

APPENDIX III

PLATEAU
MYSORE
WESTERN GHATS
EASTERN GHATS
COORG
BHAVANI
KUNDAH RANGE
NILGIRIS
Bangalore
Mysore
Coimbatore
Madras
Cape Comorin
Ootacamund
Coonoor
Mettupalaiyam
Tuticorin
Palghat
Calicut
Cochin
Trivandrum
Negapatam
Karaikal
Pondicherry
Vellore
Salem
Erode
Tiruchirapalli
Madurai
Dindigul
Karur
Namakkal
Tiruppur
Pollachi
Udumalpet
Gudalur
Devarshola
Kotagiri
Coonoor
Mettupalaiyam
Tuticorin
Palghat
Calicut
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Madurai
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Karur
Namakkal
Tiruppur
Pollachi
Udumalpet
Gudalur
Devarshola
Kotagiri
Ootacamund

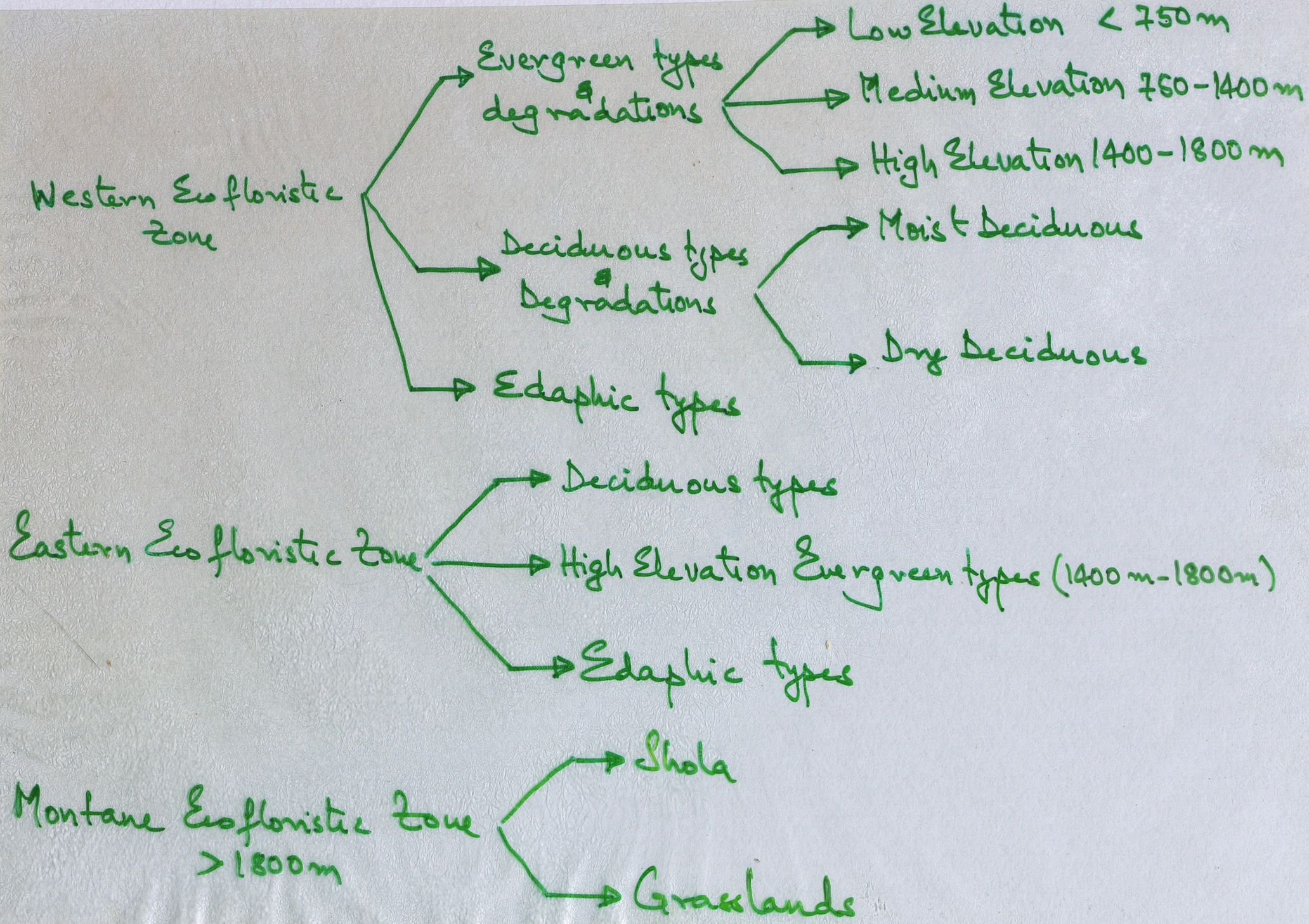

Western Ecofloristic zone
Evergreen types & degradations
Low Elevation < 750 m
Medium Elevation 750-1400 m
High Elevation 1400-1800 m
Deciduous types & Degradations
Moist Deciduous
Dry Deciduous
Edaphic types
Eastern Ecofloristic zone
Deciduous types
High Elevation Evergreen types (1400 m-1800 m)
Edaphic types
Montane Ecofloristic zone >1800 m
Shola
Grasslands

Table IV. Ecological changes on the Nilambur plains

Year	Land use	Communications and Settlements	Legal Categories	Water Resources
1800	Densely forested hills. Flat lands under cultivation	Few permanent settlements	Forested lands under traditional temple control	Many perennial streams
1905	Teak and rubber plantations on the forest fringes	Nilambur town becomes a trade, communication and administrative centre. Routes to Kerala, Mysore and Nilgiris	Forested areas reserved	
1950	Rubber plantations in the plains			
1990	Timber and rubber plantations increase. Agriculture expands	Nilambur town expands. New labour settlements in forest fringes		

Table VI. Ecological changes on the Attappadi plateau

Year	Land use	Communications and Settlements	Legal Categories	Water Resources
1800	Densely forested. Shifting cultivation in patches	Paths towards east: to the Coimbatore plains	Local chieftain control	Many perennial streams
1905			Forested areas reserved	
1954	Settled agriculture. Forest degraded and reduced	Road linked to Coimbatore plains. New settlements along the river	Encroachments	
1975	No shifting cultivation. Settled agriculture shifting southward. Forest degraded to scrub	Road linked to to Coimbatore and Kerala. New settlements in the south-west		Perennial streams in northern parts become seasonal
1989	Garden and plantation agriculture in the south-west	Settlements in the south-west increase		Perennial streams in southern parts become seasonal

Table VII. Ecological changes on the Coimbatore plains

Year	Land use	Communications and Settlements	Legal Categories	Water Resources
1800	Mainly agricultural. Hill slopes thickly forested, also under shifting cultivation	Agricultural settlements. Routes to Kerala plains, Mysore, and Tamil plains	Lands under local control	Some perennial streams, well and lift irrigation
1905	Agriculture spread to foot hills. Forest workings	Coimbatore a trade, communication and administrative centre. Routes to Nilgiris, Mysore, Kerala and Tamil plains. Railway lines to Kerala and Nilgiris	Forested areas in the hills reserved	
1950	Hill slopes degraded into scrub	Coimbatore township larger and becomes industrial. Communications extended into hills		Well and lift irrigation increased
1990	Increase in scrubland. Reduction in agri-cultural area	Coimbatore township larger. Growth of small industrial towns		Depletion of subsoil water

ENDOGAMOUS GROUPS	APPROXIMATE PERIOD OF MIGRATION	MODE OF RESOURCE USE	
		TRADITIONAL	CURRENT
JEN KURUMBAS	PRE 1600	Hunting gathering	Settled cultivation & labor
BETTA KURUMBAS	PRE 1600	Hunting gathering / shifting cultivation	Settled cultivation & labor
KATTU NAIKENS	PRE 1600	Hunting gathering	Settled cultivation & labor
PANIYAS	PRE 1600	Hunting gathering, Agricultural Labor	Labor
MULLU KURUMBAS	PRE 1600	Hunting gathering / shifting cultivation	Settled Agriculture
WYNAADAN CHETTIS	1600 - 1800	Settled Agriculture	Settled Agriculture
MAUNDANDAN CHETTIS	1600 - 1800	Settled Agriculture	Settled Agriculture
MAPPLAS	1600 - 1950	Labor, trade	Settled agriculture trade
SRI LANKAN TAMILS	1960 - 1990	Labor	Labor
MALAYALEES FROM TRAVANCORE	1950 - 1990	Horticulture	Horticulture
BADAGAS	1800 - 1900	Settled agriculture	Settled agriculture

Ecosystems People

Ecological Refugees.

