiriwara—Schumacheria castaneaefolia, Vahl.	3	
bata (bamboo)—Ochlanda stridula, Thw.	3	
peratambala—Gaetnera vaginans, Merr.	2–3	
tapassara-bulath—Apama siliquosa, Lamk.	2–3	l. s.
galkaranda—Humboldtia laurifolia, Vahl.	2–3	
galis—Gardenia latifolia, Ait.	2	
pinibaru—Memecylon arnottianum, Wight. Eugenia phillyraeoides, Trim.	2	
wal-bombu—Symplocos spicata, Roxb.	1–2	
welikaha—Memecylon silvaticum, Thw.	1–2	
pathkela—Bridelia moonii, Thw.	1–2	
dunekeiya (rush)—Pandanus foetidus, Roxb. *okeiya* (rush)—Pandanus zeylanicus, Solms.	1–2	in moist sites.
wewel (cane)—Calamus zeylanicus, Bedd.	1–2	in moist sites.

Ground Layer and Climbers as for Community I. In addition the following :—

Herbs: *thebu*—Costus speciosus, Sm.	1–2	in moist sites.
nellu—Strobilanthes spp.	1–2	
Dianella ensifolia, Red.	1	

Climbers and Creepers.

bandurawel—Nephenthes distillatoria, L.	1	
korosawel—Delima sarmentosa, L.	1	
walgamiris—Piper spp.	1	

IVa. The Myristica-Semecarpus-Mangifera and other Soft-wooded Species Faciation.

The softwooded species faciation of the *Vitex-Wormia-Chaetocarpus-Anisophyllea* community resembles in its relationship to the main community, the *Durio* and softwooded species faciation to the *Mesua-Doona* community, and to a certain extent is also associated with higher altitudes within the distributional range of the community. *Malaboda—Myristica dactyloides*, Gaertn., *badulla—Semecarpus gardneri*, Thw., and *etamba—Mangifera zeylanica*, Hk. f., are generally the predominant species in the faciation ; *kirihembiliya—Palaquium petiolare* (n) Engl., *kataboda—Durio zeylanicus*, Gardn., and *aridda*—

Camnosperma zeylanicum, Thw., are the other commoner soft-wooded constituents of the faciation ; *kirihembiliya* may sporadically show local predominance though not so markedly as *aridda* and *kataboda*, the former being the chief species in Community III and the latter in the softwooded species faciation of Community II. Other frequent hardwooded species in the dominant layer are *hedawaka—Chaetocarpus castanocarpus*, Thw., and *welipenna—Anisophyllea cinnamomoides*, Gardn. and Champ. (*vide* photograph 6 on Plate 11).

The *second layer* and *undergrowth* show no marked differences in composition from the main community. Regeneration is generally more prolific within the faciation especially of the softwooded species forming the faciation, chiefly, *kirihembiliya*.

Ecologically the faciation may be considered more advanced than the main community and more closely resembling the climax communities, especially the faciation of Community II and Community III. The faciation may be regarded as a *sub-sere* which may succeed to a high-forest community.

LOW JUNGLE COMMUNITIES

i. The Aporosa-Chaetocarpus-Vitex-Anisophyllea and other Species Community.

This is the most important and widespread of low jungle communities. In its composition, the community bears a distinct resemblance to high forest Community IV—the *Vitex-Wormia-Chaetocarpus-Anisophyllea* community. *Pepaliya—Aporosa latifolia*, Thw., which is only an occasional species in the latter community now becomes the predominant species. With this exception, the principal co-dominants of the latter community, viz., *hedawaka—Chaetocarpus castanocarpus*, Thw., *milla—Vitex pinnata*, L., and *welipenna—Anisophyllea cinnamomoides*, Gardn. and Champ., have also the same status within this community, indicating a probable relationship between the two communities. This aspect will be considered later. The other common associates of the dominant layer are *godapara—Dillenia retusa*, Thunb., *diyapara—Wormia triquetra*, Rottb., *badulla—Semecarpus gardneri*, Thw., *kina—Calophyllum* spp. (chiefly *walu-kina*—C. *bracteatum*, Thw.), *malaboda—Myristica dactyloides*, Gaertn., *aridda—Camnosperma zeylanicum*, Thw., *gulu-mora—Cryptocarpa wightiana*, Thw., and *etamba—Mangifera zeylanica*, Hk. f.

