1) Check Slope map from National Atlas

3 2) Prepare tentative list of maps to be drawn at Pondicherry along with scale & legend.

3)

$$\boxed{\frac{1}{2}\left(\frac{1}{2} + \frac{1}{2}\right)}$$

α

.25

Avg 1 $1.5 \times .5 = .75$

$\frac{1}{2}($

Subramanian & Nayyar. Pl. species of the Western Ghats
(1980s)
in M.S. Main (ed)

1. Northern Sahyadris.
(North of Goa)

2. Southern Sahyadris.
(Goa to Coorg)

3. Nilgiri - Wynaad

4. South of Palghat
(normally merged with Silanka)

Hoara's — Satpura Hypothesis.

1) Southern W. Ghat, South of Nilgiri Cullenia dominated:

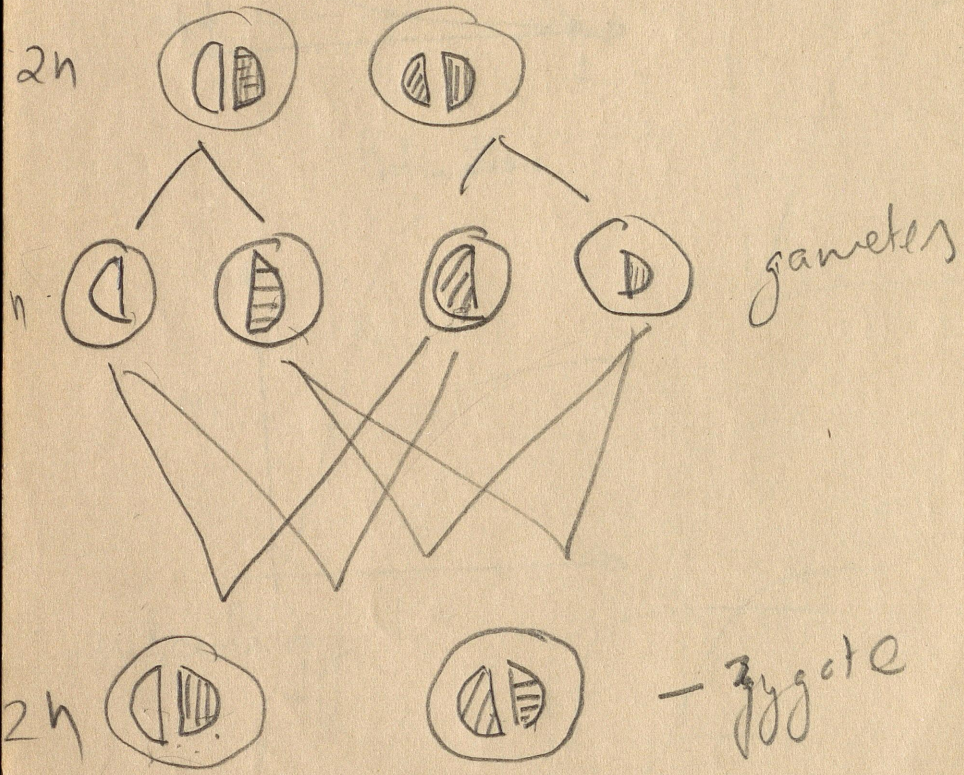
2) Dipterocarpus indicus.
till N. Canara

3) B. & U.K. Calloplylum —
polyanthum replaces Cullenia
in North Canara.

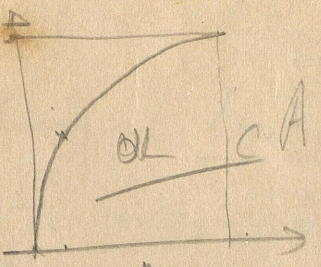
Rodges & Panmar's classification,

most recent classification

too fine.

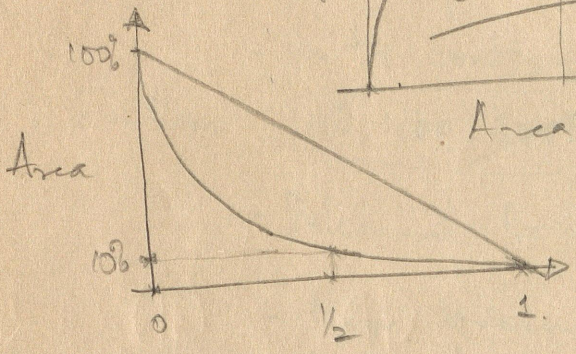


G $\frac{1}{2}\left(\frac{1}{2}+\frac{1}{2}\right)$

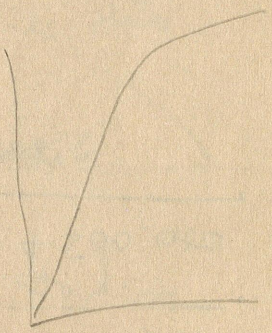


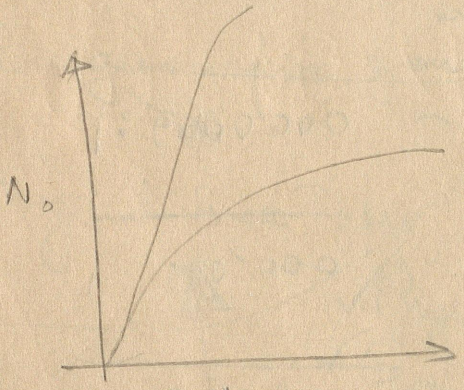
z. 0.3

0.7

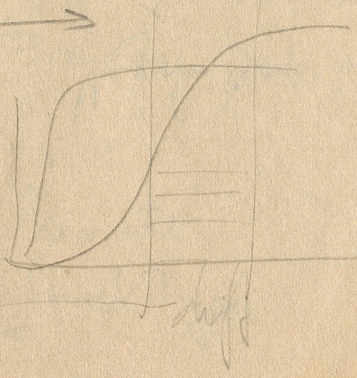


Extinction.





autecology



Scales of Maps.

1:100,000 Vegetation.

1:250,000 .

1:6,000,000 or 1:5,000,000 .

or 1:4,500,000

India

1) Location map: Southern India

- with contours ~~300~~, 600, ~~900~~, 1200,

1: 6 million ~~1500~~, 1800, ~~2100~~ > ? 2400 >

- Political Boundaries: State

- Major Streams
- Major towns

2) Biogeographic zones: India.

&

Original Forest Types

Contours: ✓
Streams ✓

✓ Physiographic provinces (ref. N.A. 41) regions.

✓ Geology (ref. N.A. 8)

1: 6 million

Soils
Climate.
Forest Types.

3) Maps in 1 : 250,000.

Drainage pattern

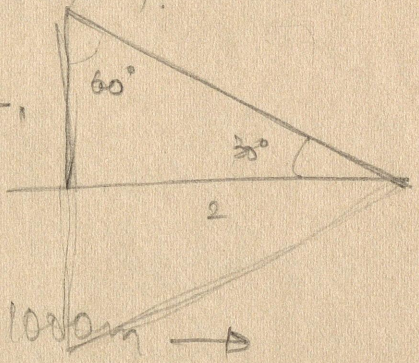
Climate : Rainfall.

Topography:

Geology.

~~45~~ - 20m in 1000m.

1m in 50m



500m in 1000m →

1 in 2

I need a fine drawing.

10m contour intervals.

~~60m~~

1cm = 500m

50m
40m
30m
20m
10m

E CAT

4) Vegetation & Land Use map

Scale 1: 100,000

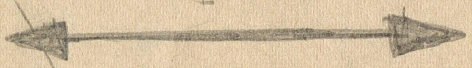
Prabhakar,

I have taken the calc

Thanks KC

FLAT $\boxed{10\,m \quad - \quad 1000\,m}$ 2cms.

1 m in 100 m <10m/km



~~1-5 m in~~

GENTLE 1 m in 100 m
2 m in 100 m } <10 m ~~contours~~ / km

MOD 2 m in 100 m
8 m in 100 m] 10 - 20m / km
15 m in 100 m

STEEP. 15 m in 100 m

30 m in 100 m
~~60 m in 100 m~~
~~30 m in 100 m~~
> 60 m in 100 m

V. Steep

Slope curve on 1:50,000 to be converted to 1:100,000

Flat : <10 m / km

Gentle : 10 m ~ 20m / km

Mod : [20m ~ 80m / km
80m ~ 150 m / km

Steep : 150 m - 300 m / km
300m - 600 m / km

V. Steep : > 600 m / km

State / District Boundary

Rivers .25/

Roads – Steadler

Ghats – X

Towns – o

Peaks : — Δ

Contours : .25/- 450 m

900 m

Passed,

Thurs.

Explanatory Notes

Future work Planned:

1. Vegetation & Land Use mapping: To be done from extensive field surveys of the Nilgiris Area aided by visual interpretation ~~Satellite 'Spot'~~ Satellite Imageries and Topographic Sheets. The final map will be prepared on a ~~1:~~ ~~10,000~~ 1/100,000 scale.

2. Oral History: Field surveys among the 17 ~~tudor~~ human communities to derive details on their Modes

of Resource Use. Collection of information regarding their territory, population, kin group, vegetational resources used etc.

3. Analysis of Historical Records: A detailed analysis of forest records, ~~to find determine~~ Agricultural statistics, and census records to determine landscape and vegetational changes

PROGRESS REPORT

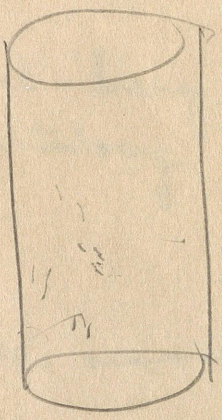
Work completed during the academic year 1989-90 is as follows.

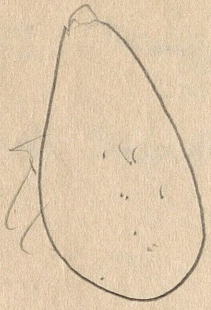
1. ~~Reconn~~ Preliminary field survey of the vegetation, land use and the human communities inhabiting the Nilgiri area

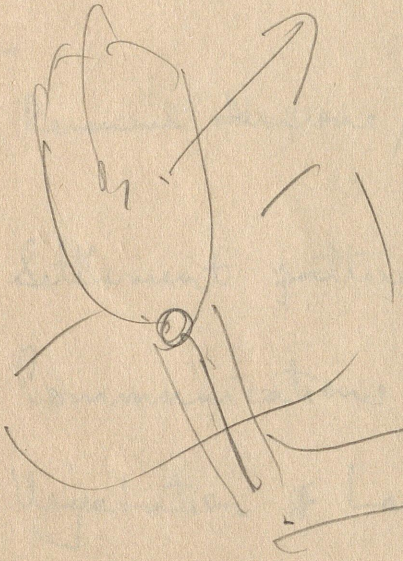
2. Visual Interpretation of Satellite Imageries ~~and~~ ~~the~~ towards preparation of a Vegetation Map of the area

3. ~~Study~~. Study and Secondary sources of the Nilgiri Area

4. Study of primary historical records, ~~and~~ a periodization and development of a framework to study the Ecological history of the area







Madrigiri
40 - 50 km
from Tiruvannamalai
in Tirulapur
forest.
Trippuri
period
metal
making.

MAP DATA BASE

~~1) Vegetational Overlays~~

1822 : Ward's Survey map.

2) The first Map 1847 : Ouchterlony.

Revenue Survey maps.

SOI : Triangulation 1910s onwards.

Forest Department maps.

—.

Details on

1) Revenue divisions / Administrative divisions

2) Settlement patterns

3) Communications

4) Vegetation & Land Use.

GiGi Santow,

A Simulation Approach

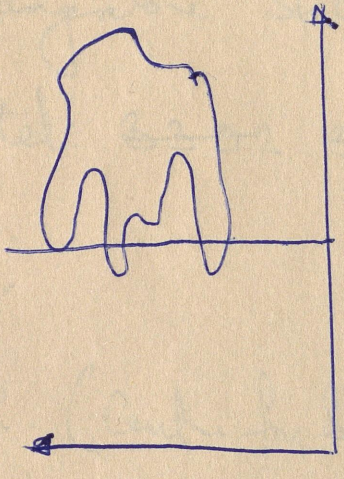
to the Study of

Human Territority.

a nijdicbgs publicatie

Leiden/Boston 1974.

312
N78



Meenakshi, Architect.

Development Alternatives

29, Jayamahal Main Road,

Bangalore 560046

tel: ~~3302~~ 333 000

SERGÉ

c/o C.S.R. (Centre for Scientific Research)

AUROVILLE - 605104

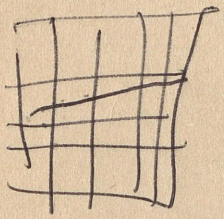
TAMIL NADU

(Ferro cement)

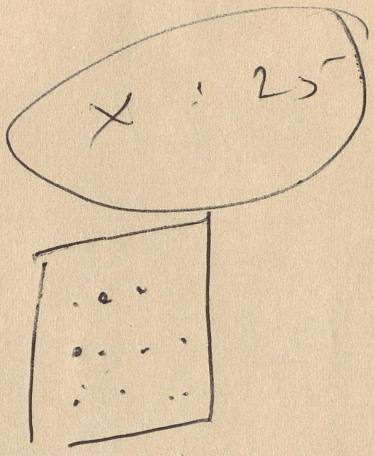
Master in Rural Architecture Experience

Architecture for 4½ years.

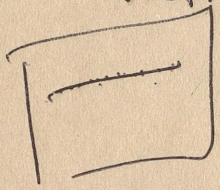
Raster b

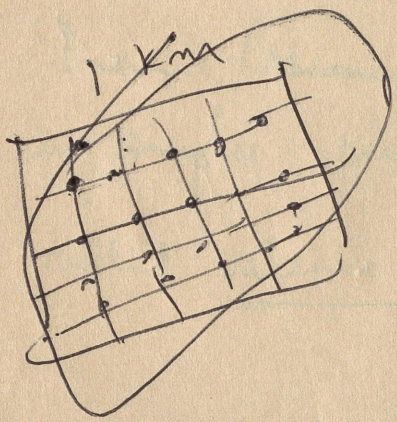


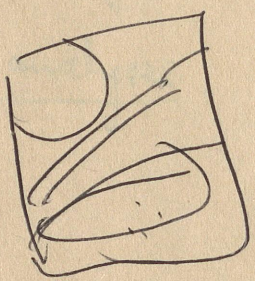


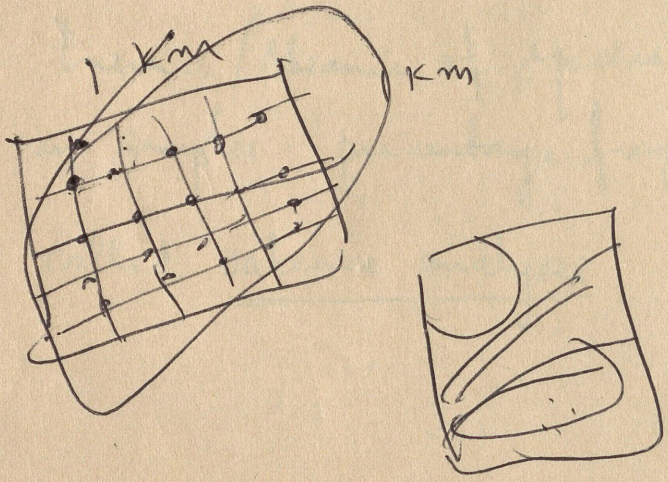


Vector based








1 Km
Km

Ch ①, ②, ③, ⑥ dyl of Plant communities

---

2 methods of community description.

① Complete list of species with freq. symbols & or numerical rating by inspection. density? cover? R/O/C.

② Raunkiaer (1905, 1934)

Presence / Absence of species in samples: percentage freq. called valence analysis.

5 t/acres.

density: No / unit area

mean area = $\frac{1}{\text{density}}$ = $\frac{\text{unit area}}{\text{No.}}$

= $\frac{1}{5}$ = 0.2 acres / tree.

density $\propto f$(distance)

Cover.

Quantitative Measures of Vegetation



Absolute Measures.

density
cover
yields
bio-mass.

Non-absolute measures.

frequency.

Frequency has meaning only in relation to the particular size and shape of sampling area used.

Density ~~etc~~, Cover, etc, measures ~~are~~ - The resulting value, though subject to a relatively large sampling error can be localized. -

whereas frequency: less sampl error

Aggregation ?

Frequency is dependent ~~on~~
partly on density
partly on pattern

Problems of scale.

The problem of patchiness is complicated further by the occurrence of heterogeneity on different scales in the area. – But How? What model can one build for it.

Assumptions about distribution.

Random distribution.

Probability is the same all over.

Uniform distribution

Probability rises at the corners of an imaginary grid.

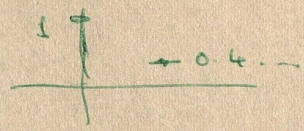
Clumped distribution.

Probability is raised around certain points

$\frac{1}{2\cdot 3}$ 2·3) 1014.

$(1-6)^{9}$

1 $1-\frac{1}{10}(.9)^{10}$.



How does:

$$(1-r^{-1})^{r} = e^{-1} \quad \text{if}$$

r is large? =

but looks OK!

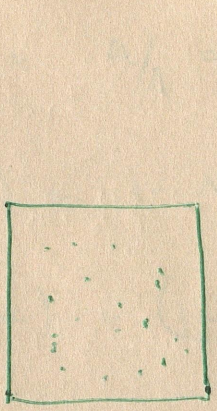
$$\left(1-\frac{1}{r}\right)^{r}$$

Relations between density & frequency

Relations between density & frequency

Random

3-30



An area A contains n individuals.

'a' in the sampled window.

$A/a = r$

Derive that the chance of finding ~~a~~ a individual is a Poisson distribution.

21/18/68

$x = n/A$.

This is very small.

$$p(1) = a/A = x^{-1}$$

$$p(\ ) = 1 - x^{-1}$$

$$p(\text{none}) = (1 - x^{-1})^A$$

↓ derive

Represented as

$$e^{-m},\ m e^{-m},\ \frac{m^2}{2!} e^{-m},\ \frac{m^3}{3!} e^{-m},\ \ldots$$

$$\frac{m^n}{n!} e^{-m},\ \ldots$$

where $m = a x$ (mean)

Three categories for quantitative estimates of vegetation

(1) Estimate of overall composition of the vegetation within certain boundaries, which a view to comparison with other areas or with the some area at another point in time

(2) Investigation of variation within the area.

(3) Correlation of vegetation differences ~~within the area~~ with differences in one or more habitats factors.