Biosphere People

Time-Chart Of Subsistance Resource Use : N-Wynaad

1800 1850 1900 1950 1990

Land Use

Paddy, Millets, Pulses (Decreasing)

Forests

Hunting

Scavenging of kills

Fuelwood (Increasing)

Gathering of tubers, fruits, etc.

TIME-CHART OF COMMERCIAL RESOURCE USE: N-WYNAAD

1800 — 1850 — 1900 — 1950 — 1990

LANDUSE

Coffee — Pest attack

Coffee in favourable areas

Coffee, Tea & Mixed Plantation Crops.

Forests

Teak

Teak, and other timber trees

minor forest produce

Minerals

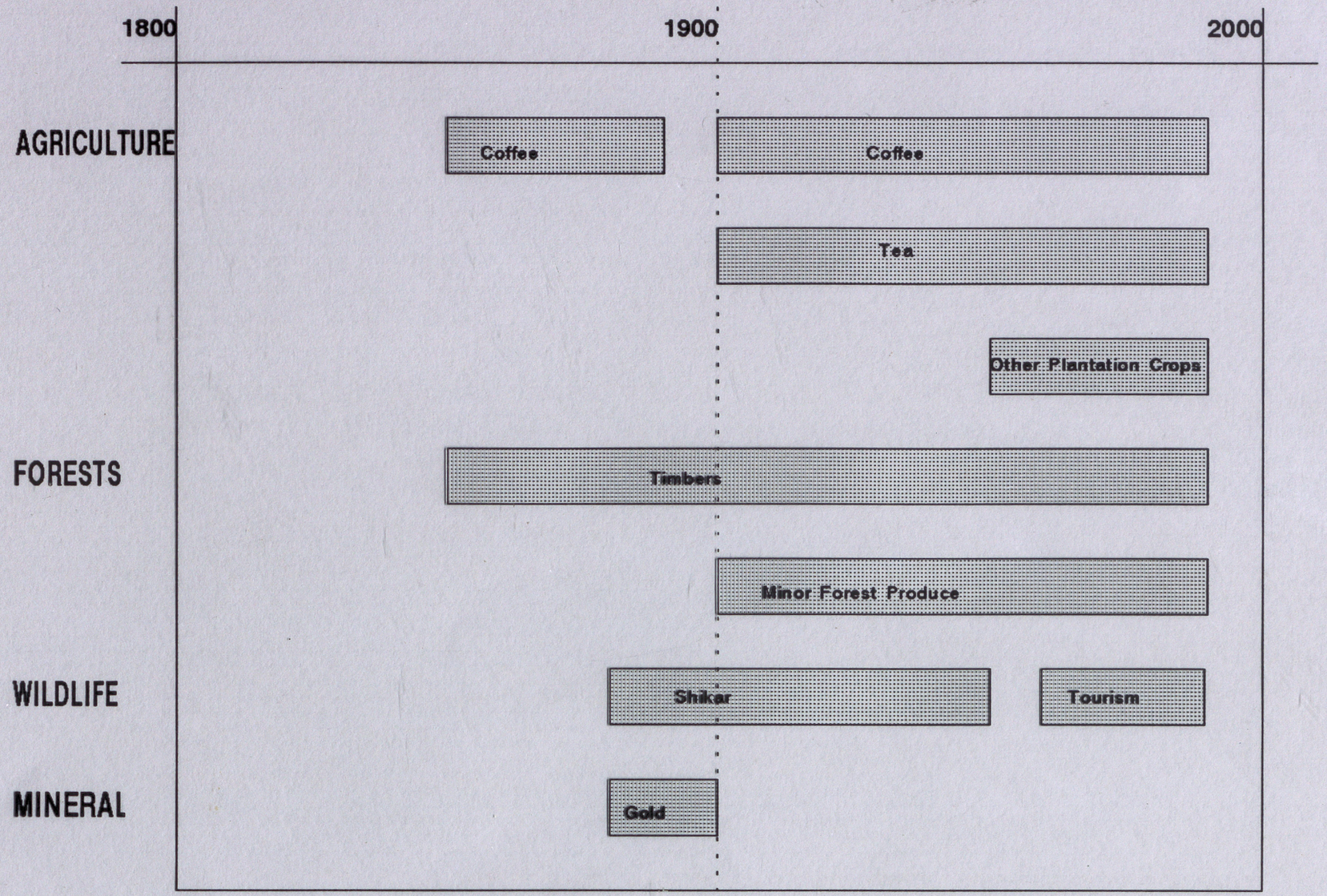
Hunting / Vermin Extermination — Conservation / Poaching.

Gold boom — Failure — Gold mining

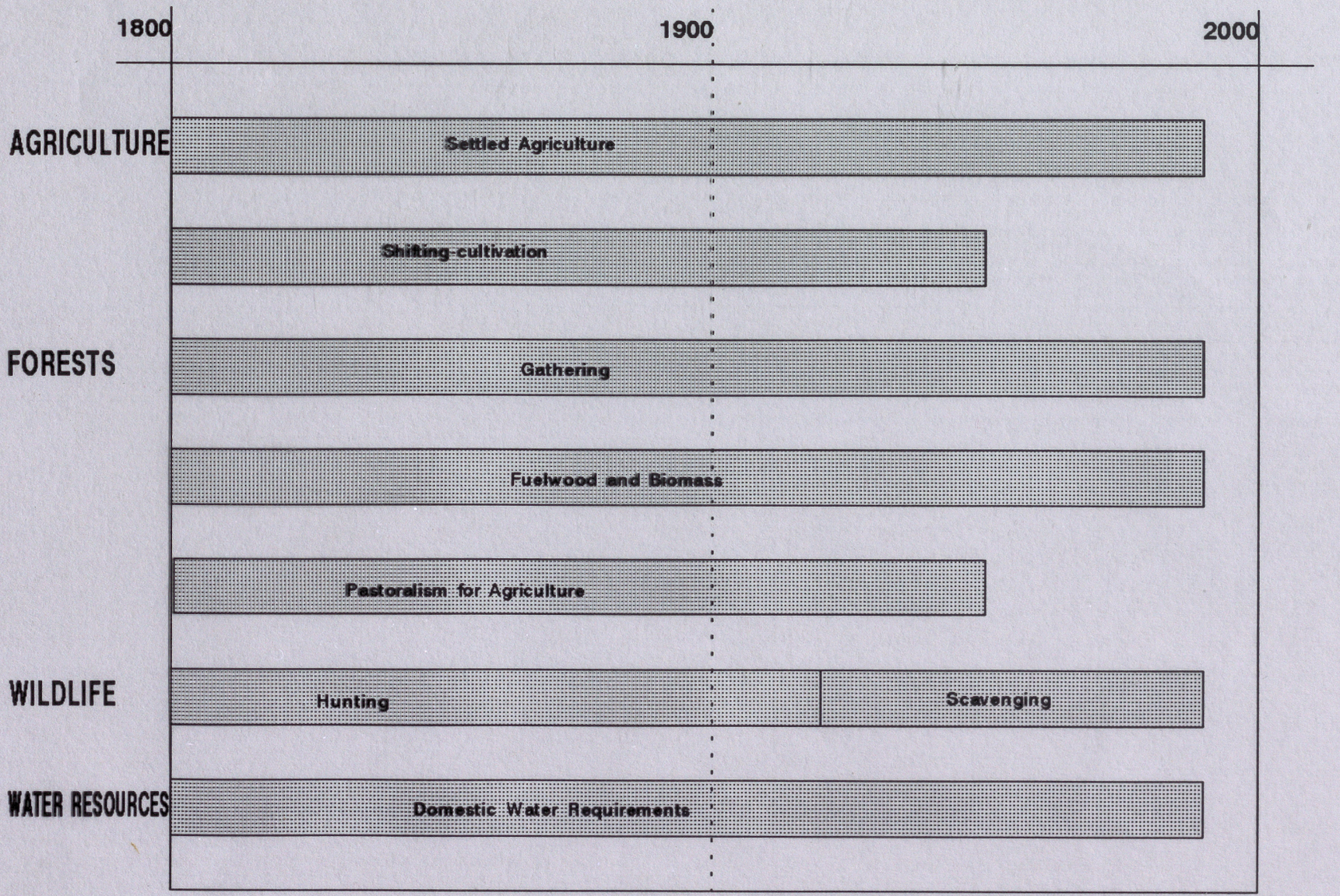
Table III. Ecological changes on the Wynaad plateau