In the *second layer*, *walla—Gyrinops walla*, Gaertn., is the predominant species and may also be considered a characteristic species of the community. The other commoner species in the second layer are *angana—Nelitris jambosella*, Gaertn.,

bokera—Ochna wightiana, Wall., *goraka—Garcinia gambogia*, Desrouss., *wanaidella—Wenlandia notoniana*, Wall., and the palm *katukitul—Oncosperma fasiculatum*, Thw.

The important distinctions in the height growth and crop form have been described previously. (*vide* photograph 8 on Plate 12).

The *undergrowth* is usually dense and characterized by the predominance of the *bata* bamboo—*Ochlanda stridula*, Thw., which may be regarded, where abundant, as an indicator species of the community. It often forms a characteristic association with the tall shrub species *kekiriwara—Schumacheria castaneaefolia*, Vahl. The other species present are also common to the high forest Community IV. *Regeneration* is poor in comparison with the latter community, the principal species of the community being also the principal species found in regeneration.

Site Conditions and Ecological Status.—This community occurs chiefly on bouldery and exposed sites. The soils associated with such sites are mainly those of Series VI. *Chena* cultivation is probably the chief cause in the removal of the natural vegetation and production of this type of forest. In addition, severe exposure to monsoonal winds may be in some instances a contributory factor to the relative stability of this community, *e.g.*, in Mipagama-Pedikande and Waratelgoda forests in the Ratnapura District. As the soils have now become more or less permanently altered, the community may be regarded a *disclimax* and even possibly a *faciation* of the high forest Community IV on these shallow degraded soils.

List of Species in order of predominance. D = Silvicultural dominant; s .l. = second layer; l.s = low shrub.

Tree Layer.		
pepaliya—Aporosa latifolia, Thw.	3	
hedawaka—Chaetocarpus castanocarpus, Thw.	2–3	D
milla—Vitex pinnata, L.	2	D
walla—Gyrinops walla, Gaertn.	2	s. l.
welipenna—Anisophyllea cinnamomoides, Gardn. and Champ.	2	D
godapara—Dillenia retusa, Thunb.	1–2	D
angana—Nelitris jambosella, Gaertn.	1–2	s. l.
diyapara—Wormia triquetra, Rottb.	1–2	
badulla—Semecarpus gardneri, Thw.	1–2	
walukina—Calophyllum bracteatum, Thw.	1–2	
malaboda—Myristica dactyloides, Gaertn.	1–2	D
aridda—Camnosperma zeylanicum, Thw.	1	
yakahalu-dun—Doona trapezifolia, Thw.	1	D
dun—Doona zeylanica, Thw.		
bokera—Ochna wightiana, Wall.	1	s. l.
goraka—Garcinia cambogia, Desrouss.	1	s. l.
kenda—Macaranga peltata, Muell. Arg.	1	s. l.
gulumora—Cryptocarpa membranacea, Thw.	1	
etamba—Mangifera zeylanica, Hk. f.	1	

netaw—Xylopia parvifolia, Hk.f. and Th.	1	D
dambu—Syzygium gardneri, Thw.	1	
panudan—Syzygium neesianum, Arn.	1	
kirihembiliya—Palaquium petiolare (n) Engl.	1	D
ixetha—Cyathocalyx zeylanicus, Champ.	1	
bombu—Symplocos spicata, Roxb.	1	s.l.
madol—Garcinia echinocarpa, Thw.	1	s.l.
alubo—Syzygium makul, Gaertn.	1	
Shrub Layer (including bamboos and canes).		
bata (bamboo)—Ochlanda stridula, Thw.	3–4	
kekiriwara—Schumacheria castaneaefolia, Vahl.	3	
tapassara-bulath—Apama siliquosa, Lamk.	2	l.s.
galkaranda—Humboldtia laurifolia, Vahl.	2	
peratambala—Gaertnera vaginans, Merr.	2	
mussaenda—Mussaenda frondosa, L.	2	
wewel (cane)—Calamus zeylanicus, Bedd.	2 in moist sites	

Ground Layer and Climbers as for High Forest Community IV.

MINOR COMMUNITIES.

ii. The Oncosperma and Other Species Community.