Sampling :

Subjectively decide homogenous areas:
or extraneously decide homogenous areas.

(i) If there in doubt, sample ~~as~~ parts of an area seperately - a priori -

(ii) Sample in such a way that the data could be used, to divide into seperate portions, posteriorily. (aggregation)

Placing samples

(i) Selecting ~~sg~~ sites typical of the area as a whole

inappropriate

(ii) Placing samples randomly or by placing them systematically in some regular pattern

(iii) Some combination of these methods

Random sample gives estimates of mean & dispersion.
and mean and dispersion is essential for comparison.

Comparisons of random & systematic sample for timber volume, basal area, density found that any gain in accuracy from syst. sampling was slight.

(नवधान्य)

9) Bengal gram
Sesamum
Rice
Wheat
Urad

An systematic sampling the variance

In systematic sampling the variance is ~~used~~ better used as a measure of conformity between successive samples over the same area and cannot be justified as a basis of tests of significance between samples taken over different areas.

The essential feature of random sampling, which allows the observed variance of the data to be used as the basis of tests of significance, is that any point within the area has an equal chance of being represented in the samples.

Density measurement

Size of Q

Shape

No. of samples

If the individuals are random, ie, if the # per quadrat of the size & shape used fall into on a Poisson series, the accuracy of the estimate can be shown to depend only upon the nos. of individuals counted.

—

mean = x/n = variance.

Variance of the mean of n Q = $n^{-1}(x/n)$

S.E. = $\sqrt{x}/n$

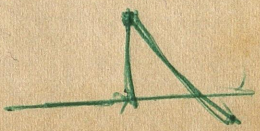
Shape considerations

The use of rectangled quadrats were more efficient compared to the square, and the efficiency was greatest, if the strips were oriented at right angles to the boundaries between obviously different parts of the area sampled. (Bormann, 1953).

But this could not happen in perfectly random distributions, and its general occurrence is itself evidence of widespread non-randomness of vegetation.

Plot less sampling

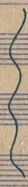
1) Closest individual
2) Nearest neighbour
3) Random pairs



Vegetation Mapping

SATELLITE DATA BASE

SPOT



LANDSAT

12/08/91

CCF

2000 - 3000 st/ha of wattle for plantation in Nilgiri

Original → 200 - 300 ~~tra~~ trees/ha : @ 11 ft ~~acre~~ 2/2

CCF Wildlife for Action Plan

A.M. Perumal in charge Biosphere Reserve at Coimbatore

Er. V. Jagannath
Engr - Engr - ISRO.
C/o. KRUP, IISc, Campus
Bl - 12

Brief Communication on Biosphere
↓ NILGIRI

* Albizzia amara - Acacia.

400 ~ 600 mm. 7-9 dry months.

→ Gyrocarpus Hardwickia.
Slopes 600 m.

*

* Anogeissus - Chloroxylon - Albizzia.

600 - 800 mm

* Anogeissus - Terocarpus - Tectona. → Terminalia

Alt. 600 - 1200 m - 1500 m.

P. 1000 - 1500 m.

DS : 5 - 6 months

Albizzia amara - Acacia. (Cape Comorin).

Alt < 600 m.

D 500 - 1000 m.

Dry 5 - 7 months.

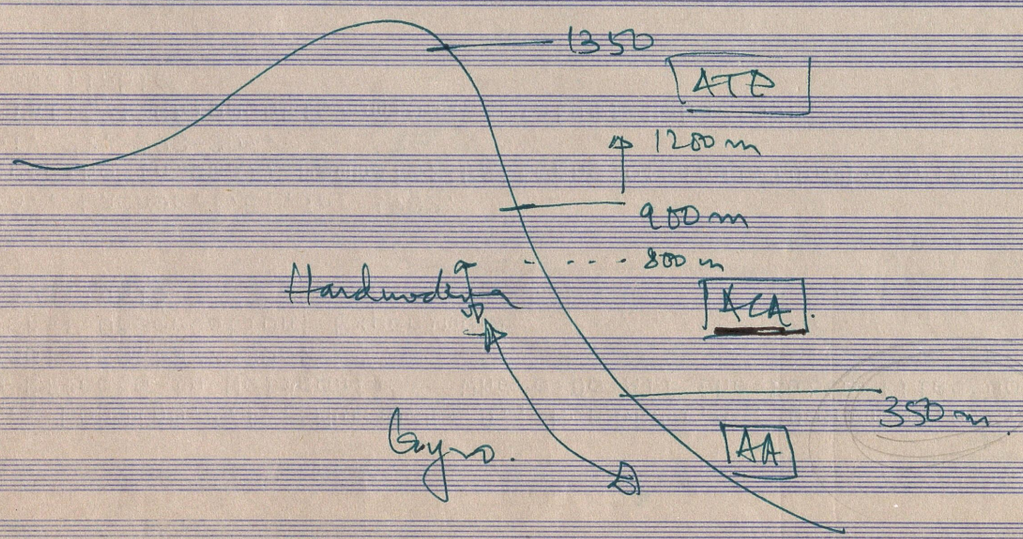
Riparian

Low Elevation < 1000m.

Terminalia - Syzygium - Pongamia.

Med. elevation.

Eleocarpus tuberculatus - Mochelia champaka - Canarium strictum



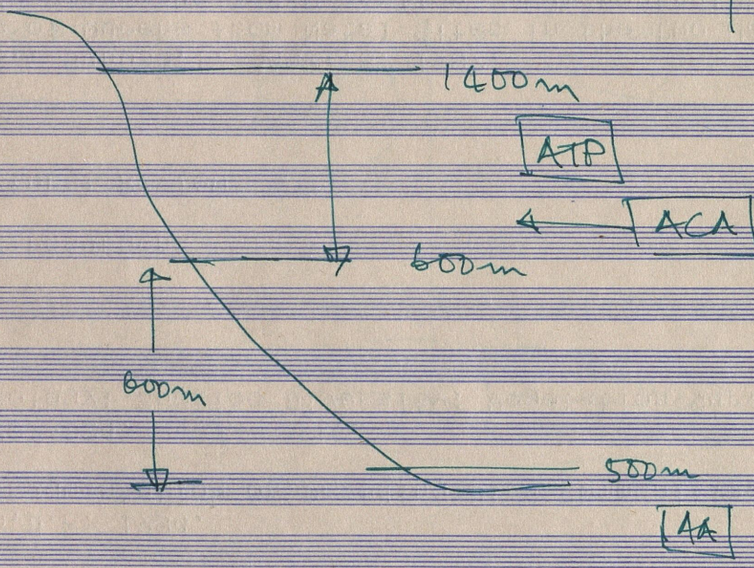
J.Chem.Ecol. 13, 1099-1115.
Social Insects; Hymenoptera; Chalcididae
Written to author on 25.9.87.

On the Eastern Eco-floristic zone.

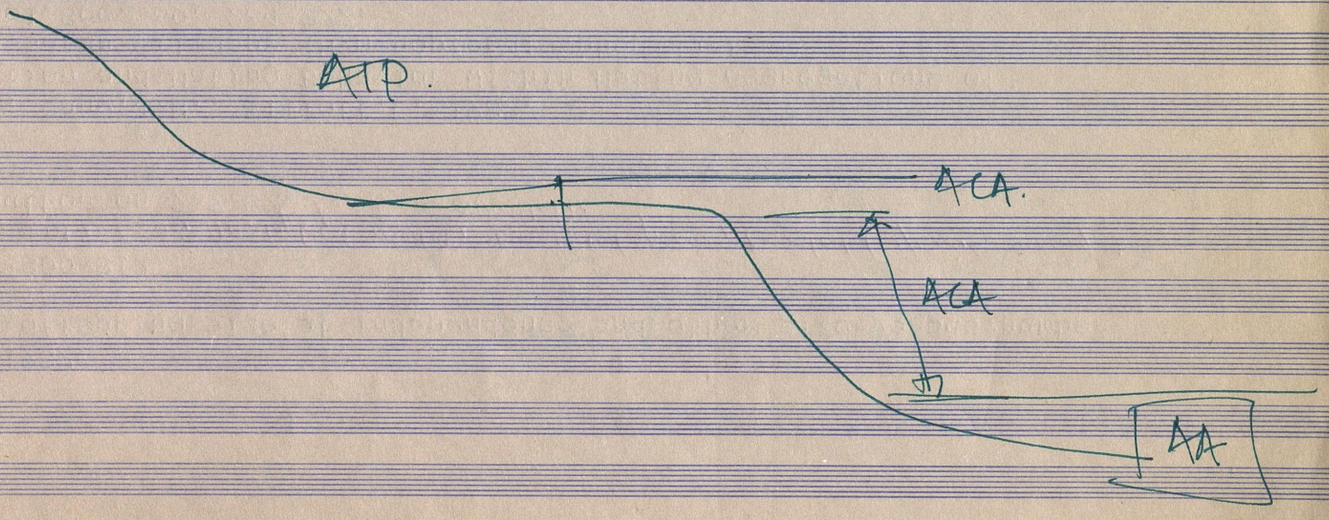
We would have

AA.

SE Slopes of the Nilgiris.

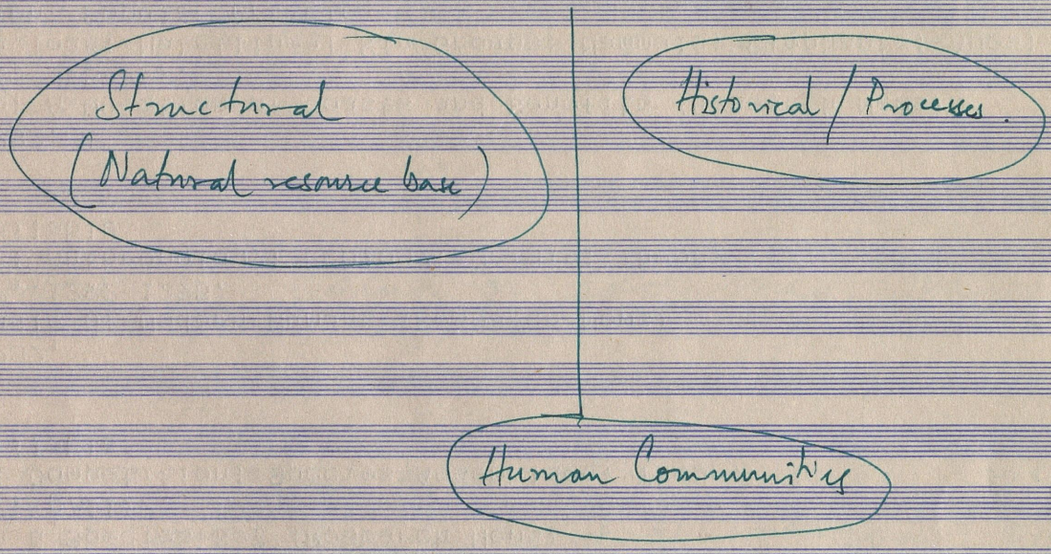


Sigur Plateau.



16th Aug 1991

Pondicherry class. PI.



All of them must be melded together - combined together to present a point of view.

The study of human communities is difficult because they are not objects alone but subjects.

On Maps:

What were their motivations and attitudes during the makings of the maps?

Science 237, 650-652.
Oriental Fruit Moth; Cropholita molesta; Agyrotaenia velutinana;

On the constancy of cadastral limits! They formed a basis for the organization of the land ownership, settling disputes etc. the power of the state. Some base lines were made and all property related to that base line.

Mapping denotes the need of control over the space by the colonizables.

Discuss the legend of each map. The categories etc etc.

J. Pouchepadass, Paysans de la plaine du Gange: Croissance agricole et société dans le district de Champaran (Bihar), 1860-1950
& École Française d'Extrême-Orient, Paris, 1989

Cadastral
p124. /Survey between 1892 and 1899 of Champaran district. Village Notes: The peasants are complaining of a slow decline in the fertility of the soil for which they have no explanation and this having happened over a few generations.

//ly with rainfall.

On 1/250,000 scale.

Drainage
Climate map
Topography map
Satellite Imagery

→ Eco-climatic zones.

→ Series zones.

Compute areas for analyses from Bellon's sheets.

- Vegetation by satellite interpretation.
- Drainage - Vegetation map. (eg land use)
- Vegetation - Topography map. (eg tea)
- Vegetation - Climate map (eg MBF)
- Drainage - Rainfall

Attappadi

* No. of dry seasons.

* If 2 dryness is present,

  * ~~No~~ Less teak

  * No Dillenia

  * There are of course, Anogeissus & Terminalia.

Indicator species.

Lagestromia ~~p~~ parviflora. (may not be found in the eastern side

* Plantation maps. At Bangalore

* Vegetation of Gopinari

* SOI Sheets

* Some habitat slides.

Rainfall regimes from Krishnaswami for Nilgiris.

Check plantation map of Nilgiris dt. at FI

J.P. Pascals program

From 17th to end of

29 Aug } Trivandrum
2 Sept }

3 } Pondi

8 Sept } Vietnam

17th Sep } Pondi
30 Sep }

Area Computation

9 sheets of 11 x 2.5 = 27.5 km x 27.5 km.

= 9 x 756.25 sq km

Total area mapped = 7,000 sq km

Springer-Verlag, New York, pp.67-95. O.L. Lange, J.S. Olson, a H. Remmert
Plants; Ecotone; Edge Effect; Community Ecology; Forest Islands; Community
Structure; Community Dynamics; Forest Dynamics; Line Strip Method;

Note for Discussions

Krish ✓ 1) Rainfall data on Nilgiris area.

Profile : & Range & Ang.

✓ 2) The physiognomy types of the deciduous forests?

✓ 3) 1:250,000 Overlay areas computation.

4) Tasks : 1) Prepare and take 1:250,000 overlay sheets and compute areas.

2) Rainfall data

3) 1:100,000 Satellite Interpretations.

✓ 5) Should I have a category Agriculture with tea.

Krish ✓ 6) Data on plantations in the Nilgiri and Sahyamangam divisions.

Copy of the Topography Contours Master / Ouch ter Lowy maps

Reprint available
Record no. 123

SACE Conference

The Ecological History of the Nilgiris.

* the idea of periods or phases.
* An overview and introduction.

The data base of maps for the Nilgiris.

* A comparison with other areas like Europe and America.
* Different types of data bases.
* Motivations for mapping.
* The Invariants in maps
* The variants in map
* Reliability and a critique

Maps of the Nilgiris.

* The data base for the area.
* Analyses.

Description of Mature Larva of Belanogaster dubia Kohl (Hymenoptera, Vespidae), with notes on the Larval Characters of the Polistinae
Kontyu, Tokyo 56, 817-823.

~~Remote Sensing as an ecological synthesis.~~

* place name analysis and comparison
* Patterns of habitation spread
* Ecological niches and their domain
* Vegetational transformations, like estates, plantation.
* Communications (Roads, Railways)

Remote Sensing Interpretation as an Ecological Synthesis.

Objective and Aims of the Map. The problem of scale.

Our data base inputs.

Bio climate

Topography

Administrative Units : RFs.

SOI Vegetational Features.
eg...

Field notes

Other satellite imageries

Experience and Interpretative factor.

General Principles and Problems of Satellite Image Interpretation.

Spectral responses variant on
Incidence of radiation
Reflectance, Seasonal
Diurnal
Obstructions. Cloud cover.
Influence of soils & geology.

Topography could also affect the vegetation, ~~for example~~

Topography

Reprint available
Record no. 137

Problems of Nilgiris

* The scrub - grassland - swamp complex is ambiguous.

* Plantation status, w.r.t species, age & density of trees is ambiguous

* Sholas intermixed with plantations is ambiguous

* Effect of topography on vegetation is marked in the Attappadi area, the Nilgiri southeastern slopes, where the south eastern aspects are all better vegetated than the north western aspects



Phenological Considerations

Spectral Response affected by the phenology of vegetation. Maximum leaf fall occurs during the months of Feb & March. Our Satellite imagery is during a month of max leaf fall and fire. Thus the densities of the vegetation in the deciduous belt is not perceived in the images. The density of these vegetation types have thus been inferred from the

4125
Dahl, R. 1984.
Royal Jelly
In: The Best of Rohald Dahl . (Penguin Books) 197-218.

Classifications

Legend: Tree & Shrub Savanna.
(for Gudalur area.

Mixed plantations, ~~ar~~ horticulture
~~Rubber~~

How to do slope gradients in ~~each~~ area?
We may take the watershed as the unit and see where valleys are wider ~~and~~ or steeper.

Verify FP Eucalyptus plantation along the Nilambur road, I cannot make out?

Discuss limits of the vegetation maps.
→ * NBR limit
* Lat / Long limit

Interpreting Nellakota Devarshola : are in the Gudalur.

Verify Shrubs and thickets outside Gudalur on the road to Nilambur

On the western side, the agriculture limits are not reduced, nor are the streams depicted that makes ~~data~~ interpretation a little difficult.

4/09/01

Density and the red tinge in the satellite imagery can be caused by a shrub layer that more or less stays evergreen in sheltered valleys.

Thus in the moist deciduous area, the absence of leaf in the canopy would show itself better as a density of shrubs, and in the heavier rainfall area, the shrubs would be a riverine or tal valley type that shows a red tinge on the imagery.

On the western side in the Nilambur plains, the area is fully inhabited with an extensive spread of rubber plantations and other arboriculture like coconuts. Mole in the flatter area it is mainly paddy cultivation and other cultivations that are fully harvested by Feb & thus yielding a blueish tinge in the imagery.

3999
Gadagkar, S. R., Sundararaj, N. 1985.

Genetics; House Sparrow; Parentage; Experiment
Reprint available

The riverine 'red' among the tree savannas in the Gudalur area, may be depicted as Evergreen disturbed forests. They could still be shrubs that are evergreen and form a thicket among streams. This area needs to be verified in the field.

Get a trace of detailed forest plantation maps of the area. To reduce and put onto in the vegetation map.

Interpreting the evergreen area: The New Amblamalam area, had Evergreen forests; Some-evergreen patches; and a mixture of secondary moist deciduous forests.

Moist deciduous | S-EV & EV

Uniform | Smooth | Granulated.

SEV | EV

No Red tonge | Red tinge

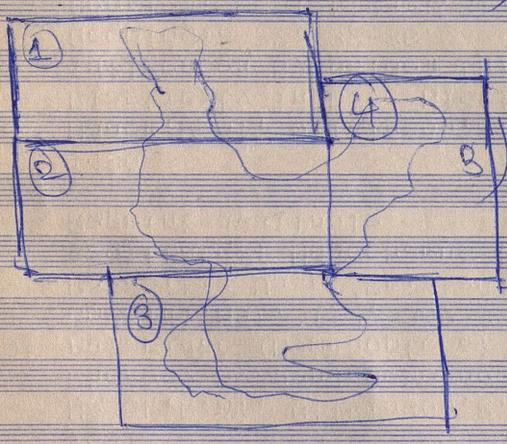
Increasing density of red.