Year	Land use	Communications and Settlements	Legal Categories	Water Resources
1800	Agriculture limited to few swamps. Other areas thickly forested		Lands held by cheiftains and temple	Many perennial streams
1905	Coffee estates in forest clearings(25 km^2). Forests worked	European settlements around estates. Routes to Nilgiri, Sultan's Battery and Kerala plains	Northern portions reserved. Other areas leased from cheiftan	
1950	Agriculture expands. Tea and coffee plantations larger (130 km^2)	Gudalur settlement as trade and communications centre. Routes to Nilgiri, Kerala and Mysore. Game roads in forested areas		
1990	Forests cleared for agriculture and plantations	Increased communication in suth and west.	Change in land categories. Reserved forests declared sanctuary	

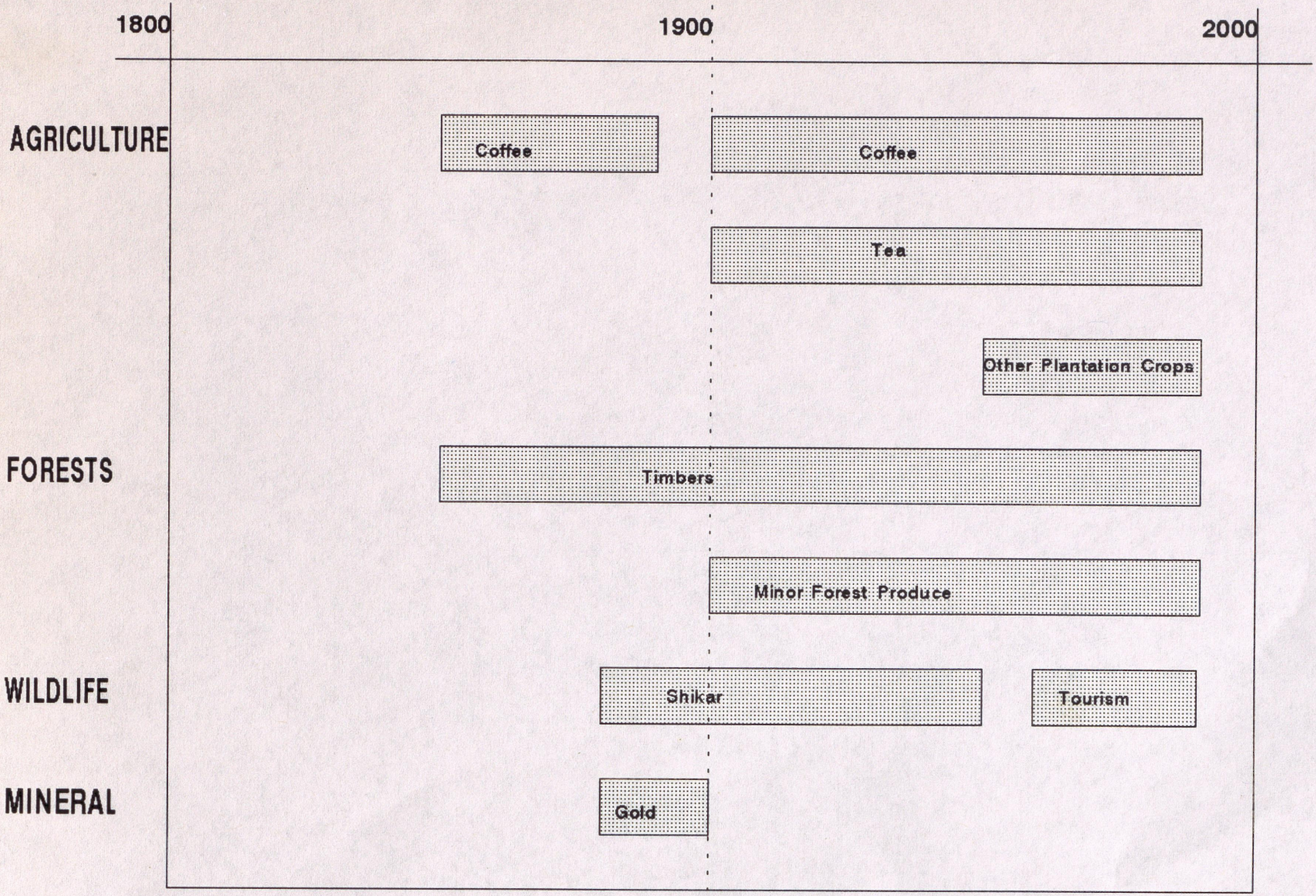
TIME LINE OF COMMERCIAL RESOURCE USES: NILGIRI-WYNAAD PLATEAU



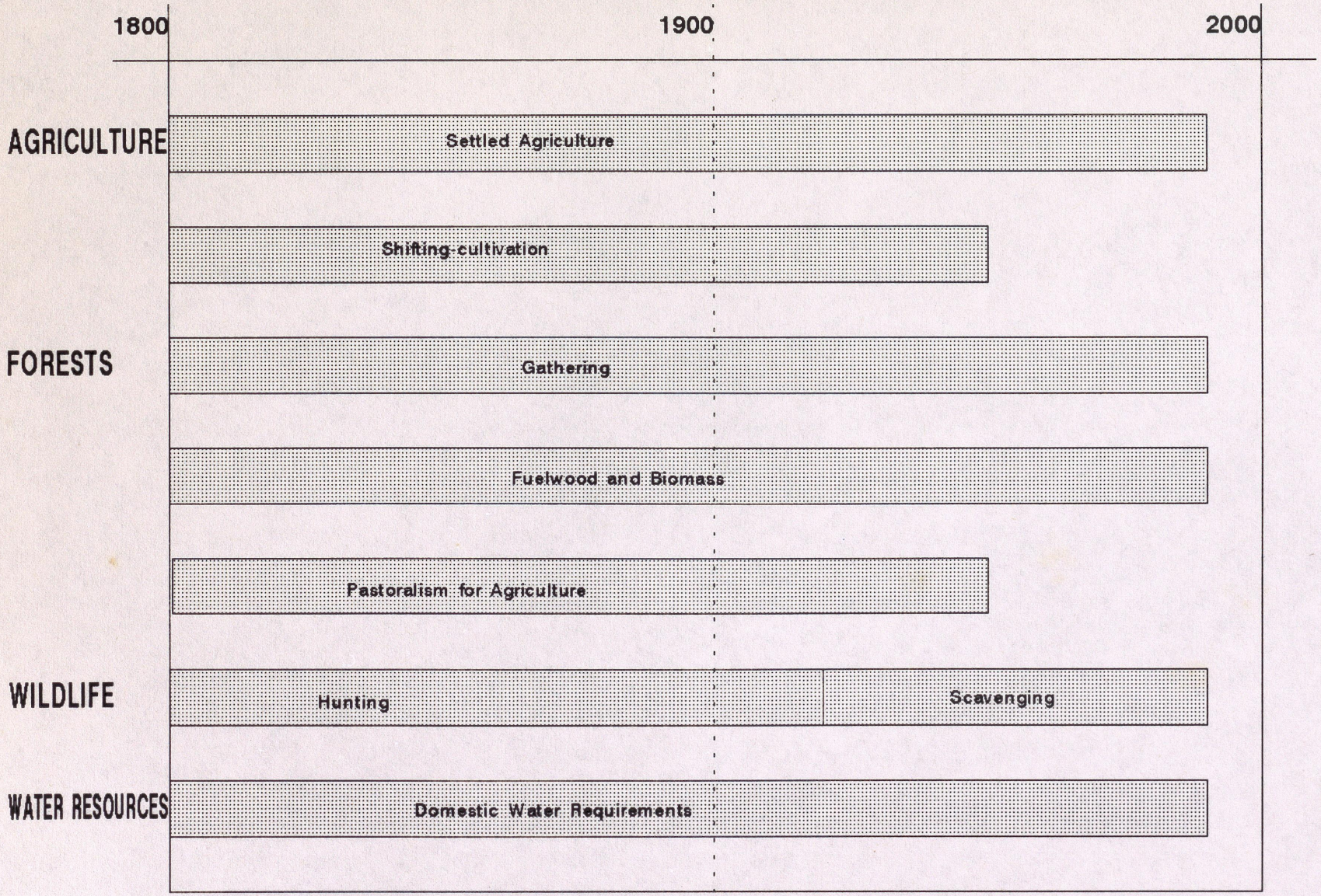
TIME LINE OF SUBSISTENCE RESOURCE USES: NILGIRI_WYNAAD PLATEAU



TIME LINE OF COMMERCIAL RESOURCE USES: NILGIRI-WYNAAD PLATEAU



TIME LINE OF SUBSISTENCE RESOURCE USES: NILGIRI_WYNAAD PLATEAU



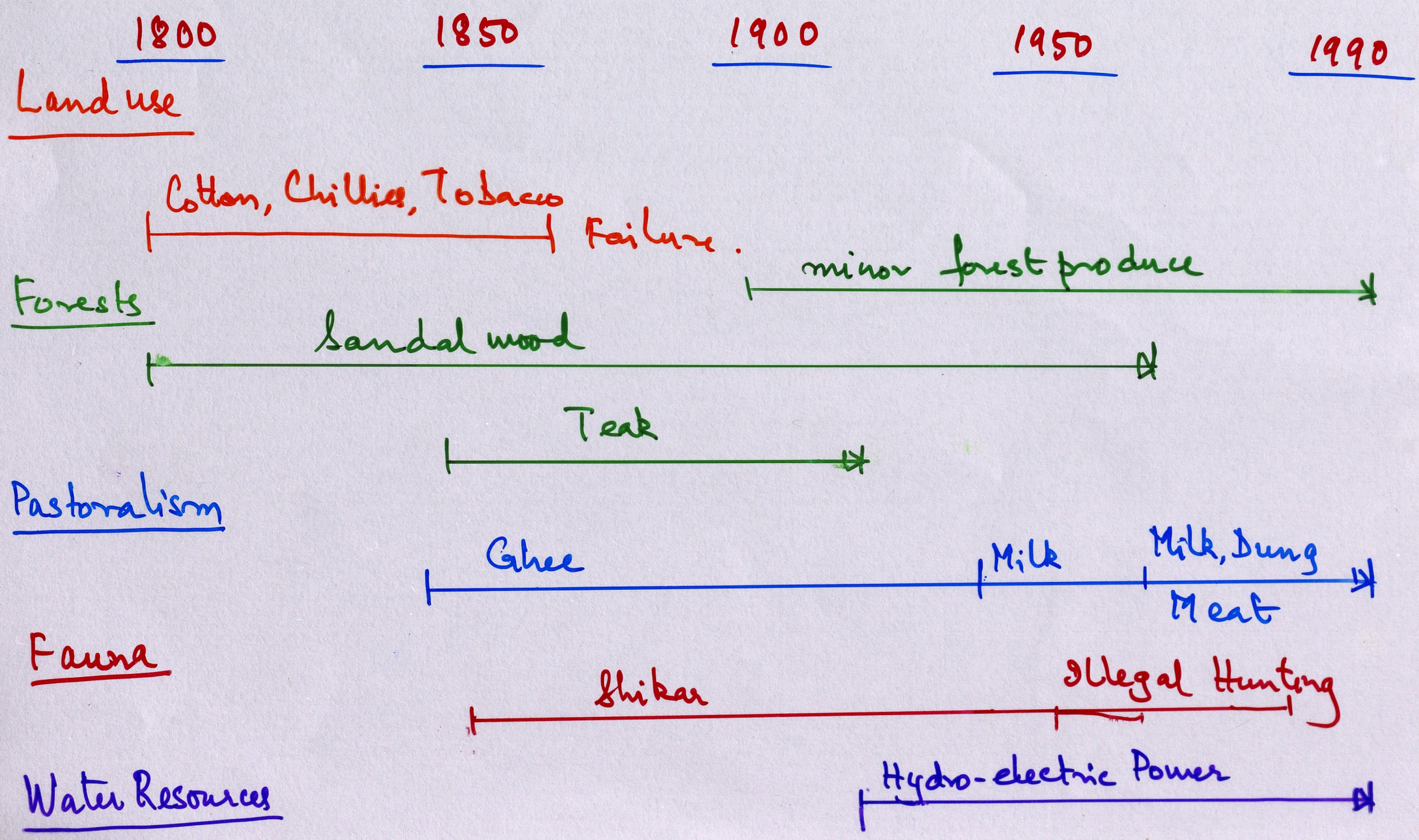
Teak Resource Extraction: N-Wynaad

Compartment History of C17 ≈ 370 ha.