On the open slab-rock formation or steep bouldery localities, especially on rocky ledges and precipitous summits, *e.g.*, the Ballahela rock in the Kelani Valley Reserve, the Yakatuwa rock in Timbiripola-Maniyangama forest near Avisawella, a community characterized chiefly by the palm *katu-kitul—Oncosperma fasiculatum*, Thw., has become established. *Indi* (a palm) *Phoenix zeylanica*, Trim., *dotalu* (a palm)—*Loxococcus rupicola*, W. and D., *daluk—Euphorbia antiquorum*, L., and thorny small tree species such as *katukenda—Scolopia acuminata*, Clos., are other occasional and characteristic associates. Only a few sporadic bigger tree species such as *kekuna—Canarium zeylanicum*, Bl., and *atuketiya—Xylopia parviflora*, Hk. f., occur in pockets of soil.

In the *undergrowth*, *bata—Ochlanda stridula*, Thw., and grasses are common. Climbers are also of frequent occurrence.

Ecologially the community may be considered a faciation of the high forest Community IV or the *Aporosa-Chaetocarpus-Vitex-Anisophyllea* low jungle community on slab-rock formations. Where such exposure has been entirely natural, the community may be considered a *Xerophytic climax.*

iii. Humboldtia and Other Species Community.

In parts of the Kelani Valley Reserve which lie south of the Kelani Ganga near Kitulgala, areas which have been heavily exploited in the past almost amounting to clear-felling, for pit-props and box-woods, are now covered with an almost pure growth of *galkaranda—Humboldtia laurifolia*, Vahl. This shrub species here assumes the proportions of a low tree. A dominant height of 40 feet is not uncommon. *Dathketiya—Xylopia championii*, Hk. f., is a common tree species. The

commoner species in the shrub layer are *peratambala—Gaertnera vaginans*, Merr., *kekiriwara—Schumacheria castaneaefolia*, Vahl., and *tapassara-bulath—Apama siliquosa*, Lamk.. Regeneration of *galkaranda* is prolific, but of other tree species is poor.

The community usually occurs in sites which are steep and bouldery. It is probably a biotically induced *sub-sere* which may eventually succeed to a type of forest similar to high forest Community IV.

SCRUB JUNGLE COMMUNITIES.

Scrub jungle characterizes the initial stages of succession in forests which have been clear-felled, generally in *chena* cultivation, provided that the soil has not become too impoverished by burning and resultant exposure, to support this type of growth.

The characteristic dominants of the community are the shrub *associes, weraniya—Hedyotis fructicosa*, L.—*bowitiya*, the larger *maha-bowitiya—Melastoma malabathricum*, Linn., and the smaller *bowitiya—Osbeckia aspera*, Bl., which are among the earliest colonizers. Among other early invaders which may, especially on steep rocky sites replace the associes in dominance, are climbers and creepers, often thorny, among which the most important are *lankapalu—Mikania scandens*, the shrub *Lantana aculeata*, L., *naperitta—Hibiscus furcatus*, Roxb., and *pamba—Lygodium scandens*, Sw..

In a later stage in succession, representative tree species of low jungle such as *wanaidella—Wenlandia notoniana*, Wall., *kenda—Macaranga peltata*, Muell. Arg., *gedumba—Trema orientalis*, Bl., and *diyapara—Wormia triquetra*, Rottb., make their appearance, and the shrub growth is often augmented or replaced by an invasion of the *bata* (bamboo)—*Ochlanda stridula*, Thw., often in association with *kekiriwara—Schumacheria castaneaefolia*, Vahl.. In some localities an almost pure consociation of *kenda* or *gedumba* may become established, *e.g.*, in the Badullawalla and Eluwana forests of the Ratnapura District and Yagirale forest in the Kalutara District. (*vide* photograph 9 on Plate 13). Regeneration of tree species is poor and sporadic. *Diyapara—Wormia triquetra*, Rottb., *milla—Vitex pinnata*, L., *hedawaka—Chaetocarpus castanocarpus*, Thw., *walukina—Calophyllum bracteatum*, Thw., and *del—Artocarpus nobilis*, Thw., are among the commoner species.

Site Conditions and Ecological Status.—Scrub jungle often occurs cheek by jowl with low jungle communities. It is probably the earliest observable re-growth on land that has been completely depleted of forest in *chena* cultivation and subsequently abandoned. It may be regarded as a *sub-sere* preceding the *Aporosa—Chaetocarpus—Vitex—Anisophyllea* low jungle community and occurring like it, mainly on the soils of Series VI.

List f Species (including low tree species indicated thus :—l. t.)