Minutes of the meeting with Dr. J.P. Pascal on 4th Sept 1991

Decisions

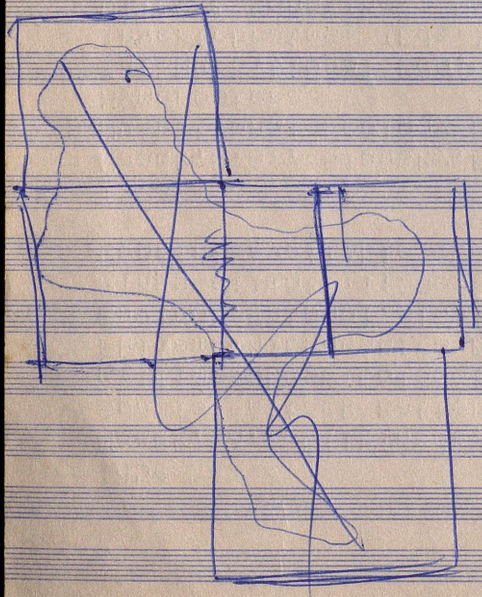
1) The whole of the Nilgiri Biosphere map should be published including the Karnataka and North Kerala sections in course of time, after 2 years.

2) It will be jointly published by the French Institute and ITE.



3) For my thesis work and for my immediate study, I would interpret the southern portions of the Biosphere Reserve and keep ready the final interpretation map.

4) ~~Dr Pascal will~~



4) The Nilgiri Biosphere map will be in 4 pieces with legend (on each map?) and insets of depict the broad bioclimatic features of the area ~~climate, bioclimatic zones~~, topography, drainage, ~~etc~~ other zones.

Anthropology; Fossils; Evolution; Origin; Theory
Reprint available

5) Mr Petrus will start work on middle and southern 3 sheets, no 2, 3, 4, and use the topsheets to reduce and draw the final sheets for

Roads.
Cadastral lines (RF, Dist, taluk, state)
Habitations
Streams.
Mines (Have to discuss if there are more)
Contours?
~~Bio-climatic zones~~.

These will be drawn and kept ready as to print. It may take about 4 months and would be ~~reduc~~ ready to use for my thesis. *

6) Regaring the ~~vegetation~~ satellite interpretation of the vegetation, the master copy of my work would be redrawn by Mr Petrus and amonia copy taken and ~~coloured~~ one coloured copy available to me for my analysis. I ~~could~~ could also put this copy into the thesis.

* The PL will provide my a copy of the overlay of each state in trasparent paper that I could use for my analysis.

Memo for SPP

Clarifications

Dry Deciduous forests:

- The dense forest/ Woodland to Savanna woodland
- Tree Savanna
- These are not clearly identified

Check Korakundah Tea limit from schedule

Bring Muralis phenology format.

Clarifications on legend.

In EV forests there seems to be no category of woodland to Savanna woodland

There are only
- dense
- disturbed
- SEV
- Tree / Shrub Savanna
- Scrub woodland to dense thickets
- thickets - discontinuous

Check Sirmuani area limits of EV / SEV / MDF

vegetation map
satellite imagery

Characterising biological diversity, land-use patterns and changes in the NBR.

With a wide bio-climatic variations, the NBR harbours many different plant communities characteristic of the Western ghats. Although detailed floras are available for many areas, no attempt has been made in characterising the biological diversity of the area. Our study involves the analysis of these floras, determination of the determine the distribution of endemics, and to systematically sample the vegetation types ~~of the area~~ to determine ~~areas of~~ high priority conservation areas in the NBR.

The NBR area also harbours a wide diversity of human communities with different modes of ~~resource~~ land-use from hunting-gathering, shifting and sedentary agriculture,

The Condor 87, 309-315.
Birds; Census; Flock Size; Observation; Theory
Reprint available

animal husbandry, and commercial agriculture and forestry. ~~As a principal aim of the Alta NBR programme is~~ The interaction between the human communities and the environment are being studied, ~~to~~ with the aim to integrate the developmental needs of the people with conservation priorities.

Notes on Satellite Image Interpretation.

Tea plantations) There are different types of Tea plantation that give different spectral responses.

1. Pure tea stands without shade cover
2. Seed tea plantations
3. Clone tea plantations
4. Degraded tea plantations.

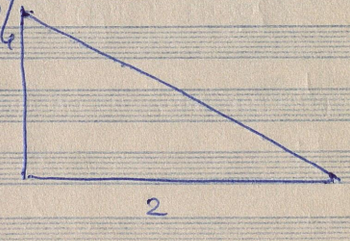
Shade cover for tea plantations affect the spectral responses. And the shade cover is season dependent. On clear sunny seasons the tree cover is kept at maximum, and on cloudy overcast seasons, the tree canopy is pruned and kept at minimum.

It looks like the spectral responses of tea is also determined by the area where it has been planted. The tea in the Nilambur area gives a different response from the tea plantations of the Coonoor estate area on the Nilgiris. This may be due to different silvicultural practices and seasonal variation of silvicult-

- ual practices in the two areas. This must be checked and verified. The Nilambur tea is at 250 m elevation and the Coonoor tea is at >1200 m elevation.

Scale and the question of resolution of satellite imageries is a principle question to be answered. If the 'continuum concept' of vegetation is valid (at a level higher than the species), the ~~degree of~~ resolution would affect the image we get.

As an example the steep slopes to the Nilambur plains would present itself as a dispersed tree, shrub and barren cover at the 20 m resolution in the SPOT whereas in the 36 m scale of LANDSAT it presents itself as a evergreen forest. The area would be poor in soils because of the high level of leaching and erosion with an annual rainfall of 2000 mm to 5000 mm and slopes of 50%



Parental Care; Biparental Care; Model; Theory
Reprint available
Record no. 301

The background - foreground approach in interpretation concerns the rivers and valleys and ridges. These may be equally proportions and would have patterns that denote flows, watersheds, topography, and geological strike plains, aspect etc. These are easily discernable

The other b-f. approach is the patches and matrix approach, and here when there are an equal proportion of each, the delineanation becomes more difficult and subjective. Thus it looks like when the patch sizes are comparable in area and shape, this subjectivity creeps in. These are conveniently lumped in the term mosaic, and one lies between the patches and matrix.

For an analysis of the maps, sampling would have to be resorted to because, a mapped representation is aimed to be an exact replication of characters on the ground to a particular scale. Thus it is difficult to grasp the whole information for analysis, and sampling may lead to quiet a true representation.

We could think of a stratified sampling, of the vegetation along different parameters like vegetation types,
topography → altitute, slope
Rainfall → Eastern - Monsoonal; Annual rainfall

le; Social Behaviour; Theory
Reprint available
Record no. 70

- ~~catchment~~
watersheds & catchments
land use → cultivation
tea
grazing
farm forestry.

Weather data is important for satellite interpretation as much as in the seasonal data. Our imagery of Feb 1989 is significantly different from the ~~overlap~~ imagery of Nov 1989 because of the season as well as the fact that 1989 had been a "third best monsoon this decade (Hindu 6-10-89). Thus the reservoirs are full and agriculture flourishes giving different spectral responses in the overlap areas of the images that we have.

Phenology of trees has an important role in determining spectral response. And the phenology of trees is intriguing. All trees shed their leaves, and some are constantly renewing their leaves either individually or as species or as whole communities as in the case of deciduous forests. Even trees and the branches of each tree shed their leaves individually and independently. All these could alter spectral ~~the~~ response of the area. A case in point is the group shedding of Eleocarpus ___, during the Jan-Feb season in the area around Mallabbad in Silent Valley.

3463
Woyke, J. 1971.
Correlation Between the Age at which Honeybee Brood was Grafted ...

A, Pondicherry

Stuart H. Blackburn, Peter J. Claus, Joyce B. Flueckiger, and Susan S. Wadley. Oral Epics in India, Univ of California Press, Berkley, 1989

Chapter 11. Aṇṇanmār Kongu tradition.

John Dargavel, Kay Dixon and Noel Semple (eds.) Changing Tropical Forests: Historical Perspectives on Today's Challenges in Asia, Australasia and Oceania. Workshop meeting, Canberra, 16-18th May 1988. Tropical Forest History working Group (S.6.07.01) Publication Section, Centre for Resource and Environmental Studies, Canberra, ~~1988~~. CRES, Canberra, 1988.

Check:

1. John Dragavel, Tropical forest history in theory and practice pp 3-18.

23. Joe R. Mansberger: In Search of the tree spirit: evolution of the sacred tree Ficus religiosa. pp 399-412.

- and other papers -

4000
Trivers, R.L. 1974.

There are settlements around teak plantations and this may be a relict from the hunting-gathering - shifting cultivators in the Attapadi having been settled as labour for raising teak plantations by the Taungya method and forced to settle in pockets around shifting cultivation patches. This is obvious in the Nilgiris especially on the Bolampatti slopes area.

Typology cover. We have to estimate the cover of vegetation and give some limits of them. In our vegetation sample of 0.1 ha, along our transect of 250 m, we have 25 evenly spaced points over which we note the cover of Open / Partially open / and Closed /.

Thus from the satellite imagery we could estimate the canopy cover for the whole area of natural forests on the Nilgiris.

In addition & we have the height ~~of~~ of trees along the transect with ~~along~~ ~~width~~ which we can asses the basal area, and biomass and extrapolate for the whole Nilgiri area with satellite interpretation.

J. Herpetology 13: 253-256.
Reprint available

8

Satellite Interpretation: an Ecological Synthesis.

* The synthesis of diverse information
* The difficulties and the need for care in interpretations.
* The ~~negative~~ negative and positive features of satellite interpretation w.r.t. Ecology & Environment. (Biomass estimates; ~~cheap~~ cheap labour,
* Experience of the study of Nilgiris.
* The Questions that can be raised.
  Ecological
  Historical
  Conservation strategy oriented.
  Bio-diversity

Because of seasonality, and many other features; the image interpretation must be internally consistant ie, each image at a particular ~~and~~ date of pass must be consistently interpreted as regards tone and vegetation. This is clear considering the overlap areas of sheets 2 and 3, taken in Feb and Nov 89.

1989 was a favourable and good monsoon (Check →) after the 86 ~~and~~ to 88 lean periods. The vegetation in the Feb season is at the end of the dry spell and with low growth period. Thus the contrasts of red and white - white the Nov image has much more red because of growth in forests and agricultural fields with crop.

In the Nov image it is difficult to make out irrigated and unirrigated areas - because all the agriland is under cultivation and there is adequate and uniform soil moisture all along the area. But this image may be better to make out agricultural land and scrubs because they would be markedly contrasted ~~and~~ with red and square

If the spectral responses is the same as in the Nov and Feb season of 1989, one can conclude that there is little biological activity in the area and vegetation in the area is little, or invarient.

Science 172: 267-269.
Hymenopteral Social Insects: Formicidae: Dufour's Gland: Alarm Signals: Experiment
nt
Reprint available

Cultural Evolution

Cladistic ~~analysis~~ analysis is central to the study the theory of evolution. The central point being the identification of common ancestory. This cannot be done with human societies and cultural evolution. It is difficult to determine ancestors for some cultural traits.

Even in the area of linguistics, we use cladistics, but here too there are problems. A new language may evolve out of the fusion of two languages with two different ancestors. This is something like a hybrid in biology, and the method of analysis of such phenomena are reticulate analysis, or nodal analysis.

In cladistics, it is most useful to use independent, or unrelated trait ~~to~~ to infer patterns on a different trait. For example, blood group characters of human communities are used to understand and check the evolution of languages. Languages as traits cannot and should not be used for the ~~the~~ analysis of the evolution of language.

For discussion with Dr JPPascal.

1) Check Satellite Image Interpretation.

2) Decide and finalize Eco-floristic zone and series limits on 1/250,000.

3) Finalize the legend for the map.

4) Decide on additional information to be put in addition to vegetation
   - Hamlets
   - Population
   - RF boundaries and list
   - Range boundaries
   - Division & circle. & ~~WW~~ WLS

5) Decide on the time chart for the completion of the project.
   - A) Responsibilities FI
   - B) Responsibilities CES.
     - Collect FD info on plantations
     - Check doubtful sites for satellite interpretation on ground.

6) Miscellaneous: on analysis; a watershed approach. To make a watershed overlay.

7) Colours and symbols.

8) Decide next meeting.

9) Layout of the NBR map.

Queen Production in Colonies of Bumblebees
Proc.Roy.Entomol.Soc.Lond. 30, 19-24.
Hymenoptera: B.partorum: Larva/Worker Ratio: Social Insects

S.D.

A comparison of the Feb - and Nov - images yields some interesting clear seperations. The discontinuous thicket is clearly seperable from the tree/shrub savanna area. Whereas in the Feb ~~fig~~ image, these two categories are merged on the slope forests of the hills, on the Nov. image, some biological activity on the tree/shrub savanna area gives it a red tinge, differentiating it from the discontinious thicket area.

Science 213, p.1314.
Species Diversity; Review
Reprint available

for JSP

* Field work in Jan. 3/4 days.

* Categories in the scrub and the eastern side: check in sheet 8.

* Sheet 2, check the EV/SEV limits.

* Check interpretation of satellite imageries (2) and (3).

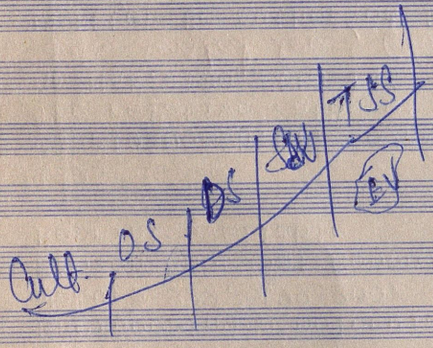
* Questions on satellite (3). - Divisions of scrub.

* Check EV/SEV line in Image (2) and other features.

Seperate the EV and SEV features from the LANDSAT and incorporate them on the SPOT. Then work inside the SPOT and finalize

The Tree and Shrub Savanna extends into more areas that are burnt in the SPOT images. The fires may have been stopped due to topo features or other line features.

Across the border on the Jaffna area of Adappadi it is Scrub woodland.



Seperate catigories of Open Scrub and closed Scrub

Open Scrub
Closed Scrub
Scrub woodland
Tree / Shrub Savanna

Prepare a Key to ~~Indentification~~ Identification.

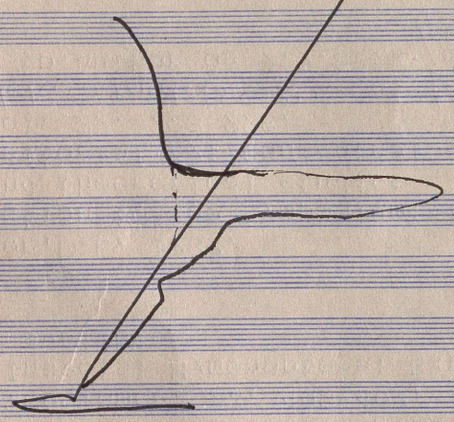
Crops . , ~~[illegible]~~

Pb. Patches of ev. or semi-ev. forest in in hills of Bolampatti which fall in the eastern eco fl. zone but are in fact receiving rains also during the SW monsoon.

→ they may be integrated in the western eco fl. zone

how?:

- 1st beate the ev. / semi ev. patches on satellite
- 2° determine the minimum elevation
- 3 redraw the western eco fl zone including the elevation = or > the minimum one.



* Adjust the rainfall curve of 2000 mm according to relief in southern part.

Rainfall & Eco flows to zone according to a limit.

Scrub classifications

Tree S.
Shrub S.
Sc-W.
DS
OS

Check 5 points in the field in the Bolampatti and decide

Thicket. a group of shrubs

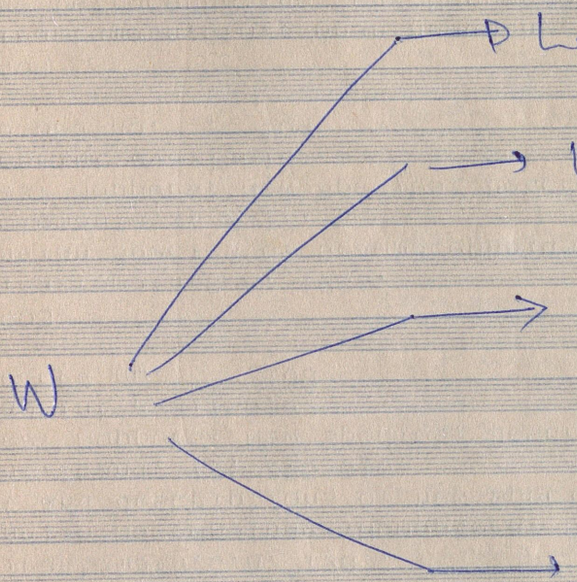
Check 2/3 points in Nilambur to finalise rubber plantation / Cashew plantation and forests.

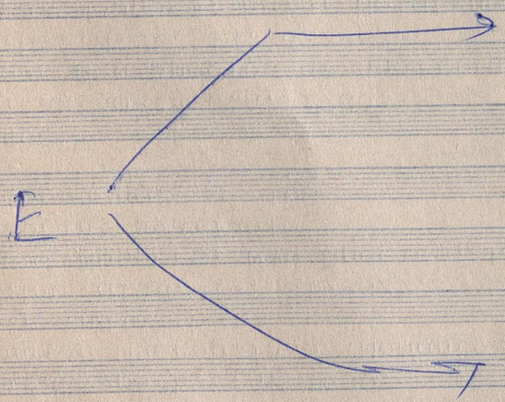
Layout design

- finalize legend
- Prepare the size of map
- where to place legend
- Insert sheet

Use Colour

J.Insect Behav. 1-11. (In Press)
Pompilidae; Cleptoparasitism; Spider wasps; Social Behaviour





M

3396
Viraktamath, C.A., Sohi, A.S. 19 180.
Notes on the Indian Species of Austrosaccalia (Homoptera: Cicadellidae)

The Consise Oxford dictionary of Earth Sciences

Drainage-~~pattern~~ network analysis: The study of the way in which the patterns of streams in a drainage basin is organized. Classical work focused on the relations between the components of a network, eg. on the link between the importance (or order) of a stream segment and its frequency. Certain laws of drainage network compositions were derived. The modern approach emphasis the importance of random processes in an explanation of these 'laws' and is more concerned with the ~~drains~~ density of the drainage network (drainage density = total length of channels/drainage area)

Drainage pattern: The spatial relationship between individual stream courses in an area. The resulting pattern often reflects the underlying rock types and structure, and several varieties are recognized. A dendritic pattern is the most common, characterized by a randomly-branched ~~or~~ arrangement. It is not structurally controlled, and is developed on a homogeneous rock, eg. clay. A trellis process consists of sub-parallel streams, usually alligned along the geological

strike, and joined at right angles by tributaries. A rectangular pattern is dominated by right-angled bends, and reflects control by joints or faults. A centripetal pattern consists of stream courses converging into a central depression. The drainage network in the drainage pattern viewed geometrically.