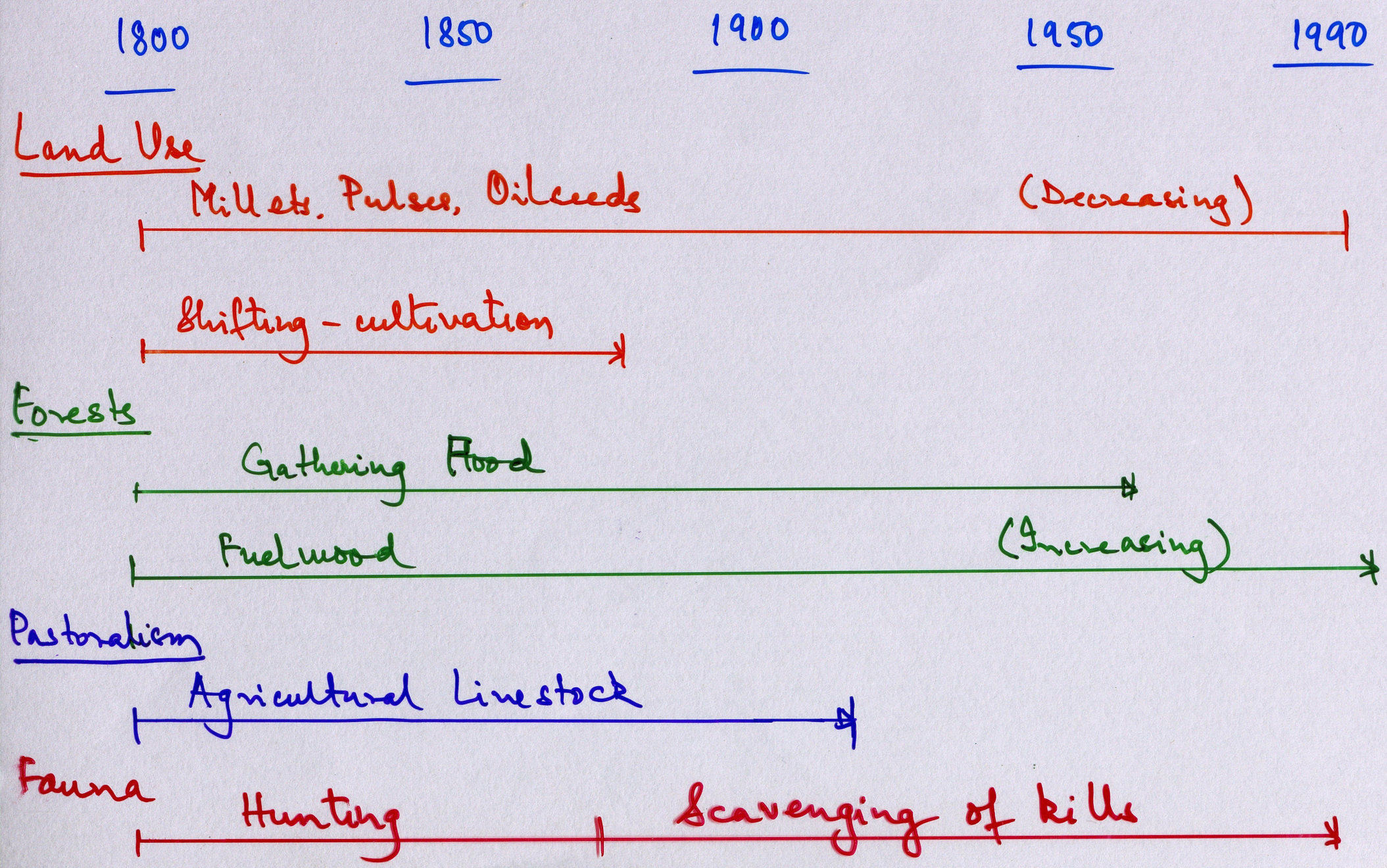
Girth in cms

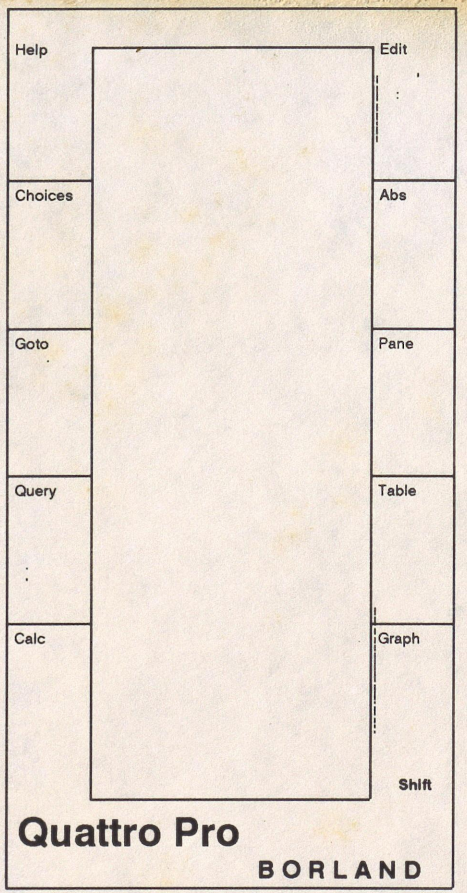
Year	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180	> 180
1929 - 30 Extraction				813 trees		420 trees
1960 Resource survey 10% sample trees/ha	40.39	21.28	17.81	13.72	5.3	4.85
1968 - 69 Extraction				?		1013 trees
1990 50 ha plot trees/ha	1.4	5.36	8.32	8.92	6.6	5.32

Time-Scale of Commercial Resource Use : Sigur Plateau



Time-Scale of Subsistence Resource Use: Sigur Plateau

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Motivations & Objectives

* Conservation of Biological & Cultural Diversity

A Hierarchy of Objectives of the Study

* To detail a dynamic process of interaction between human groups and the environment
* Characterise ecological change at the level of the landscape to serve as objective criteria
* What has driven ecological change in the last 200 years?
    a) Ecosystem factors
    b) Human-cultural factors
* Search for patterns in the spatio-temporal domain
* Help in setting out conservation priorities and programmes.

Summary

1. Vegetational changes in the Nilgiri area have been increasing driven by human resource use patterns
2. These follow a sequential pattern of resource exploitation
   (a) along a spatial domain : from easily accessible areas to inaccessible areas.
   (b) from a single resource, to range of resources
   (c) From expansion to intensification of resource use.
3. Commercial Resource uses and market demands that are external to the local area have been increasingly driving vegetational change.

4. These have been motivated by changes in technology, infrastructure and resource control regimes

5. Human groups have responded differentially to the process of commercialisation and ecological change.

(a) The settled agricultural groups have increasingly taken to market production

(b) The h-g. and sf-cult. groups, or eco-systems people have been marginalised to wage labour

(c) Commercialisation has led to increasing migrations of people.

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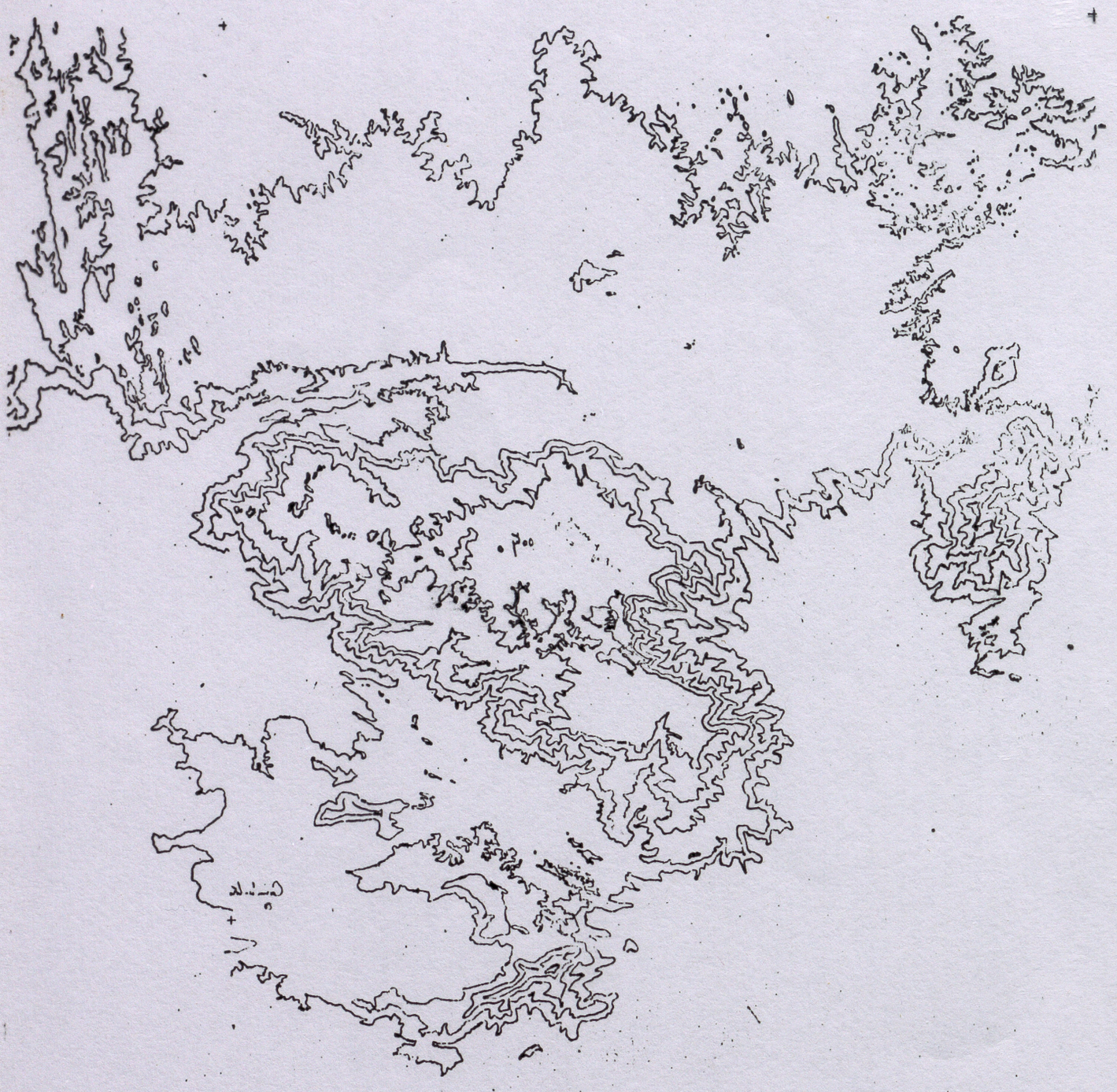
* INTERACTIONS BETWEEN HUMAN GROUPS AND THE ENVIRONMENT IS MEDIATED BY THE SPECTRUM OF RESOURCES AND RESOURCE USE THAT IS DYNAMIC AND CONSTANTLY CHANGING OVER THE HISTORICAL PERIOD

* 3 DOMAIN FRAMEWORK

RESOURCE

HUMAN GROUP

ECOLOGY



RESOURCE USE , CULTURE & ECOLOGICAL CHANGE:

A CASE OF THE NILGIRI AREA

HUMAN GROUPS HAVE BEEN THE MOST SIGNIFICANT AGENTS OF ECOLOGICAL AND ENVIRONMENTAL CHANGE OVER THE PERIOD OF THE LAST 200 YEARS

WESTERN ECO-FLORISTIC ZONE	EVERGREEN	LOW ELEVATION <600m MED. ELEVATION 600-1400m HIGH ELEVATION >1400m
	MOIST DECIDUOUS	
EASTERN ECO-FLORISTIC ZONE	MOIST DECIDUOUS	
	DRY DECIDUOUS	
MONTANE ZONE		Shola / Grassland
EDAPHIC TYPES		Riverine Swamps Slope facies
CULTURES	ARBORICULTURE AGRICULTURE	

Experiences of the Preparation of a Land Use & Vegetation Map of the Nilgiri Biosphere Reserve

Project initiated in 1990
as a collaborative Project of CES
with French Institute, Pondicherry.

Map created by visual interpretation of FCC Satellite Images, and drawn on a scale of 1:100,000.