Shrub Layer.		
weraniya—Hedyotis fructicosa, L.	3	
maha-bowitiya—Melastoma malabathricum, Linn.	3	
bowitiya—Osbeckia aspera Bl.		
bata (bamboo)— Ochlanda stridula, Thw.	2–3	
Lantana aculeata, L.	2–3	
kenda—Macaranga peltata, Muell. Arg.	1–3	l.t.
gedumba—Trema orientalis, Bl.	2	l.t.
kekiriwara—Schumacheria castaneaefolia, Vahl.	1–2	
galkaranda—Humboldtia laurifolia, Vahl.	1–2	
tapassara-bulath—Apama siliquosa, Lamk.	1–2	
peratambala—Gaertnera vaginans, Merr.	1	
Solanum sp.	1	
kudu-miris—Toddalea aculeata, Pers.	1	
divikaduru—Tabernaemontana dichotoma, Roxb.	1	l.t.
ankenda—Acronychia pedunculata, Miq.	1	l.t.
kepittiya—Croton lacciferus, L.	1	l.t.
katukitul (palm)—Oncosperma fasiculatum, Thw.	1	l.t.
wewel (cane)—Calamus zeylanicus, Redd.	1	
hin-eraminiya—Zizypus oenoplia, Mill.	1	
Ground Layer.		
(*a*) *Herbs*— Ipomaea sepiaria, Koenig.	2–3	
Hedyotis auricularia, L.	2	
Torenia crustacea	2	
Hibiscus vitifolius, L.	1–2	
Hedyotis nitida, W. and A.	1	
Desmodiun trifolium, DC.	1	
Desmodium gyrans, DC.	1	
Centella asciatica	1	
Costus speciosus, Sm.	1	
Hedyotis forma	1	
Vernonia cinerea, Wess.	1	
Mimosa pudica, L.	1	
Dianella ensifolia, Red.	1	
Alpinia sp. (?)	1	
(*b*) *Grasses* (and sedges)—		
Fimbristylis dura, Alston.	2	
Lophatherum zeylanicum, Hk. f.	1	
Themeda tremula, Hack.	1	
Cyperus pilosus, Vahl.	1	
Panicum brevifolium, Roxb.	1	
(*c*) *Ferns*— Nephrolepsis exaltata, Schett.	2	
Adiantum hispidulum	1	
kekilla—Gleichenia linearis	1	
Blechum orientale	1	
Pteris hookeriana	1	
Nephrodium calcaratum	1	
Climbers and creepers.		
lankapalu—Mikania scandens	3 locally	
napiritta—Hibiscus furcatus, Roxb.	2	
pamba—Lygodium scandens, Sw.	2	
korosowel—Delima sarmentosa, L.	2	

FERNLAND AND GRASSLAND COMMUNITIES

The *Fernland Community* is associated specifically with the soils of Series VII and occurs in localities which have been in the past under *chena* cultivation and preserved in their present condition by periodical firing. The typical consociation consists of *kekilla—Gleichenia linearis*. This species has also been observed to invade scrub jungle which has recently been burnt over. The tree layer is absent or represented by a few stunted tree species characteristic of low jungle such as *diyapara—Wormia triquetra*, Rottb., *pepaliya—Aporosa latifolia*, Thw., and *walu-kina—Calophyllum bracteatum*, Thw. The typical shrub species of the scrub jungle communities are of somewhat frequent occurrence, the most important among these being *weraniya—Hedyotis fructicosa*, L., *bowitiya—Melastoma malabathricum*, Linn., (*maha-bowitiya*) and *Osbeckia aspera*, Bl., and the *bata* bamboo—*Ochlanda stridula*, Thw. Other common shrubs are *Zizypus oenoplia*, Mill. and *Memecylon capitellatum*, L. In the *ground layer*, *Desmodium gyrans*, DC., *Phyllanthus niruri*, L. and other *Phyllanthus* spp. are common herbs. On fairly moist sites where the *kekilla* has escaped frequent firing, the fern *Nephrolepsis exaltata*, Schett., may also be found as a frequent associate of the *kekilla*. The club moss *Lycopodium clavatum* is also found in the moister sites. *Themeda tremula*, Hack., is a commoner grass found frequently in the more exposed sites.

Regeneration of tree species is scarce ; the acid humic *kekilla* layer appears to prevent the penetration of the roots of the young seedlings which have been observed to die after germination. In areas subjected to frequent fires, the humus layer is thin, but the presence of a hard surface ferruginous gravel layer resulting from soil desiccation, prevents the establishment of seedlings.