1626
Ubukata.H, 1986.

LAYOUT

~~33 x 2.5~~ =

22 x 2.5 =

82.5 cms.
55.0 cms

Each 1/1,00,000 sheet will be

82.5 x 55.0 cms.

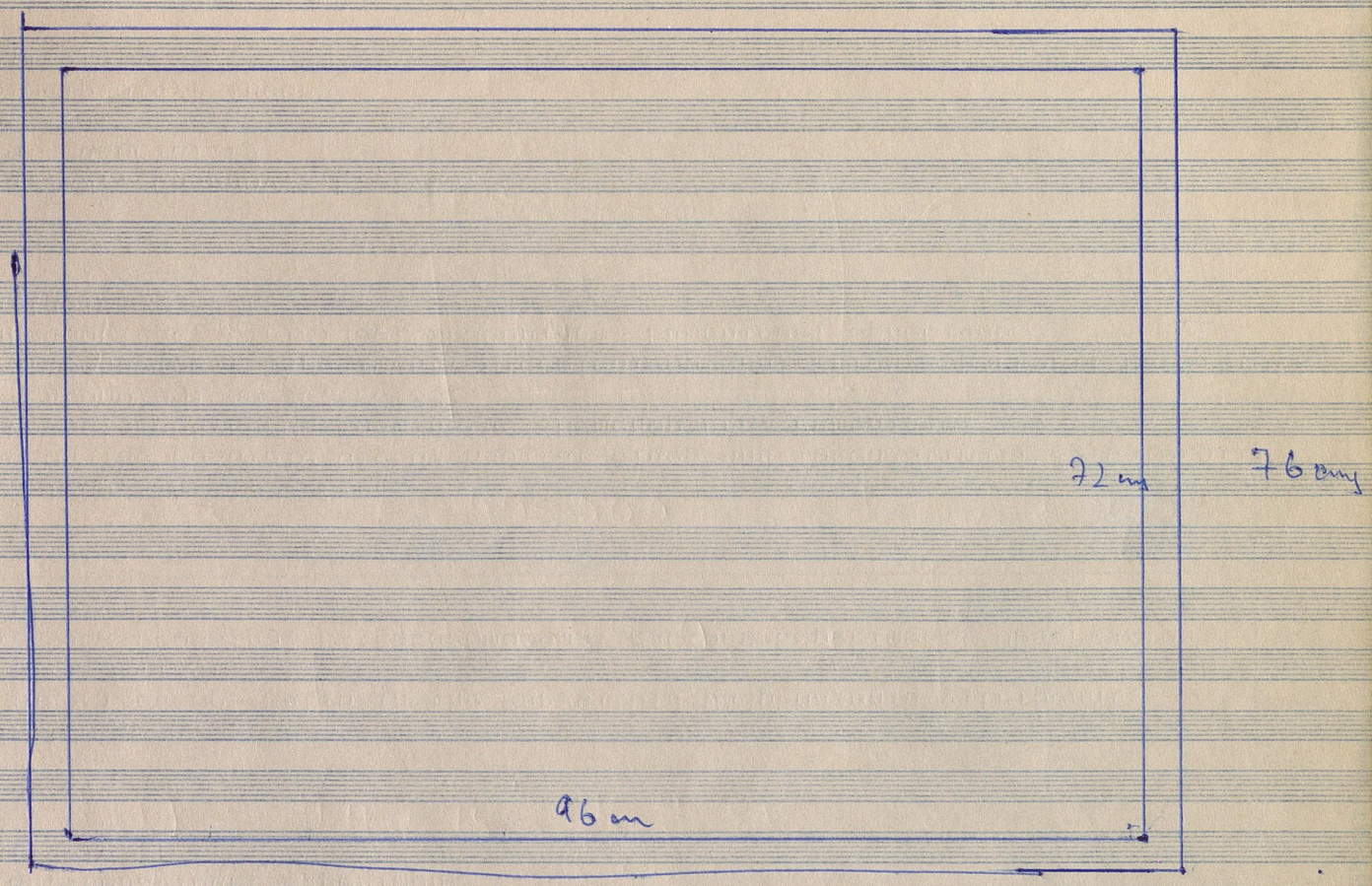
Sheet (1) : N 11°-15' to 11°-45'
E 76°-0 to 76°-45'

Sheet (2) N 10°-45' to 11°-15
E 76°-15' to 77°-0'

Sheet (3) N 11°-15' to 12°-0'
E 76-45' to 77°-15'

Sheet (4) N 11°-45' to 12°-15'
E 76°-0' to 76°-45'

Copeia 1, 76-83.
Spawning; Embryo Survival; Fishes; Adaptiveness; Experiments; Observations
Reprint available



~~96 cms~~.
100 cms

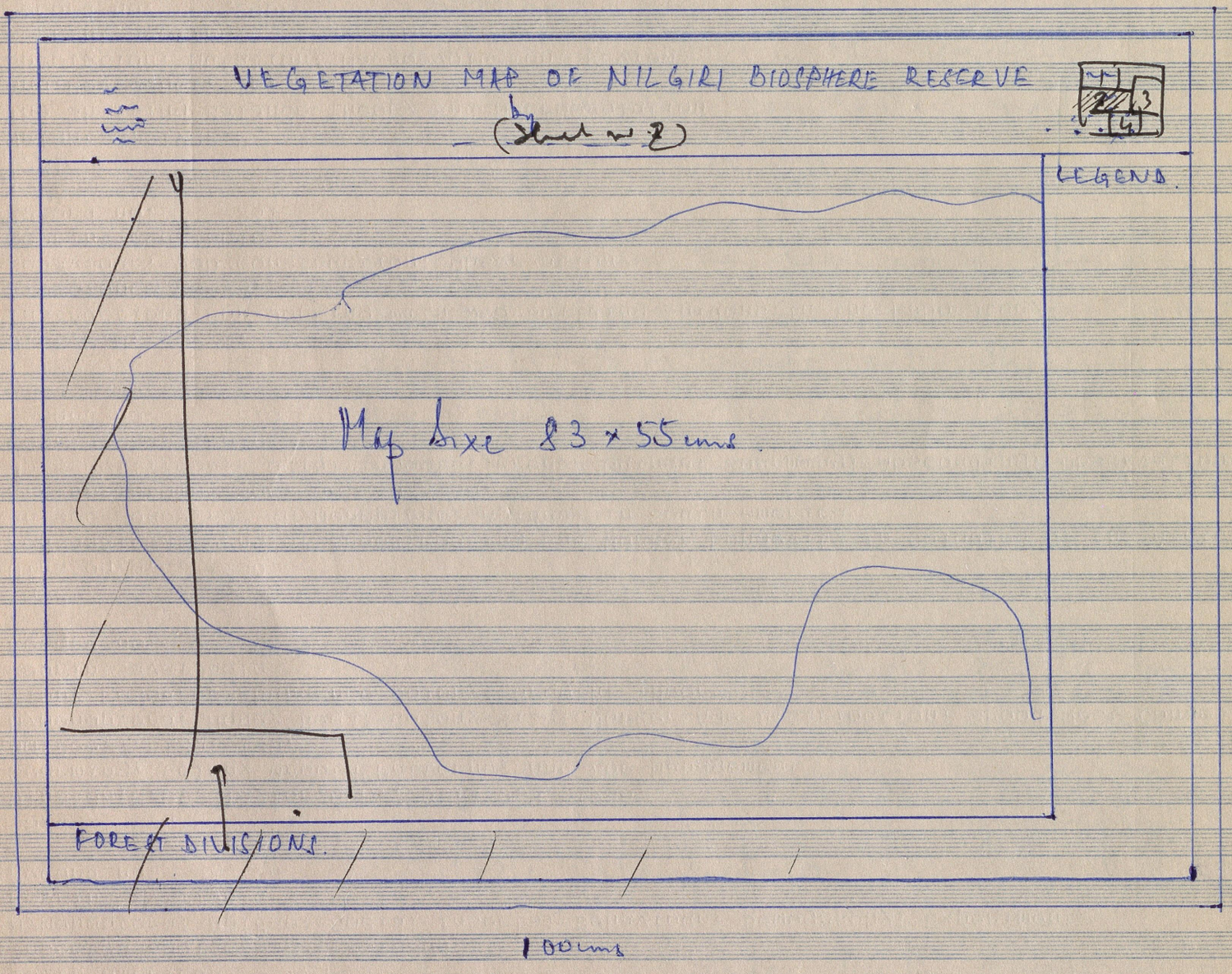
Inset map for sheet organization.
Decide on title.

Map size 83 x 55 cm

20 cms : 100 cms.
20.

1 cm : 5 cm

Review; Haplodiploidy; Theory
Reprint available
Record no. 88



Scale 1 : 5 / 20 cms = 100 cms.

1727
Wright, S.J. 1979.
Competition Between Insectivorous Lizards and Birds in Central Panama

SJ

Seperation between the ever-green and semi-evergreen on one side and the deciduous moist and dry can be made out with absolute clarity in the satellite image. The tree density can also be made out clearly in the image.

Whereas in the degraded forests various physiognomic forms are more difficult to be made out. There is greater ambiguity in the scattered shrubs, dense scrub, and tree and grass savanna seperation.

The sun-stike angle or the Azimuth is very significant on satellite image interpretation. Imagine This is an effect and influence of Topography on Satellite interpretation.

Imagine a slope with areas of a lean density and a leaf canopy that gives a response. If the sun-stike angle is equivalent to or comparable with the slope, a lean forest may reveal a high density and a denser forest, a lean density.

Winston, M.L., Otis, G.W., Taylor, O.R., Jr. 1979.
Absconding Behaviour of the Africanized Honeybee in South America
J. Apicult. Res. 18, 95-94.

It may be possible to numerically correct for this artifact of topography if the topography is known, and is available in digitized form.

One may also use the signal also, treat it numerically with ~~that~~ comparison techniques to identify a line contrasted line feature seperation, and this can be use to invert the mirror image pixels and enhance them to reveal its true spectral response.

Practically it means you are correcting for topography and viewing the landscape from the zenith of the ~~to~~ central point of the image.

1520
Wilson,E.O., Fagen,R.M. 1974.
On the Estimation of Total Behavioral Repertories in Ants

NBR Boundary of the Zones and the RFs in the Kerala section are not available on the 1/50,000 scale. This has to be brought from Bangalore where the 1/50,000 has been coloured for the NBR Zone. This can be reduced to 1/100,000.

? What are the items to be taken from the Topo sheet for the map?

The plantation limits in the toposheet are outdated and many of the plantations are a failure. Note 58A/11

~~Dense thicket.~~

~~Discontinuous thicket~~

* RF Boundaries.
* Streams.
* Habitations selected with 1991 population figures.
* Tea and Coffee etc plantation limits.
* Roads, Railways.

(Contours are necessary for Eco-floristic Zones)

Reprint available
Record no. 17

Legend Symbols

Physiognomic Stages used,

W Dense Forest / ~~[illegible]~~ Disturbed

Woodland Secondary MDF

Tree and Shrub Savanna

Dense Thicket.

Scrub-woodland to dense thickets

Discontinious thicket to scattered shrubs.

E Tree Savanna

Scrub-Woodland

Dense thickets

Woodland to Savanna-woodland,

Discontinious thickets to low scattered shrubs

M Clump-Savanna.

C) Irrigated Agriculture

Communal Silk- Spinning by Larvae of Dendromyrmex Tree-Ants (Hymenoptera: Formic idae)
Insects Sociaux 28, 182-190.
Social Insects; Dendromyrmex Chartifex; Natural History; Observation; Behaviour

Legend Colours.

W

Low elevation Evergreen.

Disturbed EV to SEV.

Secondary MDF

Medium elevation EV

High Elevation EV

Moist deciduous forests.

Dry deciduous forest

Riparian

Swamps.

Reprint available
Record no. 202

E)

AA type.

Gyro / Hardmikia

ACA

APT

M-L-M

Riparian.

M)

Shola.

Grasslands

Swamps.

Wilson, E.O. 1976.
A Social Ethogram of the Neotropical Arboreal Ant Zacryptocerus Varians(Fr. Smith
)
Animal Behaviour 24, 354-363.

C)

Forest Plantations

Tea

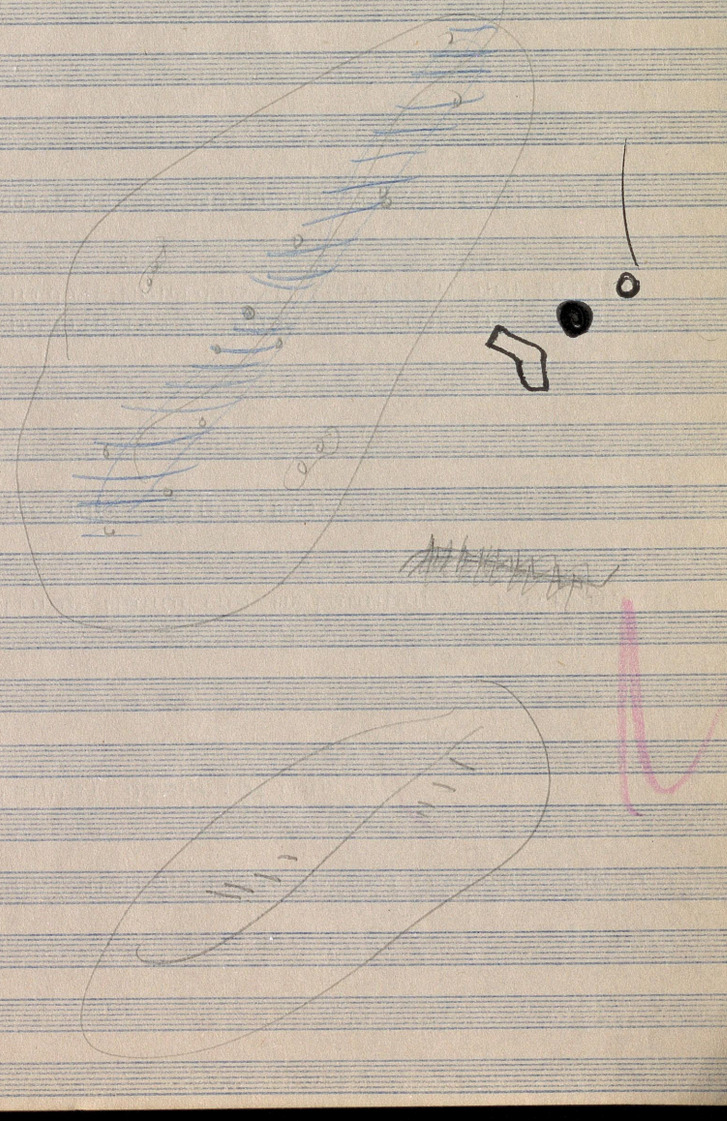
Coffee

Other mono-culture ?

Mixed Plantation

Agriculture.

D)



Cooper, D.W., Johnston, P.G., Sharman, G.B., VandeBerg, J.L. 1976.
The Control of Gene Activity on Eutherian and Metatherian X Chromosome: A Compar
ison

Legend Symbols

W : Wattle

E : Eucalyptus

Bamboo

Strobilanthus

Lantana

Eupatorium

Cane

Phoenix

Shorea

1778
Cheke, R.A. 1977.

Inset Maps.

~~To be inserted later~~

Map of NBR Organization.

Eco - climatic zone.

Climate

Drainage.

Topography.

Behav.Ecol.Sociobiol. 20, 209-217.
Hymenoptera; Formicidae; Behaviour; Experiment; Observation
Reprint available

Reductions to be effected from 1/50,000 to 1/100,000.

(1)

- Tea factories
- Mines
- Habitations

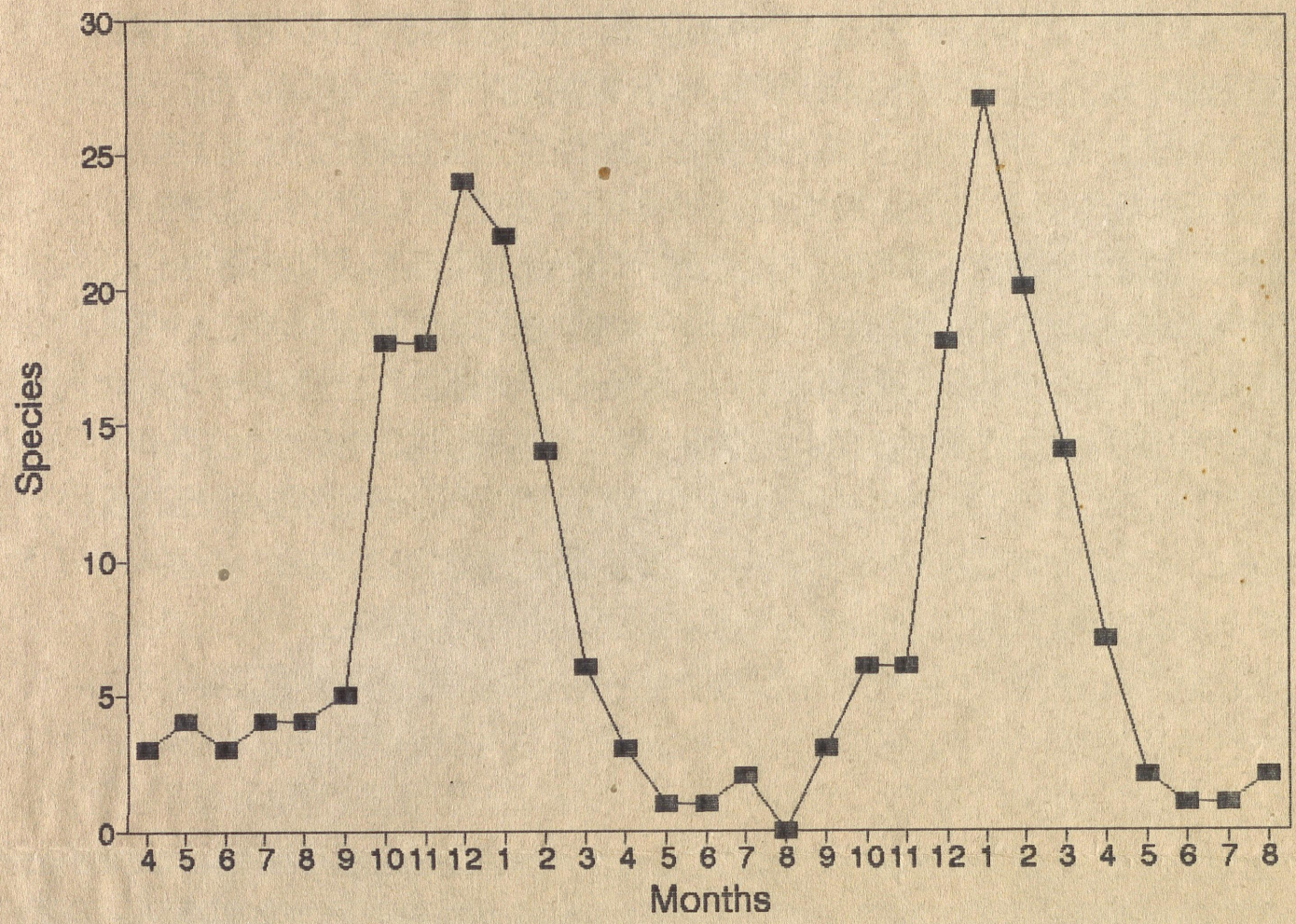
(2) Contours to be reduced.