	Date	Resolution
SPOT	1990	20m
LANDSAT TM	1991	36m
	1989	
	1986	
	1973	

Mapping : An Ecological Synthesis

Hierarchy of Criteria for Creating Inith Tables

1. SPOT Satellite Image
2. Bio-climate
3. Details from topo sheets : Habitation
   Roads: Land category ; topography.
4. Other Satellite Images :
   LANDSAT TM's
5. Seasonality
6. Ground truthing

C. ECOLOGICAL CHARACTERISTICS

CHARACTERISTICS	CORE	MARGINAL
NO. OF HABITATIONS	88	60
ANNUAL RAINFALL	900 MM - 2500 MM	500 MM - 1200 MM
VEGETATION TYPES	MONTANE (42) EV - SEV (31) MDF (15)	DDF (12) SCRUB (48)
ALPHA CROP DIVERSITY	LOW	HIGH
BETA CROP DIVERSITY	HIGH	LOW
YIELDS	PROPORTIONAL TO LEVELS OF INPUTS	ECOLOGICALLY DEPENDENT AND FLUCTUATING
ECOLOGICAL CHANGES	TRANSFORMED ECOSYSTEMS	TRANSFORMED AND MODIFIED ECOSYSTEM
WATER SCARCITY	49 HABITATIONS REPORT SCARCITY DURING DRY MONTHS	16 HABITATIONS REPORT SCARCITY DURING DRY MONTHS
CRITICAL NATURAL RESOURCE	LAND, WATER, BIOMASS	BIOMASS

B. SOCIAL CHARACTERISTICS

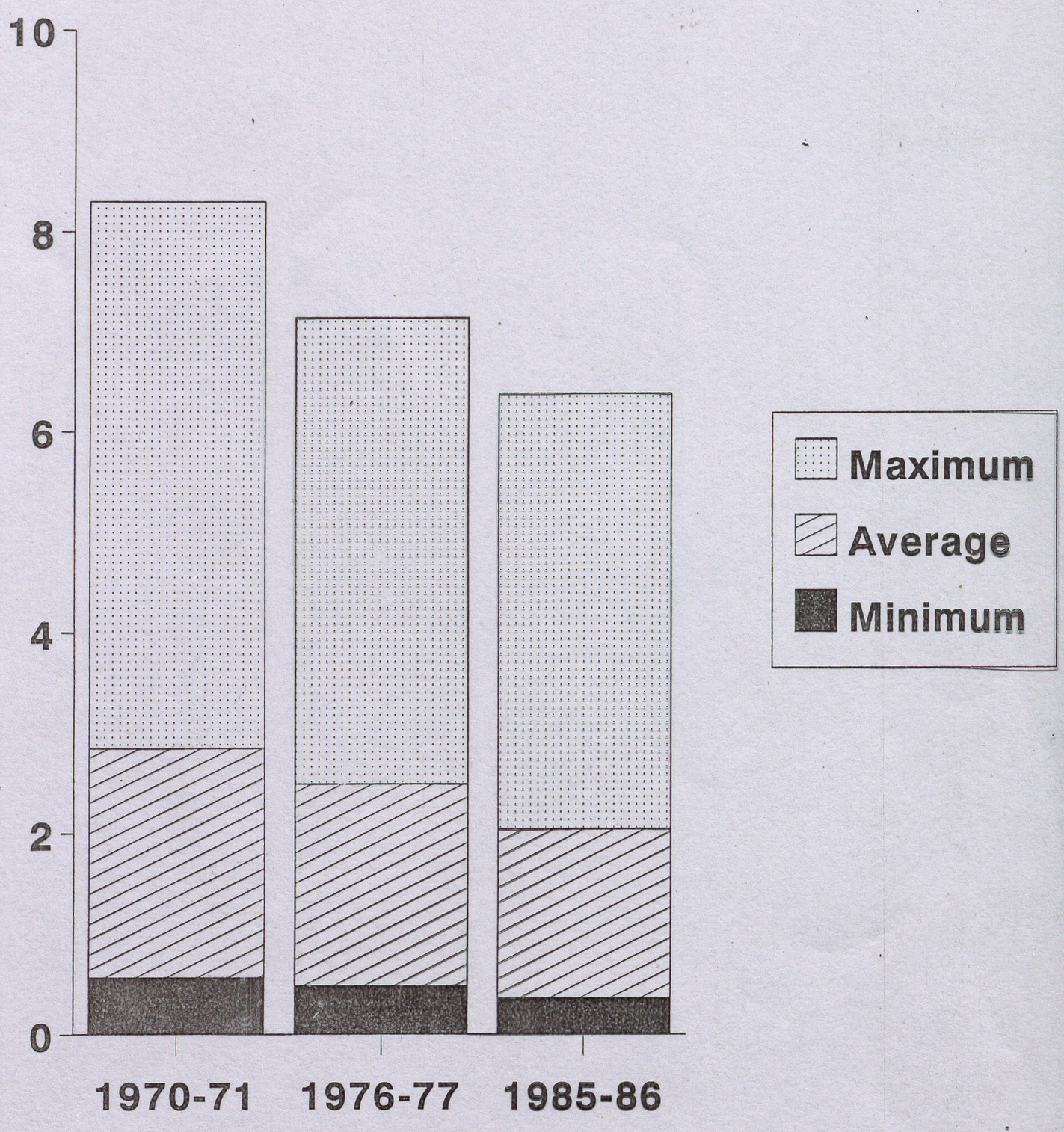
CHARACTERISTICS	CORE	MARGINAL
NO. OF HABITATIONS	88	60
NO. OF ENDOGAMOUS GROUPS	1 TO 8	1 TO 3
LANDLESS	63%	7%
MODAL SIZE OF LANDHOLDING	2 - 4 ACRES	4 - 6 ACRES

TYPOLOGY

A. RESOURCE UTILISATION CHARACTERISTICS

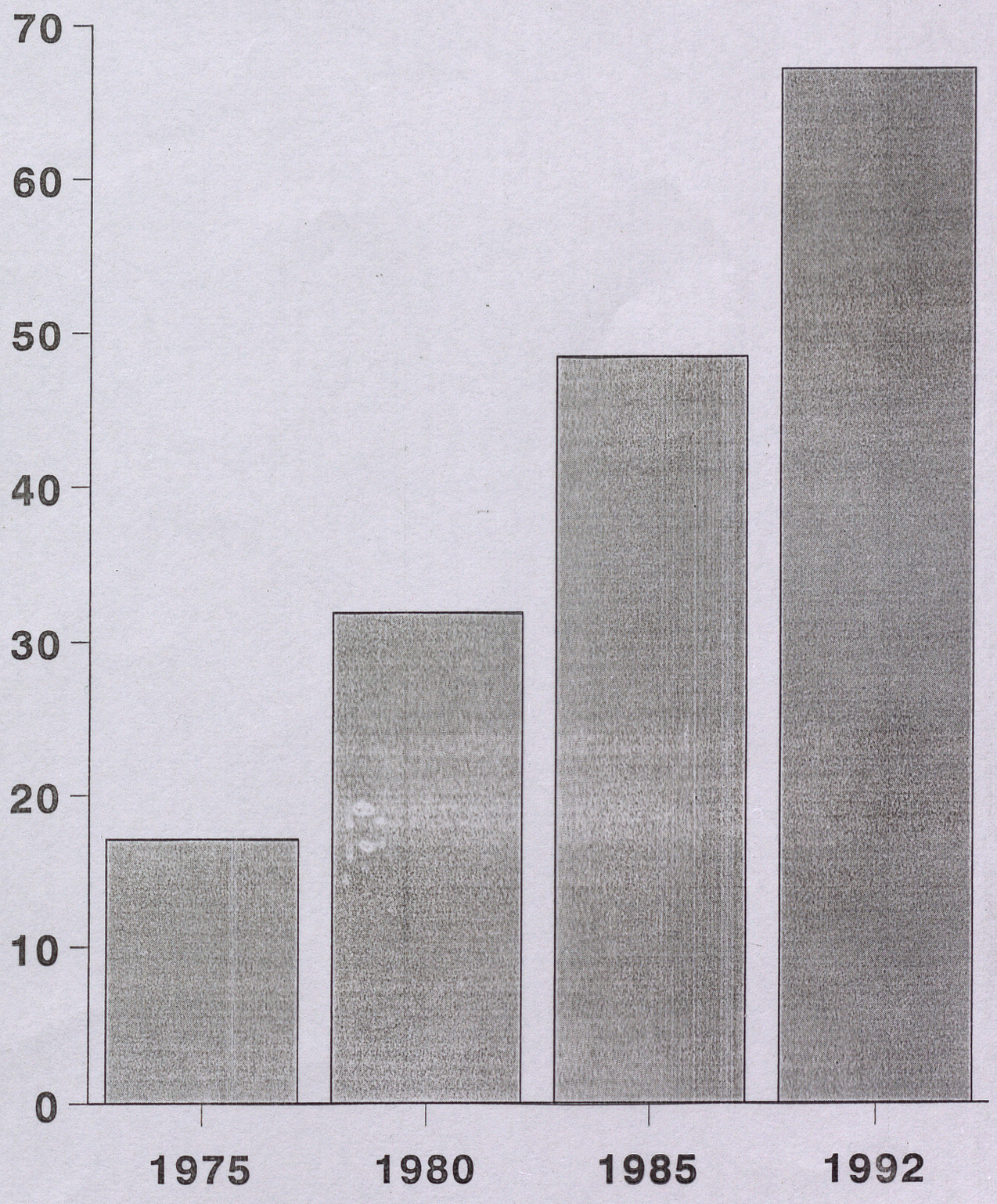
CHARACTERISTICS	CORE	MARGINAL
NO. OF HABITATIONS	88	60
%AREA UNDER CASH CROPS	82% - 95%	12% - 28%
CROPPING INTENSITY ( )	18% (1) 25% (2) 57% (P)	87% (1) 13% (2)
FERTILIZER UTILISATION	187 KG/HA	**
IRRIGATION	FACULTATIVE LIFT IRRIGATION	INDIGENOUS CANAL IRRIGATION
CULTIVATION SUBSIDY	VARIOUS SCHEMES	NONE
UTILISATION OF COMMON AND STATE LANDS	FUELWOOD	FUELWOOD GRAZING STRUCTURAL MATERIAL MFP COLLECTION
OTHER OCCUPATIONS	SERVICE TRADE	LIVESTOCK REARING MFP COLLECTION LABOUR/MIGRATION