The *Grassland Community* (*patana*) appears to be similar in origin ; the chief species in the community are *illuk—Imperata arundinacea*, Cyrill, and *mana—Andropogon nardus*, L.

Both fernland and grassland communities may be regarded as relatively stable on account of the altered soil conditions, making succession to a forest climax improbable. They may therefore be regarded as *disclimaxes* (fire climaxes).

Tabular Summary of Forest Communities, in relation to Soils, Undergrowth, Regeneration and Ecological Satus.

1. **High Forest Communities.**

Community.	Soils.	Chief species in undergrowth	Regeneration.	Ecological status.
I. *Dipterocarpus* and other species	Series I. Series II. sub-series i. of Series III.	*Gaertnera, Schumacheria, Apama, Ochlanda.*	Prolific regeneration of *Dipterocarpus* in seedling stages but poor established regeneration. Regeneration of other common tree species, good.	*Post-Climax.*

Community.	Soils.	Chief species in undergrowth.	Regeneration.	Ecological status.
II. *Mesua-Doona.*	Series II. sub-series i of Series III.	*Humboldtia, Agrostistachys, Lasianthus, Strobilanthes, Lindsaya.*	Prolific regeneration of *Mesua ferrea* and *Doona* species.	*Post-Climax*
II. (*a*) *Durio* & soft-wooded species.	Same as above.	Same as above	Prolific regeneration of *Durio* aud *Doona congestifolia.*	*Faciation* of II.
III. *Camnosperma* & other species	Sub-series ii of Series III.	*Lasianthus, Humboldtia, Schumacheria, Gaertnera, Apama.*	Regeneration of *Camnosperma* somewhat poor; regeneration of *Palaquium petiolare, Doona trapezifolia* and *Calophyllum bracteatum*, good.	*Sub-Climax.*
IV. *Vitex-Wormia-Chaetocarpus-Aniso-phyllea-(Dillenia)*	Sub-series ii and iii of Series III and Series IV.	*Schumacheria, Ochlanda, Gaertnera, Apama, Humboldtia, Gardenia.*	Regeneration of principal associates good and frequent.	*Sub-Climax* or *sub-sere*
IV. (*a*) *Myristica Semecarpus-Mangifera* and other softwooded species	Same as above	Same as above	Regeneration of principal soft-wooded associates frequent to prolific.	*Faciation* of IV. (*sub-sere*).

2. Low Jungle Communities.

Community.	Soils.	Chief species in undergrowth.	Regeneration.	Ecological status.
i. *Aporosa-Chaetocarpus-Vitex-Anisophyllea* and other species,	Mainly Series VI.	*Ochlanda, Schumacheria, Apama, Humboldtia, Gaertnera, Mussaenda.*	Regeneration generally poor.	*Disclimax* or *faciation* of high forest Community IV.
ii. *Oncosperma* and other species	Slab-rock and boulders	*Ochlanda, Grasses*, &c.	Scarce to nil.	*Faciation* of Community IV or low jungle Community i, or *xerophytic climax.*
iii. *Humboldtia* and other species	Sub-series iii of Series III and Series IV.	*Gaertnera, Schumacheria, Apama.*	Regeneration of *Humboldtia* prolific, of tree species poor.	*Sub-sere.*

3. Scrub Jungle, Fernland and Grassland Communities.

Community.	Soils.	Chief species in undergrowth	Regeneration	Ecological status.
Hedyotis-Melastoma-Osbeckia (scrub jungle)	Series VI.	*Mikania, Lantana, Hibiscus, Macaranga* (tree), *Ochlanda.*	Regeneration of tree species poor and sporadic.	*Sub-sere.*

Community.	Soils.	Chief species in undergrowth.	Regeneration.	Ecological status.
(*a*) *Gleichenia* (fernland) (*b*) *Imperata* or *Andropogon* (grassland)	Series VII.	*Hedyotis*, *Melastoma*, *Osbeckia*, *Ochlanda*, *Zizypus*, *Phyllanthus*.	Regeneration of tree species practically nil.	*Disclimaxes* (fire climaxes)

SUMMARY

1. The introductory paragraph describes the manner in which the data was collected, the scope and purpose of the paper.

Part I. deals with the *Situation*, *Climate*, *Geology* and *Soils*.

2. The regional distribution of the Wet Evergreen Forests according to topography is described, three Regions being recognized.

3. The climate of the Wet Evergreen Forests is described. Three broad zones of rainfall distribution are distinguished and described, the effect of the South-West monsoonal winds in relation to the topographical regions being dealt with. Temperature and relative humidity conditions are also described briefly.