W) 750 m. 1400 m 1800 m — on — 58A/2, 58A/3, 58A/6, 58A/7, 58A/8, ~~58A/10~~, 58A/11, 58A/12, 58B/9

(3) Contours to be reduced

E) 300 m, 500 m, 600 m, 900 m, 1200 m, 1400 m, 1800 m. — 58A/10 (+ 750 m?), 58A/14, 58A/15, 58A/16, 58B/13, 58E/1, 58E/2, 58E/3

Leaf fall Phenology



(from KS Murali.)

Framework for Reviewing

Vegetation Mapping

French Institute, Pondicherry

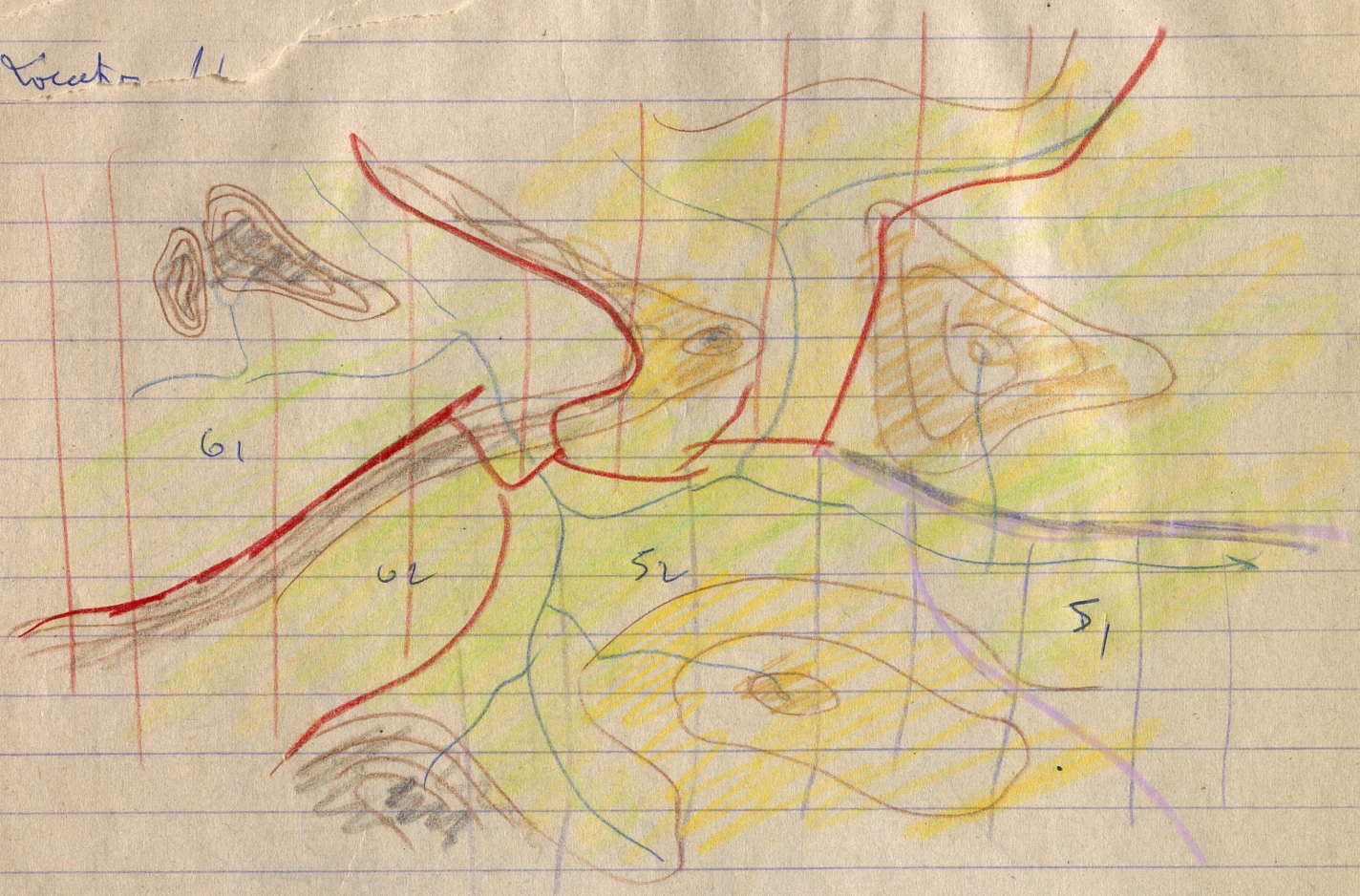
Vegetation Ecology

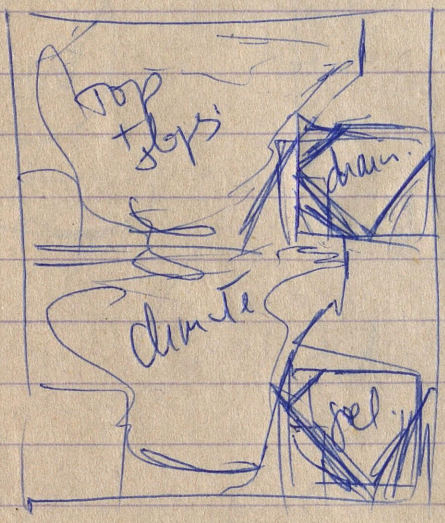
Lekhak

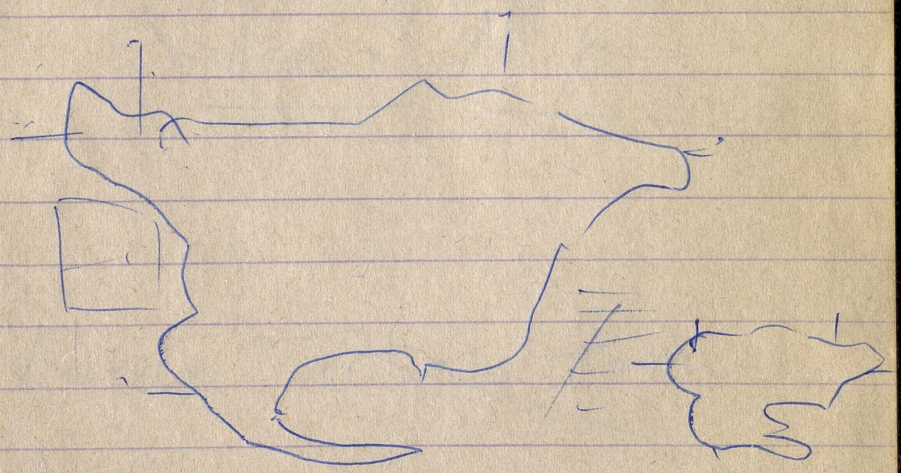
SCRIBBLING PAD

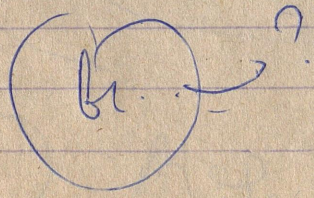
Marketed by:
MSIL
Mysore Sales International Limited
MSIL House, 36 Cunningham Road
Bangalore 560 052

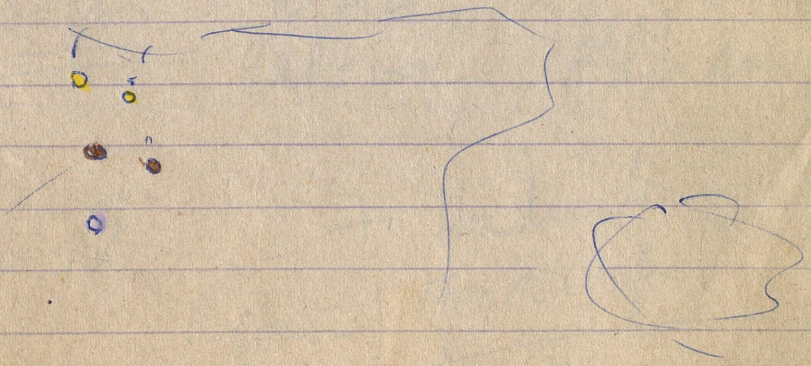
Location 11

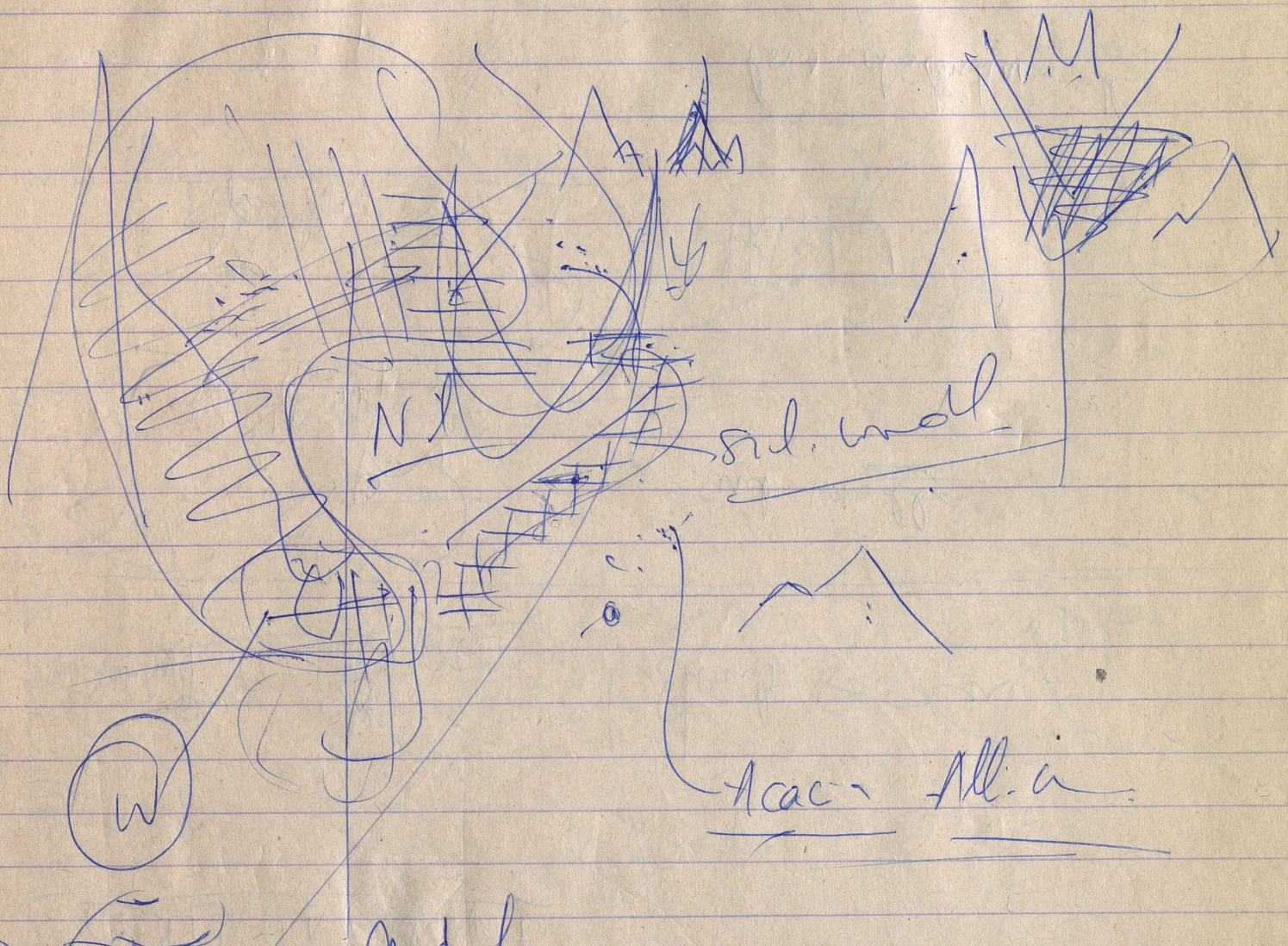


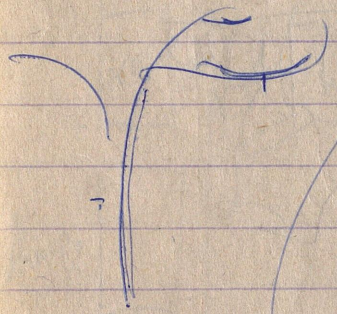










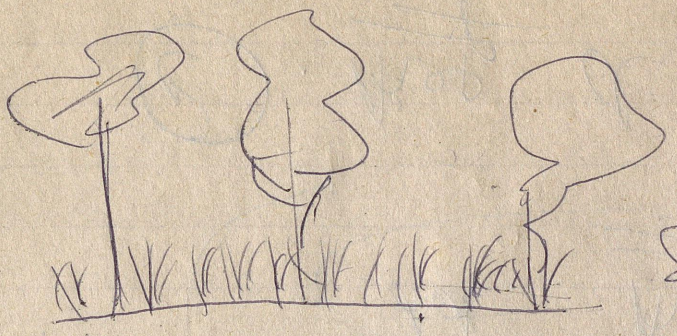


mdf

dd: Anogeiss. Tectona termin

dd. Anogeiss termin, Chlorox, Alb. ann

(2). Anog. cl. Al_ _ + Hadrich.
(coon.) Gyrocarpus



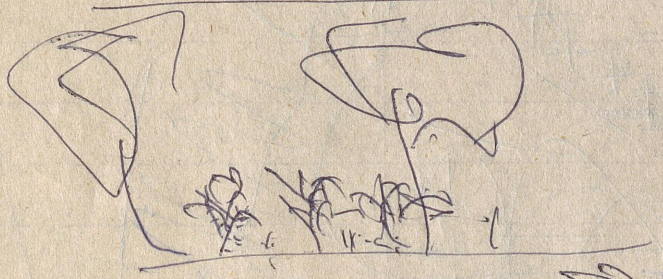
savanna - world.



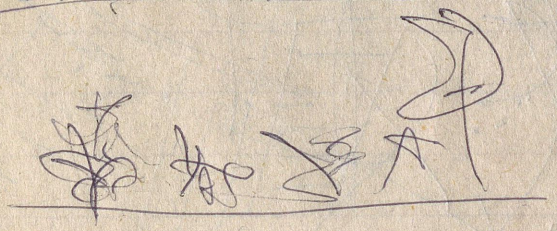
Tree savanna



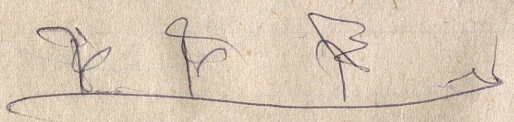
Shrub savan..