OPERATIONAL HOLDINGS



Source: CMIE, 1994

Consumption of Fertilizer per hectare of gross Cropped Area (Kg.)



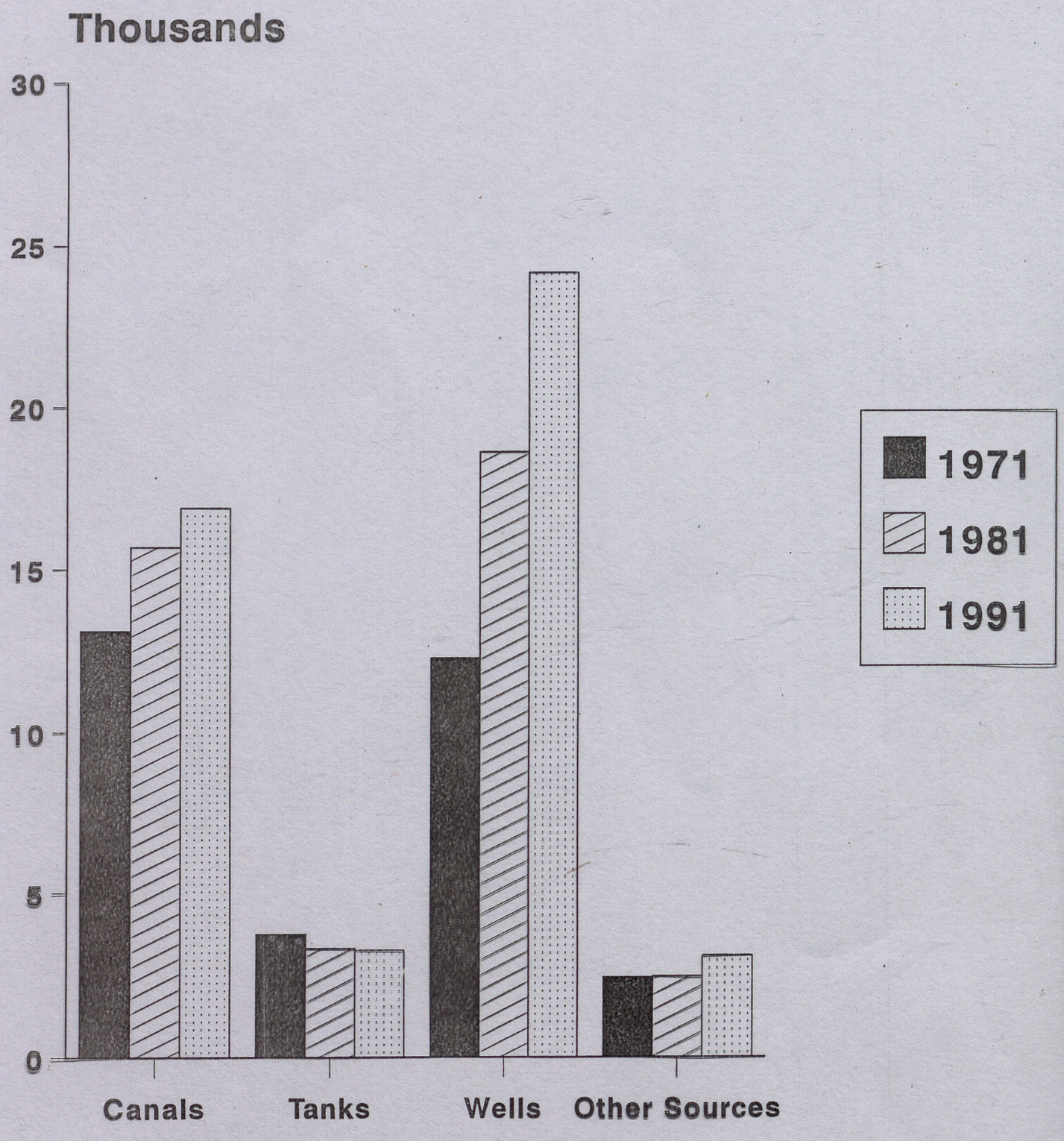
CHANGES IN YIELD OF AGRICULTURAL CROPS DURING THE PERIOD 1951-52 TO 1987-88

Source:CMIE 1989

CROP	CHANGES IN YIELD	REMARKS
RICE	2.1	STEADY
JOWAR	1.6	FLUCTUATING
BAJRA	0.6	F
MAIZE	1.9	F
RAGI	1.3	S
SMALL MILLETS	-0.1	F
WHEAT	3.1	S
BARLEY	1.8	F
GRAM	1.0	F
TUR	0.4	F
OTHER PULSES	2.1	F
GROUNDNUTS	-0.1	F
SESAMUM	0.3	F
MUSTARD	1.7	S
LINSEED	0.2	F
CASTORSEED	2.1	S
SAFFLOWER	4.3	S
NIGERSEED	1.4	S
COCONUT	-0.2	S
SUNFLOWER	-3.4	F
COTTON	1.9	S
JUTE	1.0	F
MESTA	1.3	F