4. Under Geology, the origin and structure of the Island and composition of the rock formations are briefly described; the topographical recognition of regions is related to geological origin.

5. The salient morphological characters of the Wet Evergreen Forest soils are briefly described, the results of mechanical and chemical analyses made by Joachim (7 and 9) discussed and related to morphological and profile characteristics. The conlcusions reached in the writer's previous paper (1.) are confirmed.

6. The soils are classified into seven Soil Series :—I. Alluvial Soils, II. Residual Non-gravelly Loams, III. Residual Gravelly Loams, IV. Soils with a Zonal Gravel Layer, V. Swamp (Clayey) Soils, VI. Shallow, Truncated and Bouldery Soils, VII. Fernland (*Kekilla*) Soils. The classification is based on physical properties, chiefly on the disposition of the gravel and stone content. The seven Soil Series are described briefly, the detail amplified where necessary with special reference to the soils of the Ratnapura and Kegalla Districts. Series III., in particular, is now divided into three sub-series based on the texture of the soils and size of the gravel content. The Soil Series are related briefly to vegetational types.

Part II. deals with *Ecology* and *Forest Types*.

7. The general vegetational characters of the Wet Evergreen Forests are described; their origin and the basis of recognition of forest communities are dealt with; the use of the terms "high

forest ", " low jungle ", and " scrub jungle " in the description of forest communities, is explained. The symbols used in Plant Lists and the preparation of the latter, are described.

8. Four important High Forest Communities are recognized and described :—I. The *Dipterocarpus* and other species community ; II. The *Mesua-Doona* community ; III. The *Camnosperma* and other species community ; IV. The *Vitex-Wormia-Chaetocarpus-Anisophyllea-(Dillenia)* community. Faciations of Community II. and IV. are also described. In each case the community is related to its site conditions, and its ecological status is mentioned. Plant lists are given for the four main communities.

9. Among Low Jungle Communities, the important *Aporosa-Chaetocarpus-Vitex-Anisophyllea* and other species community is described with a Plant list. Two minor low jungle communities are also described.

10. Scrub jungle communities are next described in relation to ecological succession, and a Plant list given.

11. Finally the fernland and grassland communities are briefly described.

12. A tabular summary of Forest Communities in relation to Soils, Undergrowth, Regeneration and Ecological Status is given.

REFERENCES

1. de Rosayro, R. A.—Soils of the Wet Zone Forests of the Matara, Galle, and Kalutara Districts. The Tropical Agriculturist, Vol. XCII., No. 5, 1939.
2. Adams, F. D.—The Geology of Ceylon—Canadian Journal of Research, Vol. I., 1929.
3. Bamford, A. J.—Notes on the Climate of Western Ceylon with special reference to the Upper Winds at Colombo—Ceylon Journal of Science, Section E. Vol. I., Part 3.
4. Report on the Colombo Observatory, with maps and statistics for 1938.
5. Wayland, E. J.—Stone Ages of Ceylon—Spoilia Zeylanica, Vol. XI., 1915–1921.
6. Coates, J. S.—The Geology of Ceylon—Spoilia Zeylanica, Vol. XIX., 1935.
7. Joachim, A. W. R.—Studies on Ceylon Soils VI.—The Tropical Agriculturist Vol. LXXXV. No. 3, 1935.
8. Joachim, A. W. R. and Kandiah, S.—Studies on Ceylon Soils, XIII.—The Tropical Agriculturist, Vol. XCV. No. 5, 1941.
9. Joachim, A. W. R.—Studies on Ceylon Soils VIII.—The Tropical Agriculturist Vol. LXXXVIII., No. 2, 1937.
10. Baker, J. R.—Rain Forest in Ceylon—Kew Bulletin, 1938 No. 1.
11. Vincent, F. d'A.—Forest Administration of Ceylon—1881. Sessional Paper No. XLII. of 1882.
12. Lushington, P. M.—Report on the Ceylon Forests in 1921 and their General Administration—Sessional Paper No. XII. of 1921.
13. Fabricius, L., Oudin, A. and Guillebaud, W. H.—Outlines for Permanent Sample Plot Investigations—London, 1936.
14. Troup, R. S.—The Silviculture of Indian Trees, Vol. I., Oxford 1921.
15. Clements, F. E.—Nature and Structure of the Climax—Journal of Ecology Vol. XXIV., No. 1., 1936.