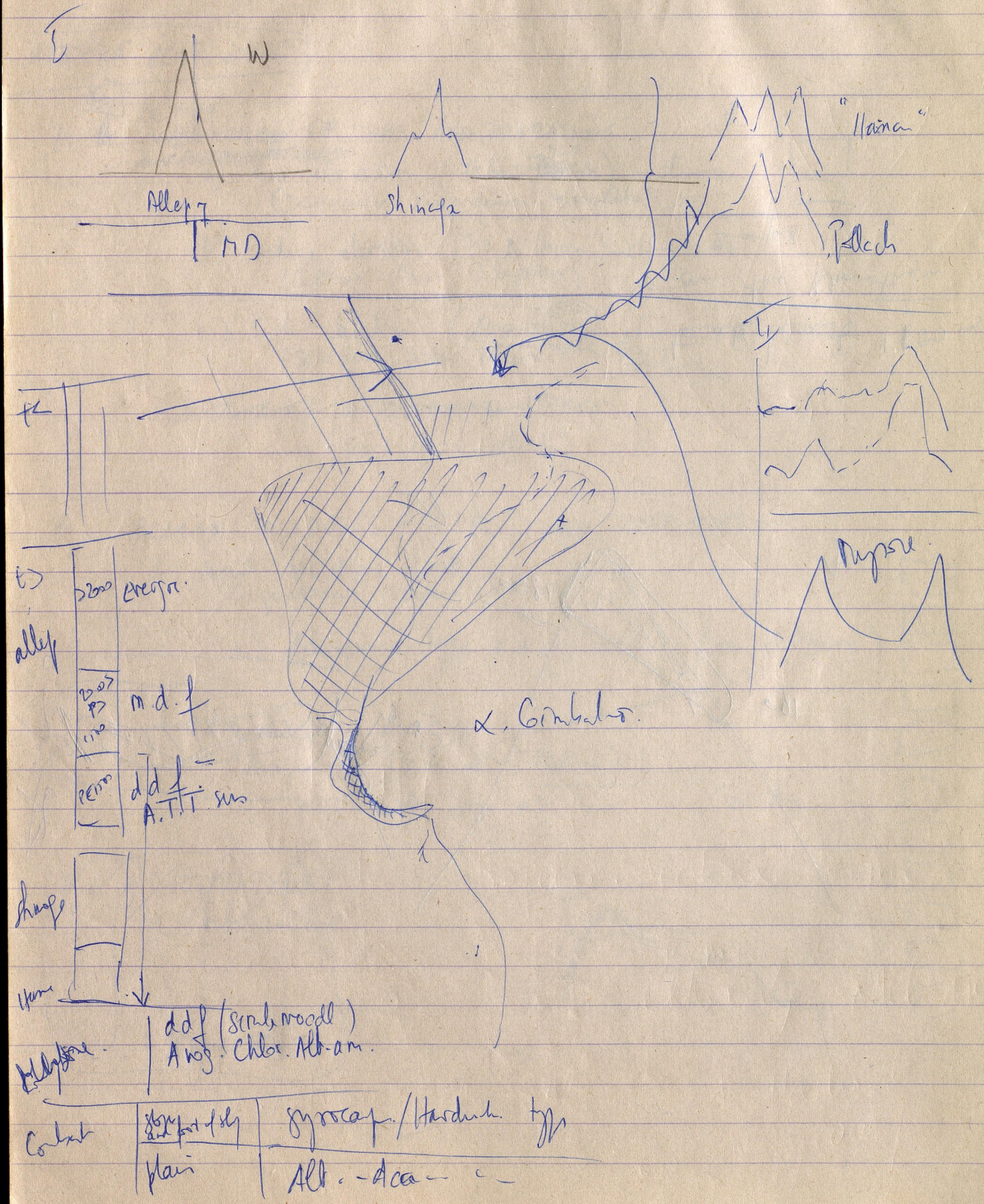
sub - world

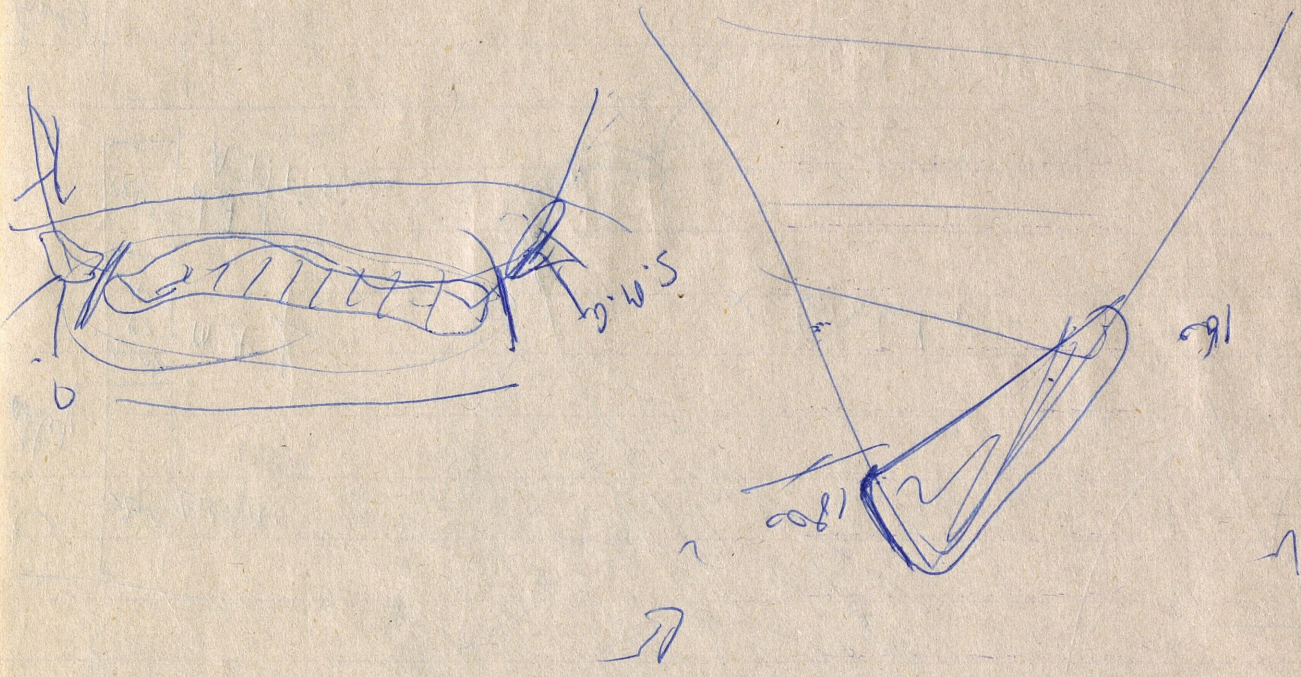


thicket.



low dis


I
W
Allepy
MD
Shinaga
"Hanan"
Pollach
II
Mysore
α. Coimbatore
t<
t>
allep
>2000
Evergr.
2000 > p > 1100
m.d.f
PE1500
ddf
A.T.T. sus
shinaga
Hanan
ddf (Scrub woodl)
Anog. Chlor. Alb-am.
Combat
plain
Alt. - Acac



tree limit 1800 m
on the Northern
slopes

WESTERN ECOL. ZONE

WESTERN ECOF. ZONE

A CLIMAX EVERGREEN F. TYPES AND DEGRADATIONS.

a) low elevation (below 750 m) – climax
(Dipterocarpus – Kingiodendron – Humboldtia) – –

b) medium elevation (750 to 1400 m) – climax
(Cullenia – Mesua – Palaquium) – d

??? c) high elevation (1400 – 1800 m) – climax
(Schaffera – Gordonia – Ruhiana) – 1600 – d

2 ~~SECONDARY OR DEGRADED STAGES~~
→ (see Myson-sheet)

B. CLIMAX DECIDUOUS F. TYPES AND DEGRADATIONS.

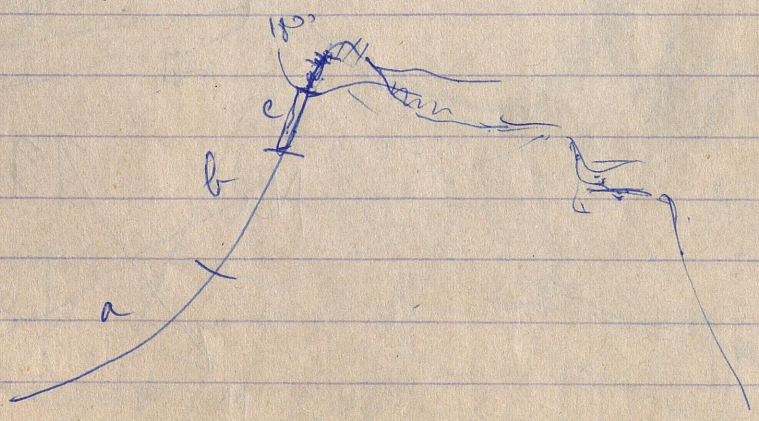
1 Moist deciduous forest
(Lagerstroemia – Tectona – Dillenia)

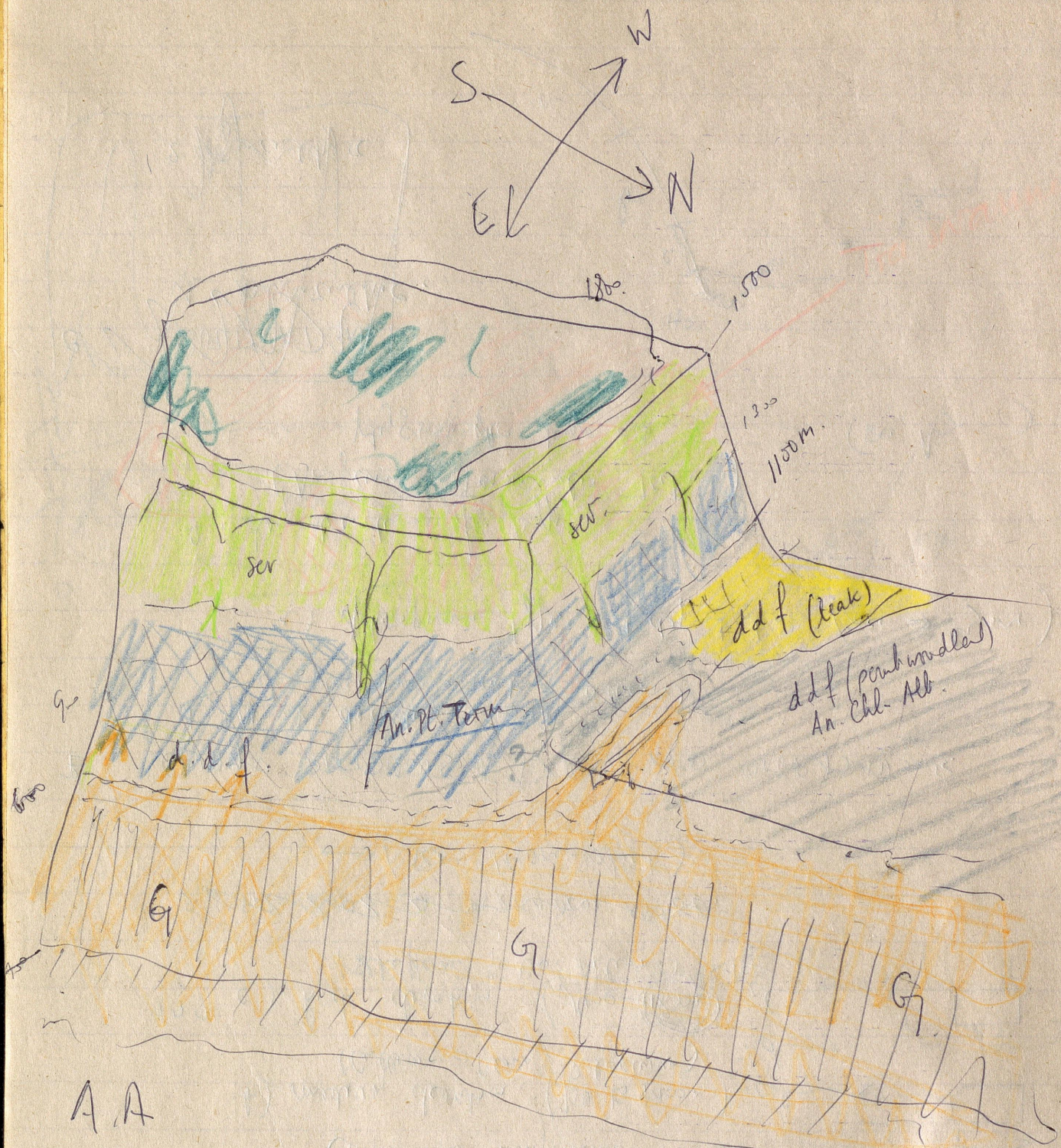
1) physiognomic types and degradation (see → Myson)

2. dry deciduous f. type
(Anogeissus – Terminalia – Tectona)

1. physiognomic type and ... (see Myson)

~~C CULTIVATIONS~~
~~1 Arboriculture.~~
~~2 Agriculture~~





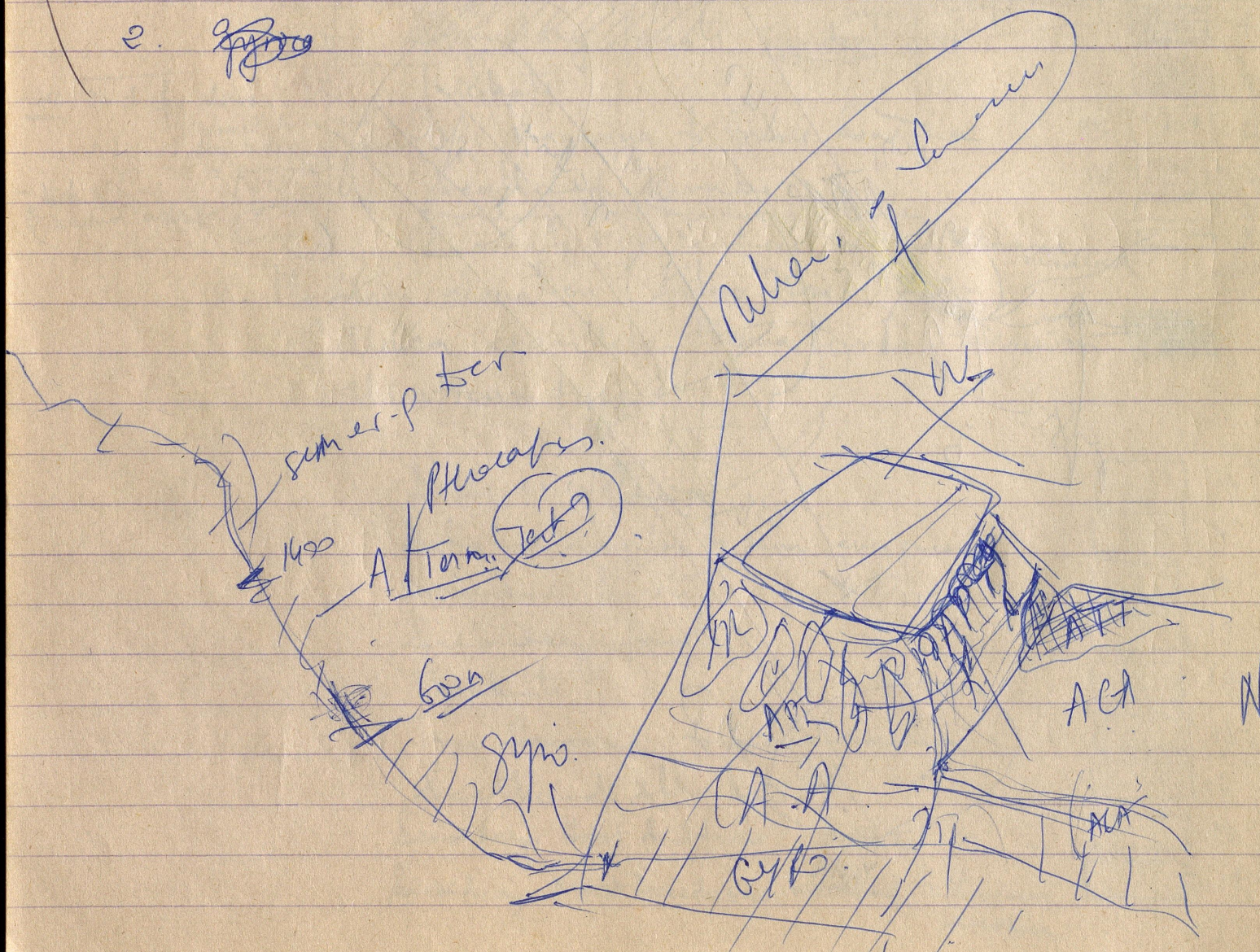
NORTHERN E.C.F. ZONE

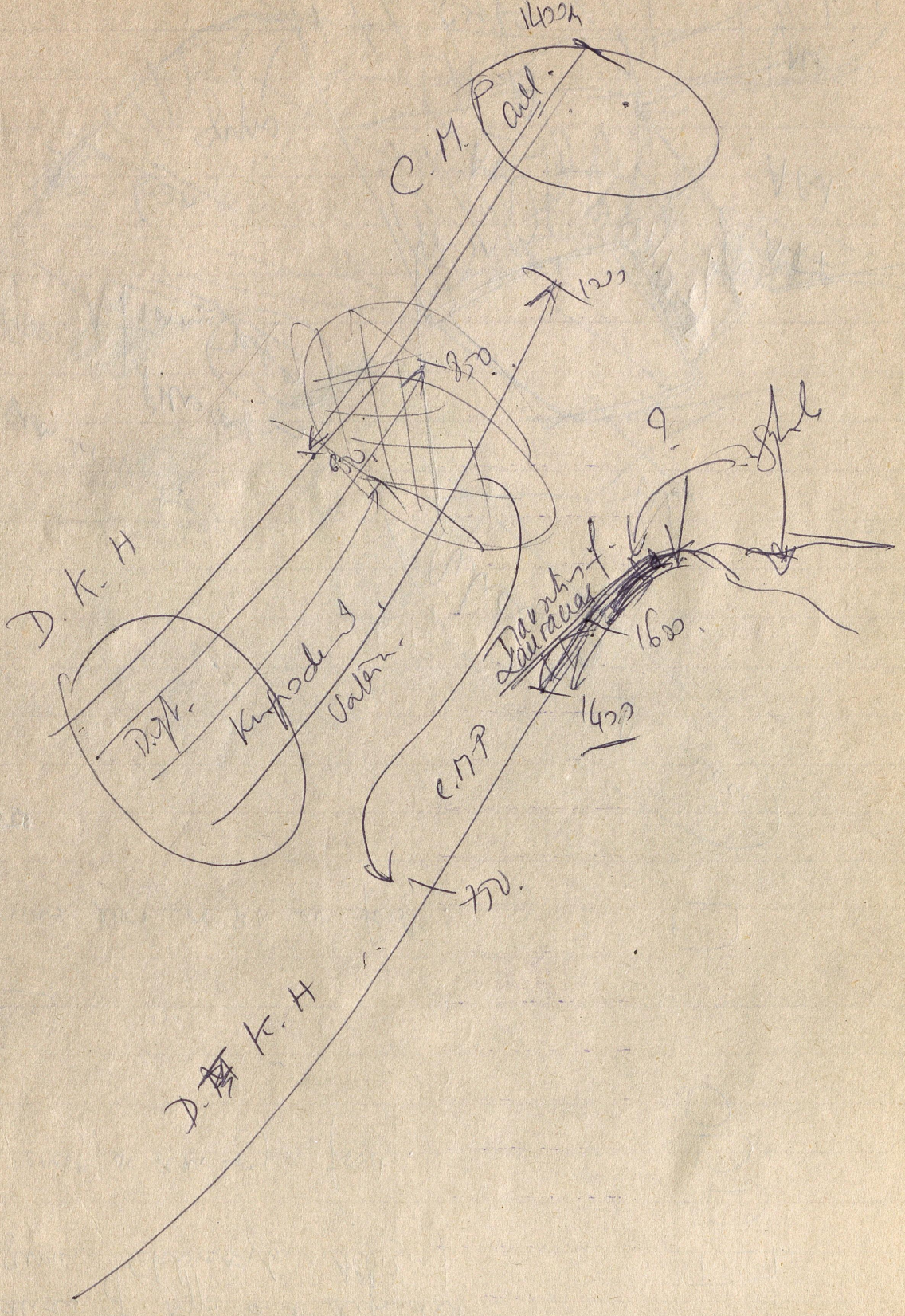
NORTHERN E.C.F. ZONE

- Dry deciduous f. typ and dependent (Anogeissus - Chlorophora - Albizia)
- Riparian evergr. or semi evergr. forest.

EASTERN E.F.Z.