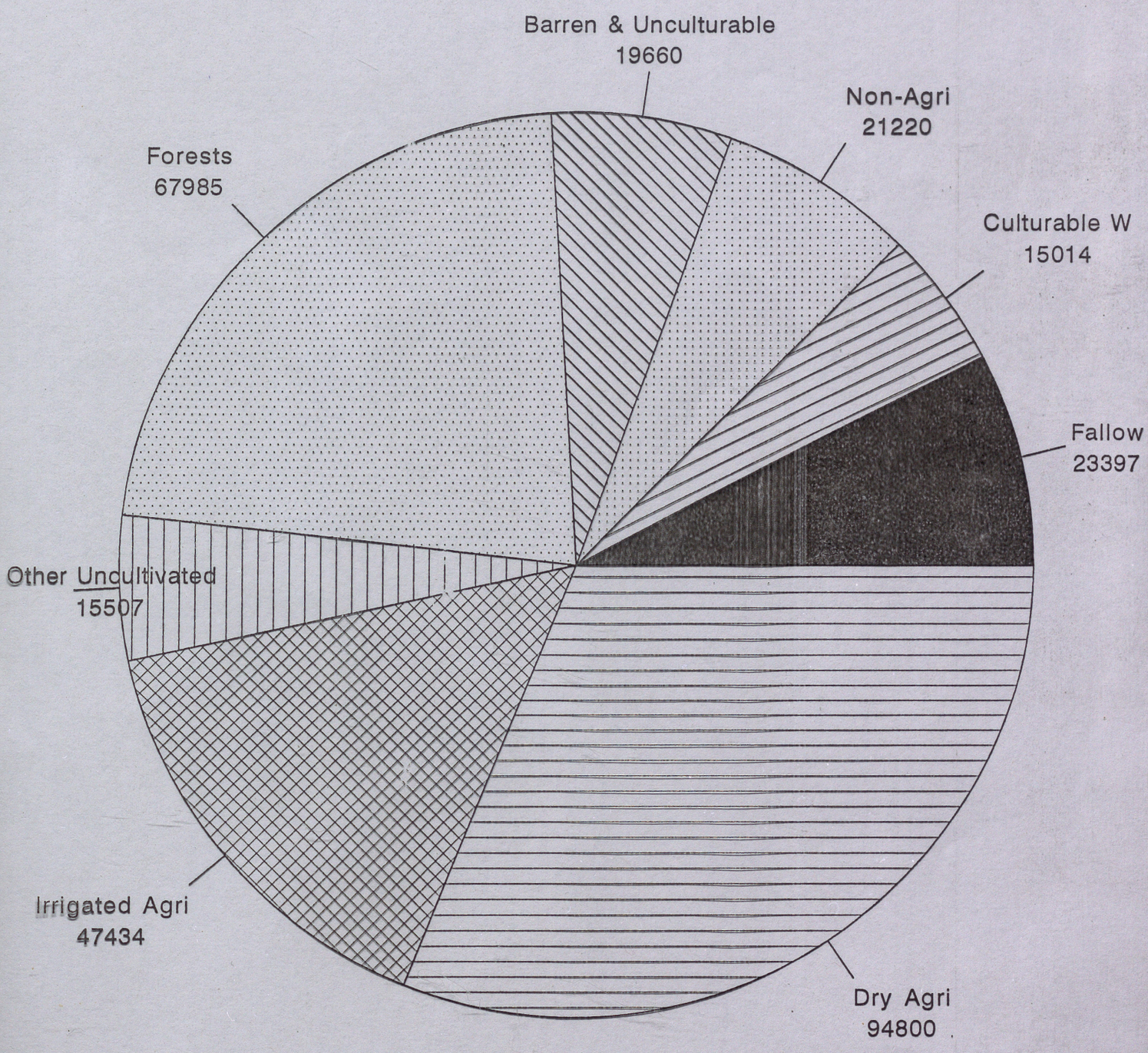
CROP	CHANGES IN YIELD	REMARKS
SUNNHEMP	1.5	S
TEA	1.8	S
COFFEE	2.3	S
RUBBER	2.7	S
CHILIES	1.0	S
GINGER	2.7	F
TURMERIC	0.2	F
BLACK PEPPER	0.1	F
ARECANUT	-4.5	S
CORRIANDER	1.7	F
CARDAMOM	4.2	F
GARLIC	0.2	S
POTATOES	2.2	S
TAPIOCA	3.5	S
BANANAS	0.5	F
ONIONS	-0.4	S
SUGARCANE	1.6	S
TOBACCO	1.2	F
GAURSEED	-4.8	F
PAPAYA	-2.4	F

SOURCES OF IRRIGATION



Source: CMIE, 1994

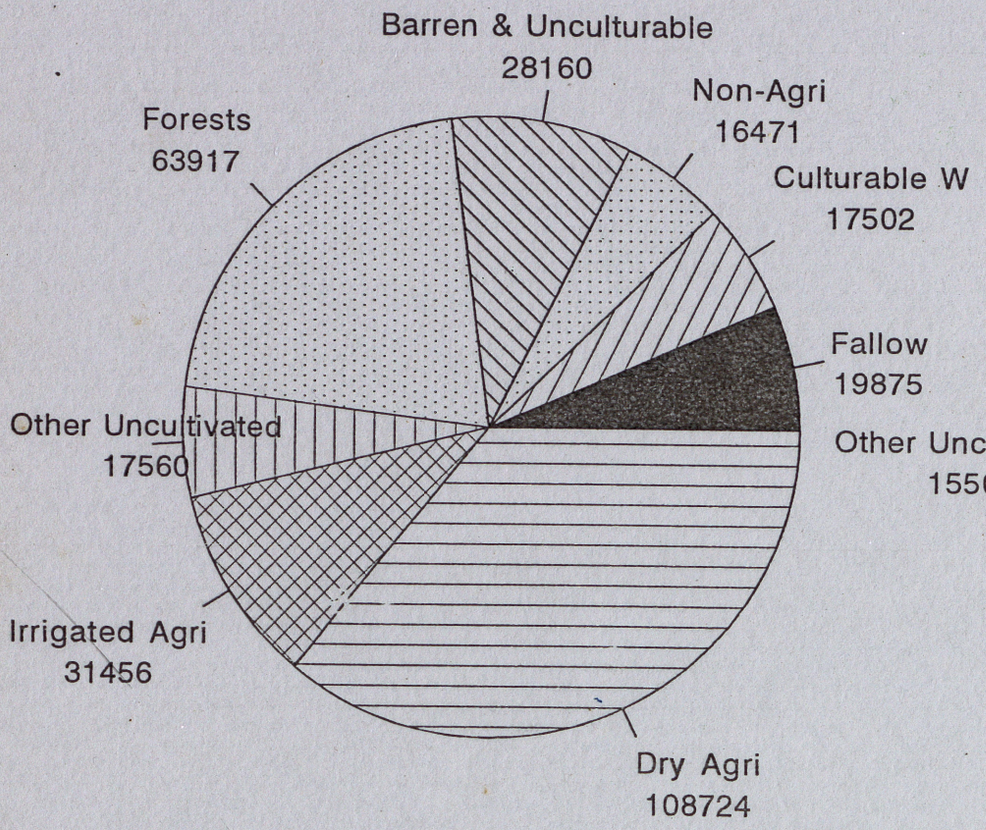
TOTAL PIE OF LAND RESOURCE



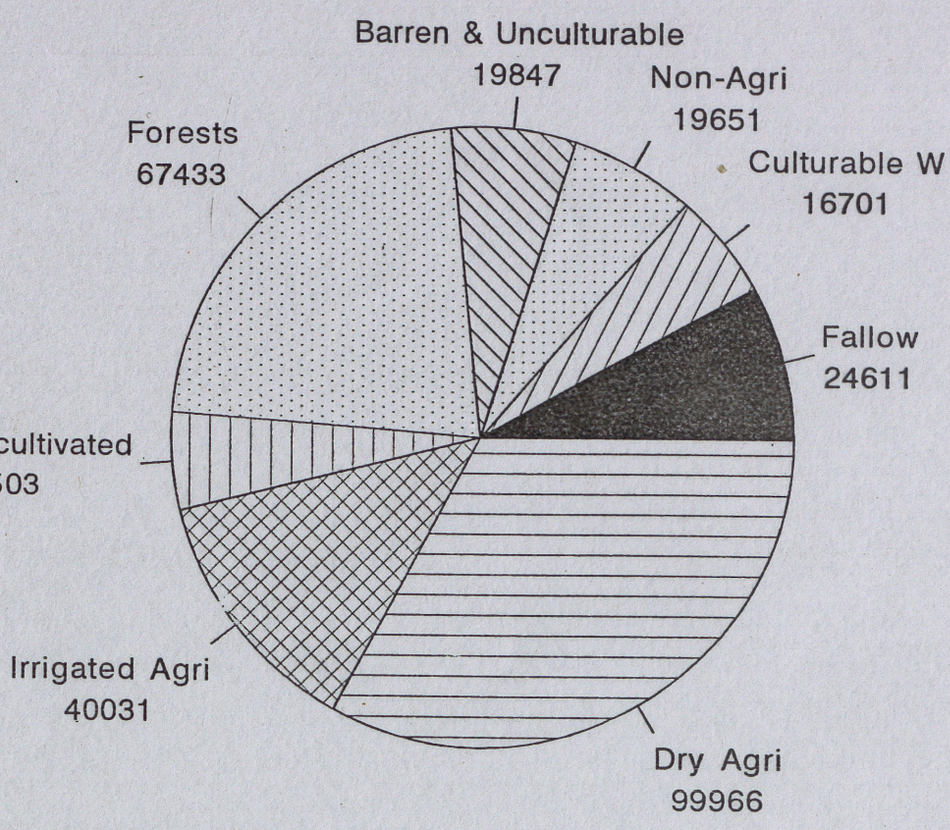
1991

Source: CMIE, 1994

TOTAL PIE OF LAND RESOURCE



1971



1981

Source: CMIE, 1994