1. Riparian evergr. or semi ev. forest.
2. ~~Savanna~~





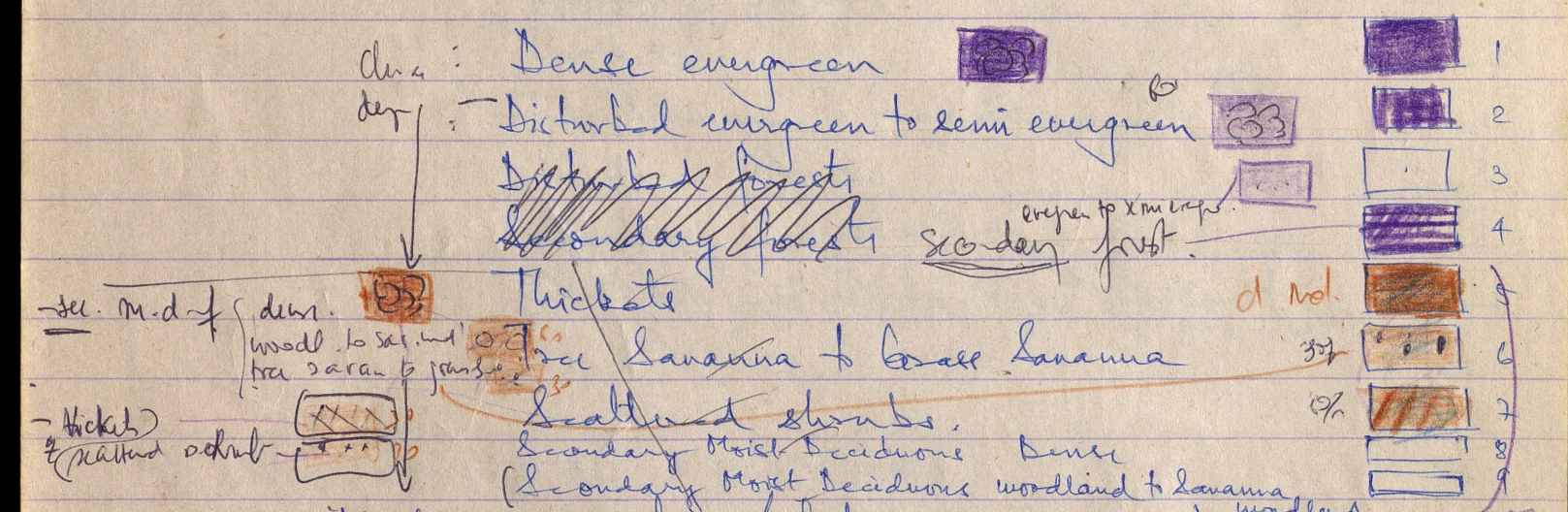
Western Ecclesiastic Zone

Western Ecofloristic Zone.

A. Evergreen Types & Degradations.

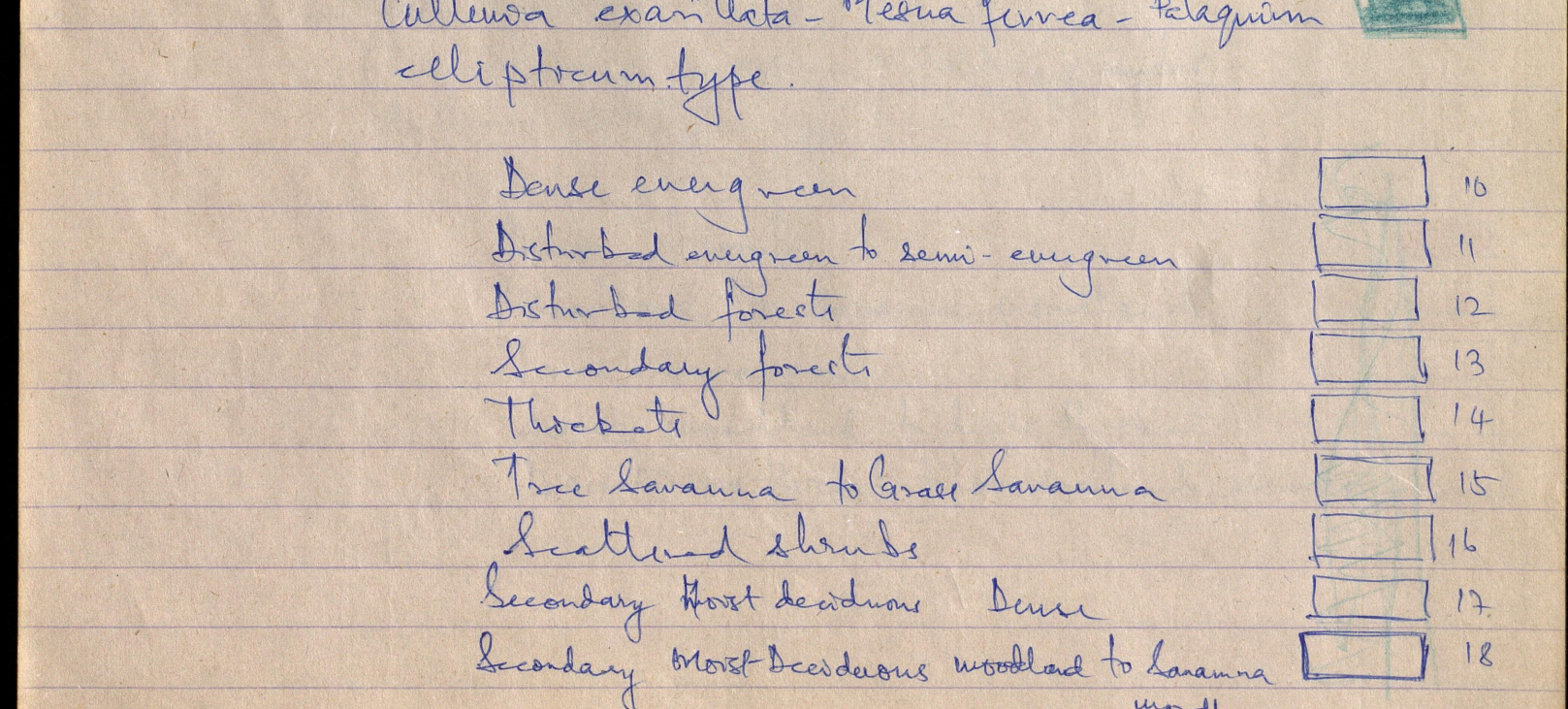
1. Low Elevation (below 750m):

Diptercarpus indicus - Kingiodendron pinnatus - Humboldtia brunonis type.



2. Medium elevation (~~below~~ 750m - 1400m)

Cullenia exarillata - Mesua ferrea - Calophyllum cleistocalyx type.



3. High elevation (1400 - 1880.)

Scheffl. spp - Gordonia obtusa - Meliosma arnottiana type

Dense evergreen

Disturbed evergreen

~~Secondary forests~~

Thicket

Tree Savanna to ~~Grass~~ Savanna ? (1)

Scattered Shrubs.

~~Secondary moist deciduous forests~~ dense

~~Secondary moist deciduous forest~~ woodland to savanna woodland

B. DECIDUOUS TYPES & DEGRADATIONS

1. Moist Deciduous Forests:

(Lagerstroemia microcarpa - Tectona grandis - Dillenia pentagyna type)

Dense Forests

Woodland to Savanna woodland

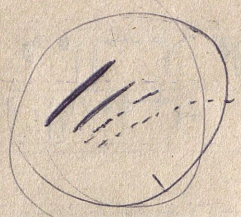
Tree Savanna

Scrub woodland to dense thicket

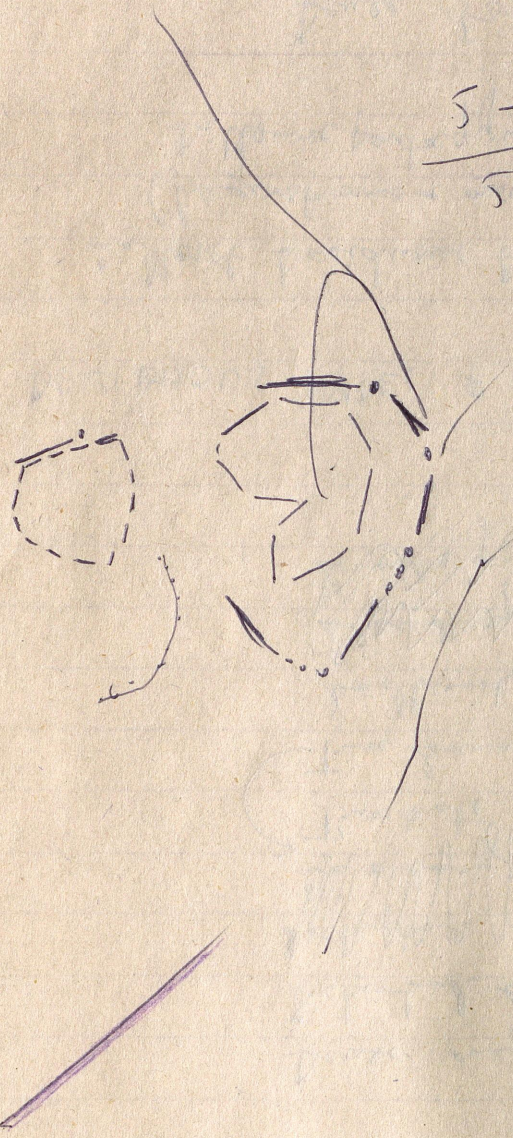
Discontinuous thicket to low scattered shrubs.

~~Tab~~
now : Blue
road : black
vill. : grey

Black
Blue
Yellow
Magenta
Grey



$\frac{5-7}{5+7}$



State
District
Taluk

Dm

RF

Road, railway.

River

Village / Town.

Contour. grey.

2. Dry Deciduous ~~Forest~~ :
Anogeissus latifolia - Tectona grandis -
terminalia tomentosa type.

Dense forests
Woodland to Savanna woodland
Tree Savanna
Scrub woodland to dense thicket
Discontinuous thicket to low scattered shrubs

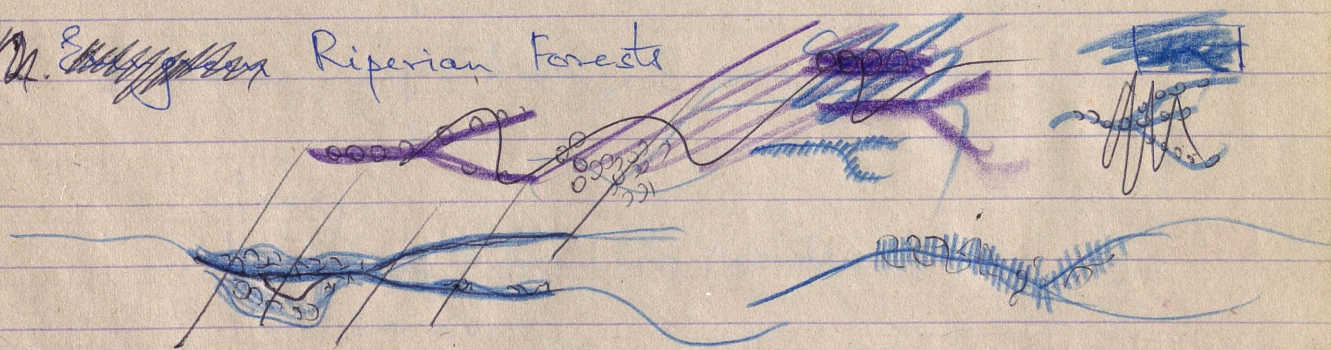
~~3. Riverine Evergreen Vegetation~~

C. Edaphic types

2. Swamps

~~2. Riverine Vegetation~~

1 ~~M.~~ Riparian Forests



& Northern.

Eastern Ecofloristic Zones

A. ~~Dry~~ Deciduous forests

~~[illegible]~~

3. Anogeissus latifolia - Chroloxylon swestenia - Albizzia amara type.

~~[illegible]~~

Woodland to Sananna woodland

Tree Sananna

✓ Scrub ~~land~~ woodland to dense thicket

Discontinious to low scattered shrubs.

~~[illegible]~~

~~2. Acacia spp - Amara species~~

1. Acacia spp - Albizzia amara type.

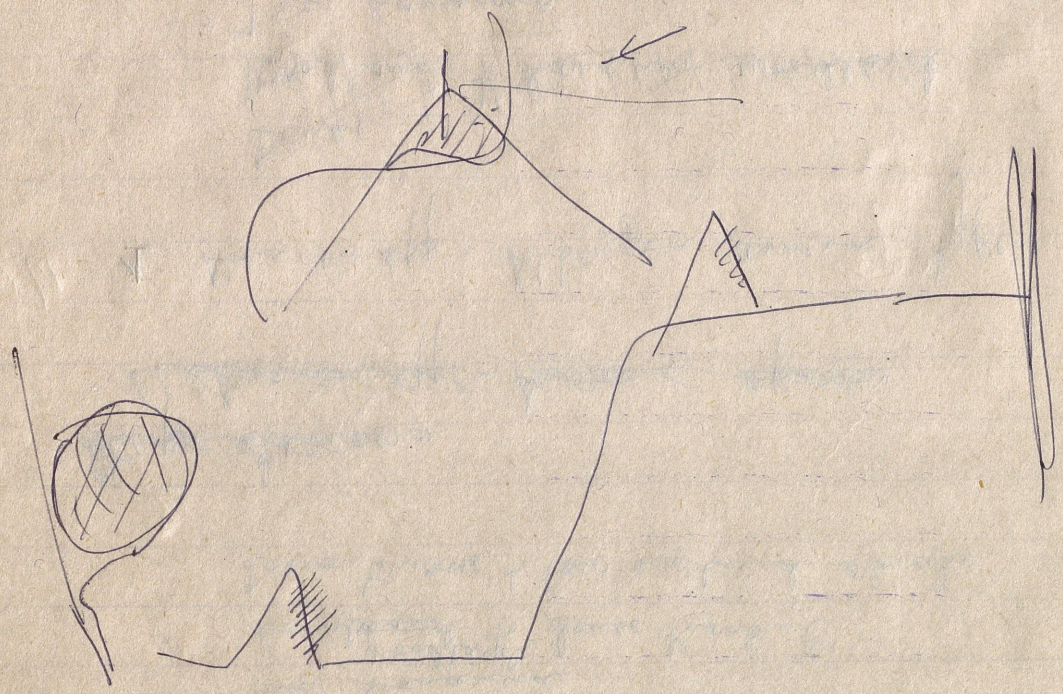
~~Dense~~

~~Woodland to Sananna woodland~~

? Tree sananna.

✓ Scrub woodland to dense thickets

✓ Discontinious to low scattered shrubs.



~~Slope facies~~ :

2. Slope from 300 m - 650 m (800m)
Gyrocarpus. type.

Dense
Woodland to Savanna woodland
Tree savanna
Scrub woodland to dense thickets
Discontinuous to low scattered shrubs.

4. Slope from 600 m - 1400m
Anogeissus latifolia - Pterocarpus -
Terminalia spp - type.

Dense
Woodland to Savanna woodland
Tree Savanna
Scrub woodland to dense thickets
Discontinuous to low scattered shrubs.

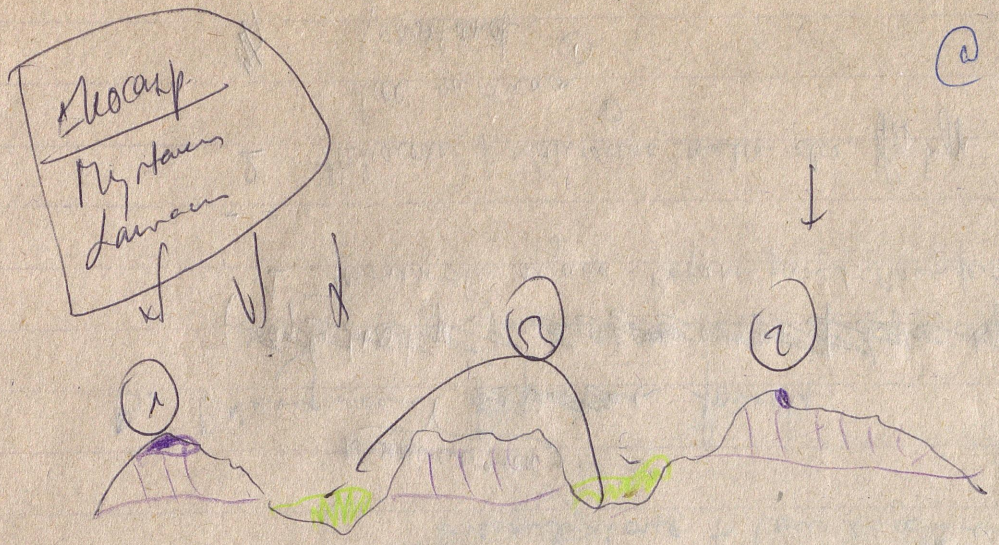
B. Evergreen to semi-evergreen ~~[illegible]~~ forests

~~([illegible]) [illegible] of higher slopes.~~

1 Terminalia arjuna - Pongamia pinnat. - Mangifera - [illegible] type

2. Meliaceae & Lauraceae medium elev. ~~[illegible]~~ type ....
Tree savanna ①
~~3~~ : Grassland ①

① this includes natural grassland & tree savanna occurring at this ~~altit~~ elevation



@ Blasco (1971)

1) High rainfall & E.G.
2) Low rainfall eg.
3) Shola
4) Cyclonic type eg.

Grasslands also many types.

2 types: the common savanna found around inhabited places.

high rainfall savanna.

MONTANE ECOFLORISTIC ZONE.

MONTANE ECOFLORISTIC ZONE.

- montane shola
- tree savannah
- grassland.

IV CULTURES

A. ARBORICULTURE

Forest Plantation → Eucalyptus, Wattle, pine, Cinchona, teak, Sandal.
Tea
Coffee
Coconut
Areca
Mixed orchards
Other mono-culture plantations (specify)

B. Agriculture & Pastoralism

Cattle penning site / Grazing lands
Irrigated agriculture
Rainfed agriculture
Vegetable culture
Traditional Cultivation

Climate: 1/250,000.

From Lengrebe & Pascal.

Isohytes & October / July demarkation.
Regimes demarkation.
Dry months demarcation.
Temperature demarcation.

Slope.

dense forest
woodland
Savann. wood.
Tree savann
Shrub Savann
Grass Sav. / Grassland
Scrub-woodland
dense thickets
low and discontinuous thickets
scattered shrubs
pounds steppe

Woodland to Savanna woodland
Tree Savanna to Grass savanna
Scattered shrubs
Thickets
~~Tree Savanna~~
Scrubwoodland to dense thickets
Discontinuous thickets to low scattered shrubs
Grasslands
~~Tree & Shrub Savanna~~

Woodland
Savanna woodland
Tree Savanna
Scattered shrubs
Thickets
Discontinuous thickets to low scattered shrubs.
Grassland.
Shrub savanna

WESTERN ECO-FLORISTIC ZONE

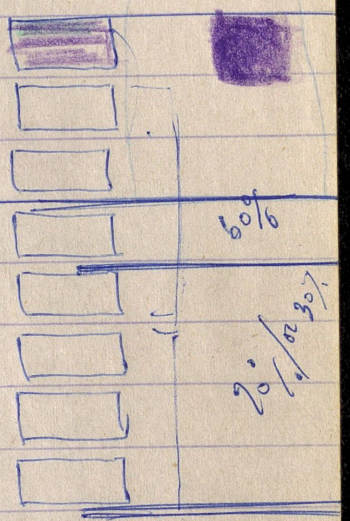
A. Evergreen types and degradations.

1. Low Elevation (Below 750m)

Diplocarpus indicus – Kingiodendron pinnatus – Humboldtia brunonis type.

- Dense evergreen
- Disturbed evergreen to semi-evergreen
- Secondary evergreen to semi-evergreen
- Secondary moist deciduous forest dense
- Woodland to Savanna woodland
- Tree Savanna to grass land
- Scattered shrubs
- Thickets

(too many categories may not be present)

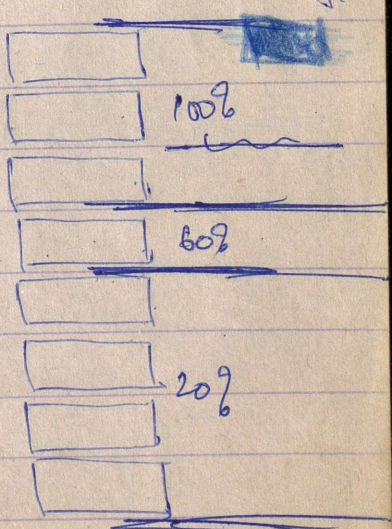


2. Medium elevation (750 m – 1400 m)

. Cullenia exarillata – Mesua ferrea – Palaquium ellipticum type

- Dense evergreen
- Disturbed evergreen to semi evergreen
- Secondary evergreen to semi evergreen
- Secondary moist deciduous forest dense
- Woodland to Savanna woodland
- Tree Savanna to grassland
- Scattered shrubs
- Thickets

(too many categories may not be present)



3. High Elevation (1400 - 1800)

Schefflera spp - Gordonia obtusa - Meliosma arnottiana type

OK

- Dense evergreen
- Disturbed evergreen
- Tree Savanna to grassland
- Scattered shrubs
- Thickets

B. Deciduous types and degradations.

1. Moist deciduous forests

Flagenstromia microcarpa - Tectona grandis - Dillenia pentagyna type

B + M + Y
10% 60% 60%

- Dense forests
- Woodland to Savanna woodland

OK

- Tree Savanna
- Scrub woodland to dense thickets
- Discontinuous thickets to low scattered shrubs

2. Dry deciduous forests

Anogeissus latifolia - Tectona grandis - Tectona grandis type

may not exist →

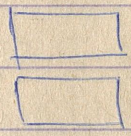
- Dense forests
- Woodland to Savanna woodland

OK

- Tree Savanna
- Scrub woodland to dense thickets
- Discontinuous thickets to low scattered shrubs

C. Edaphic types

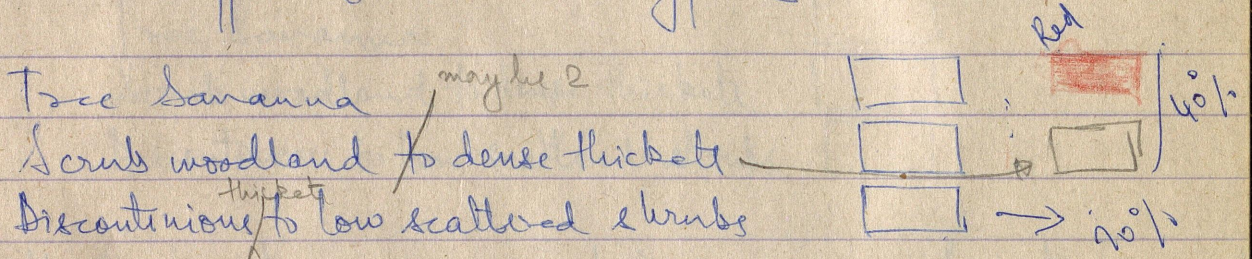
1. Riperian forests
2. Swamps



EASTERN & NORTHERN ECO-FLORISTIC ZONES:

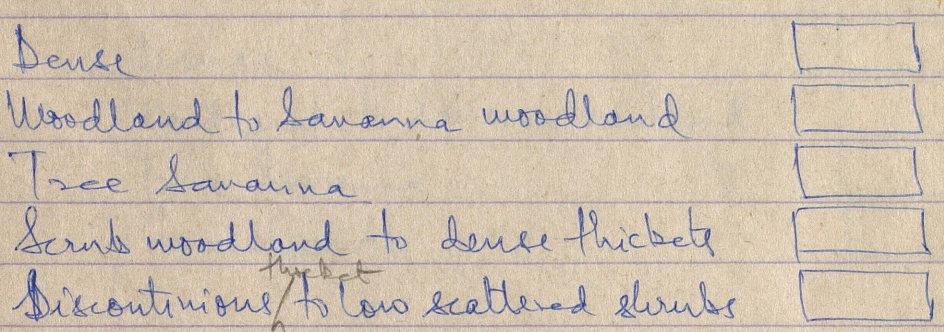
A. Deciduous Forests

1. Accacia spp-Albizia amara type (low elevation < 300m)



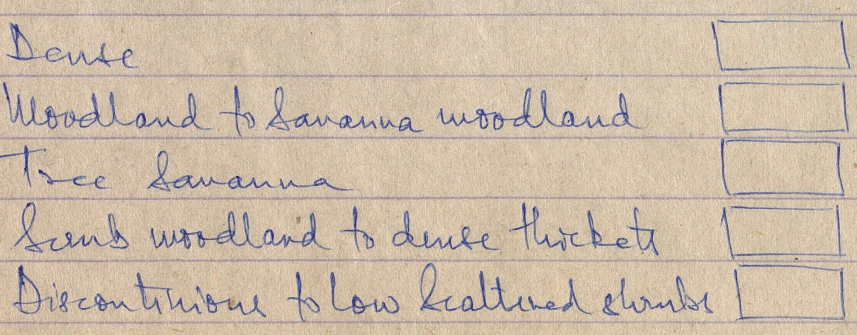
2. Slopes from 300m - 650m)

Gyrocarpus type.



3. Plateau forests

Anogeissus latifolia - Chrysoxylon Swieteria - Albizia amara type.



4. Slopes from 600 m ~ 1400 m

Anogeissus latifolia - Pterocarpus marsupium - Terminalia spp. type

Dense	☐
Woodland to Savanna woodland	☐
Tree Savanna	☐
Scrub woodland to dense thickets	☐
Discontinuous to low scattered shrubs	☐

B. High elevation evergreen to semi evergreen forests (1400 m - 1800 m)

1. Meliaceae - Lauraceae type

Dense	☐
Woodland to Savanna woodland	☐
Tree Savanna	☐
Grasslands	☐

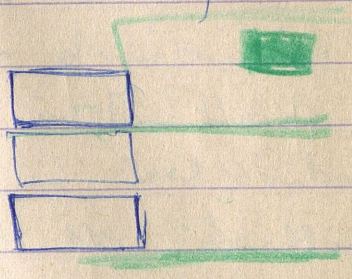
C. Edaphic types.

1. Riparian forests ☐

Terminalia arjuna - Mangifera indica type.

III MONTANE ECO-FLORISTIC ZONE. (above 1800 m)

Montane Shola forests
Tree and Shrub Savanna
Grasslands



Green: III >1800 100% B 100% Y

Green B High Ele 1400-1600 m 60% B 100% Y

Green 3 High Elevation 1400 m - 100 m 100% B 60% Y

Gould H.A. "Priest & Contra-priest: a structural analysis of jajmani relationships in the Hindu plains & the Nilgiri hills." in Contributions to Indian Sociology. (NS), No:1, Dec 1967.

Roland LARDINOIS, "EPW"

Griffiths (P). Hist. of the Indian tea trade 1967. 768p.

Buchanan, D.H. ~~Capitalistic enterpr.~~ The development of Capitalistic enterprise in India, 1930s.

Forrest (D). Tea for the British: the social and economic history of a famous trade, 1973

Records of the political department.
Police records

Records A : Permanent Records.
B : 20-10 yrs life.
C : Temporary.

"Most pre historic remains more probably concentrated between AD 100 ~~AD~~ and AD 1100 ."

NEGETATION CHANGE IN THE NILGIRIS AREA

Our focus is the negetation change in the Nilgiris area over the six historical periods that we have ~~discussed earlier~~ identified. We sketch a tentative negetational history of the area below.

I Pre-human history period - till AD 100.

The pre-human history ~~of~~ negetation of the area is conjectured based upon the climate, topography and remanant patches of ~~vegetation~~ reasonably undisturbed negetation. Our assumption is that during this period, during this period climate and topography have not changed broad "appreciably" to effect drastic changes in negetation types.

The following vegetation types could be identified and their distibution and extent mapped based on the above ~~three~~ criteria.

1. Low elevation Evergreen forests:

Average Annual Rainfall > 2000 mm.

Altitude < 750 m

2. Medium Elevation Evergreen forests:

Average Annual rainfall > 2000 mm

Altitute 750 m - 1600 m.

3. Semi-evergreen and Deciduous forests:

Average annual rainfall 1000 mm - 2000 mm.

Altitute : < 1800 m.

4. Montane Shola forests

Average Annual Rainfall > 1000 mm.

~~Temperature < 15°C.~~

Elevation > 1800m.

In well drained soils and in the folds of plateau protected from strong winds.

5. Grasslands.

Average Annual Rainfall

	CLIMATE Average Annual Rainfall in mm	Elevation ~~TOPOGRAPHY~~	Other features
		~~Elevation~~	~~Slope~~
1 Low Elevation Evergreen forests	> 2000 mm	< 750 m	flat
2. Medium Elevation Evergreen forests	> 2000 mm	750 m - 1800 m	Mildly undulating areas & Slopes.
3. Semi-evergreen & Deciduous forests	1000 mm - 2000 mm	< 1600 m	Mildly undulating areas & Slopes.
4. Montane Shola forests	> 1500 mm	> 1600 m	Steep slopes & folds of ~~hills~~ mountains ~~Protected~~ protected from monsoonal fury.
Montane 5. Grasslands.	> 1000 mm	> 1600 m	→ Hill tops, and other areas ridges & exposed to monsoonal winds.
6. Edaphic Grasslands.	-	-	Flat areas and poorly drained alluvial soils.
7 Edaphic Riverine Vegetation	< 1500 mm	-	Along perennial streams in ~~dry~~ drier areas.

We would follow these broad vegetation types during the following periods.

II. Pre-Settled Agriculture Period (100AD - 1565AD)

During this period there would have been no drastic vegetational changes. Along ~~perinial~~ perennial water streams that abord in the area, a few settlements would have cleared small patches for homestead construction, and for a some millets cultivation. With the use of fire, vegetation would be reduced ~~on~~ and on such ~~rich~~ nutrient rich sites, some millet cultivation would be attempted. From a larger area, tubers and fruit would be collected to agument food for the community. There would be some ~~trade~~ exchange of high value vegetational resources like medicinal plants, small timber etc with

the surrounding settled agriculture villages. The agricultural patches ~~themselves~~ and settlements themselves would be temporary, being operational from 2 to 5 yrs. They would be abandoned because of a lower in agricultural productivity, disease and death of inhabitants, damage by wild elephants, etc.

Pastoralism ~~etc~~ and grazing along the riverine patches in the drier tract would be common. The Nilgiri plateau, especially the Moyar basin would have supported large herds of ~~cattle~~ buffaloes. In addition, seasonal grazing in the areas surrounding the Nilgiris plateau would have been ~~common~~ common - especially during the July - Jan season ~~when~~ and during ~~the~~ the deficit monsoon years.

During the later part of this period, settled agriculture, with plough cultivation would have spread into this area from the Mysore country and the Kongu nad of Coimbatore plains. The swampy areas of Wynaad would be sites where paddy cultivation spread.

Our reconstruction during this period is conjectured from current cultural practices of communities living in the area. These communities are today spread mainly in the semi-evergreen ~~and Settled Agriculture~~ and deciduous tracts of the area, and on the montane vegetation of the plateau. In the evergreen forests, small communities living by hunting and gathering from their abundant environment would have had little impact on the dense vegetation.

III. Settled Agriculture (c. 1505 - 1812)

The coming in of settled agriculture would significantly transform the landscape. On the ~~plateau~~ Nilgiris plateau, many permanent settlements came to be established. Areas around these settlements were cleared and continuous annual agriculture were established as favourable sites in wide valley bottoms. On the slopes many shifting cultivation sites are taken up to augment the food supply. Along with settled agriculture ~~is~~ livestock ~~grazing~~ that was essential was necessarily banded close of villages, may be overgrazing certain areas. Settled agriculture spread at a steady rate from the northern portion of the plateau to the

eastern and southern parts of the Nilgiris plateau. ~~This~~ Settled agriculture thus restricted and even ousted some of the shifting cultivation, hunting and pastoral sites. Thus in the forested hill slopes, at favourable sites, the recuperation period ~~in~~ reduced. Grazing on the plateau was now restricted ~~by~~ but still large herds of buffaloes were maintained ~~in~~ in areas on the western side of the plateau which were not conducive to agriculture.

We reconstruct this vegetational change from the culture of the settled agricultural community, the Badagas and clues ~~gleaned~~ gleaned from the place names that the Badagas gave to their villages and the surrounding areas that still survives today.

IV. First Phase of British Colonization : (1812 - 1860)

During this period, significant changes took place in the flora of the Nilgiris. As many as a hundred new plants were brought into the area. A few centres for acclamatization of plants were set up - at Kallatti, Coonoor, and Ootacamund. It may have been during this period that the weed Lantana was released into the area. Many other tree species, ornamental species, crop plants and vegetables were introduced from Europe, Australia and Americas.

Settlement patterns changed and corporations and municipalities were set up in European settlements. Areas around these settlements were

drastically deforested, and the sholas vanished because of the firewood requirements of these settlements. The immigrant ~~labour~~ settlers from the hot Tamil plains found the cool climate on the hills uncomfortably cold and ~~had~~ needed a lot of firewood to keep warm.

→ With the increased population on the hills, the agricultural community, the Badagas expanded cultivation into steeper and inappropriate slopes, more in the shifting-cultivation mode.

During this period many paths and roads were opened, mainly along the eastern side of the plateau. And the plateau was in close communication with the district headquarters at Coimbatore.

V. Second phase of British colonization (c. 1860 - 1950) and the next

This period was marked by massive and large scale changes in the landscape of the Nilgiris area. Early experiments with tea and coffee proved profitable, ~~On the Nilgiri plateau~~ and ~~estates~~ various estates on the whole was a ~~not~~ useful enterprise. Along with tea & coffee, ~~teak~~, rubber, and fuelwood plantations sprung up. There were initial setbacks ~~backs~~ during the early period caused by inappropriate climes for these plants and the coffee blithe disease in 1862. Later, tea plantations in the Nilgiris plateau ~~and~~ around Coonoor and Kotagiri; and coffee plantations in the Wynaad plateau covered huge areas. Many forested tracks in the evergreen forests

of Wynaad were cleared for coffee; and many grasslands and sholas were ~~clearfo~~ converted into tea plantation. Badaga agriculture also steadily expanded.

Noticing such large scale vegetational change, the British enforced conservation rules to protect the numerous shola forests that were very charming on the landscape. Laws were enforced against the destruction of sholas and fuelwood plantations were raised to satisfy demands. In the deciduous tracts, where many economically useful timber trees were present, the government took control over them for their own purposes. Timber demand from the townships, the railways, ship building

gun-carriage factories and the Kolar mine were adequately met from these forests. Infact around even 1910 there was a glut in the timber market.

During the later part of this period, with some improved 'timber-treatment' measures some of the evergreen forest trees were also commercially exploited. Many timber tree plantations ~~were~~ were raised by the 'taungya' method clearfelling the natural vegetation. ~~Such~~ In addition, natural forests were carefully manipulated to favour economically useful species.

The rights of the indegenous inhabitants was thus severely restricted. Shifting cultivation of legally stopped, and agriculture and grazing was restricted in many areas to only revenue lands.

VI Modern Period (1950 - 1990)

The Modern Period is marked by the ~~expansion~~ of ~~plantations with quick growing species like Eucalyptus, Wattle etc.~~ conversion of grasslands into industrial plantations; the expansion of tea; ~~and~~ the intensification of agriculture; the alteration of drainage patterns with hydro-electric projects and the establishment of exclusive areas as sanctuaries and national parks.

Here too, we can identify an early period when changes in the biota were attempted. Improved seeds, ~~and~~ newer crops, and improved varieties were tried. It may have been during the period of experimenting with biotas that the most significant weed, 'Eupatorium' colonized the area. We have reference for it from the early '60s.

Biotas were perceived as important to maintain

the perennality of streamflows, but the grasslands were seen as poor in productivity. These were planted with industrial plantations, completly transforming the landscape of the Nilgiris hills. ~~Recent studies have shown that During this period settlement patterns changed, and more urbanized areas sprung up.~~ One significant change was colonization of the parts of the Wynaad tract that were considered malarial. Areas in this tract attracted droves of refugees and settlers who cleared areas in the evergreen forests to establish homestead and small farm plots, growing produce for the market.

During this period settlement patterns changed, and more urbanized areas sprung up. Road communication

links expanded to the remotest areas. And industrial units claimed large areas of land for their enterprice.

Amidst all this intensfication of resource use, and depletion of biological resources, an attempt was made to set apart regions of biological abbundance. This has brought apart a stark polarization and conflict over resources, necessitating greater enforcement of the law by the government and a greater opposition from the deprived folk. This brings us to the present stage of a polarized ~~landscape~~ and fragment landscape with increase pressure on the ~~bio~~ biomass requirements of the rural country side.

Conclusions:

Through the sweep of vegetational history, we find a certain pattern of vegetational change. We identify a phase of introduction of 'exotic' a wide range of 'exotic' biota and the selection and domination of certain species over the landscape vegetation. Having proved 'useful' and having established itself, we identify a second phase where the husbanded biota spreads in the area and there is an intensification of the husbanded biota.

We infer this pattern with the coming of the Badagas; we clearly identify these two phases during the colonial period; and during the modern period, the 'grow more food campaign' and the 'green revolution'

introduced newer hosts in the Nilgiris area and later intensified and spread.