

AUSTRALIAN AGENCY for INTERNATIONAL DEVELOPMENT

# AGRICULTURAL SYSTEMS OF PAPUA NEW GUINEA

Working Paper No. 15

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## CENTRAL PROVINCE

TEXT SUMMARIES, MAPS, CODE LISTS AND VILLAGE IDENTIFICATION

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B.J. Allen, T. Nen, R.M. Bourke, R.L. Hide, D. Fritsch,  
R. Grau, P. Hobsbawn and S. Lyon

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THE AUSTRALIAN NATIONAL UNIVERSITY

PAPUA NEW GUINEA DEPARTMENT OF AGRICULTURE AND LIVESTOCK

UNIVERSITY OF PAPUA NEW GUINEA

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**Cover Photograph:**

The late Gore Gabriel clearing undergrowth from a pandanus nut grove in the Sinasina area, Simbu Province (R.L. Hide).

## PREFACE

### Acknowledgements

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The Papua New Guinea Agricultural Systems Project was developed from two previous studies. Michael Bourke began mapping Papua New Guinea agricultural systems in the 1970s while a Senior Horticulturalist with the PNG Department of Primary Industry (Bourke 1976). Robin Hide created an annotated bibliography of information on Papua New Guinea agricultural systems while working with the CSIRO PNGRIS group (Hide and Cuddy 1988).

### Participants

The following persons participated in the production of this paper:

*Papua New Guinea Department of Agriculture and Livestock:* Balthasar Wayi and Dr R.D. Ghodake (logistical support), Nicholas Fereday and John Gibson (field mapping in Port Moresby city).

*Department of the Prime Minister:* Tom Nen (field mapping, data preparation, writing).

*Australian National University:* Bryant Allen, Michael Bourke, Robin Hide (conceptualisation, field mapping, data preparation, writing); Robin Grau (GIS management, ARC/INFO, map preparation); Daniel Fritsch (computer programming and database management); Patricia Hobsbawn, Elanna Lowes, Stephen Lyons (research assistance); Merv Commons (technical assistance).

## **Field Survey**

A walking traverse along part of the Kokoda Track was made in May 1982. A baseline survey of settlement blocks on the Cape Rodney Agriculture Development Project was carried out in 1985/86 and agriculture on the settlement blocks was surveyed over three weeks in November to December 1988.

The major field surveys for this working paper took place in August and September 1995.

Northwest of Port Moresby, traverses were made by two parties to the Gulf Province border in vehicles; inland up the Akaifu River by canoe; to the Mekeo villages; to Kubuna mission; along the coast between Bereina and the Aroa Plantation; thence along the Hiritano Highway returning to Port Moresby.

Southeast of Port Moresby, traverses were made by two parties in vehicles to the area of the Cape Rodney Settlement Scheme and Kupiano; by outboard dinghy from Kupiano to the Keakoro Bay villages; to inland Rigo; to Hood lagoon; to the coastal villages between Port Moresby and Gabagaba village; and inland to the Sogeri Plateau. The Motuan villages near Redscar Head, and the area east of Cape Rodney to the Milne Bay Province border, were not visited. The Koiari villages on the Kokoda Track were visited by two parties by air from Port Moresby. The Goilala area was surveyed by two parties; one flew to Kerau mission and walked to Tapini station, while the other flew to Guari station and walked to Tapini. One party then flew to Fane mission and the other to Woitape station. The Yongei area was not visited, but a visit was made to Asimba village in Northern Province.

Gardens within the city of Port Moresby were surveyed by Nicholas Fereday and John Gibson (PNG DAL) from March to July, 1993.

## **Revised and reprinted version**

The Mapping Agricultural Systems Project database was revised in late 1998 (see Introduction to Working Paper Number 1). This working paper was reprinted in 2002. Karen Lummis, Tess McCarthy, Natalie Stuckings, Laura Vallee, Amber Pares and Veerle Vlassak were responsible for the production of the revised paper.

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# 1. INTRODUCTION

The major purpose of the Papua New Guinea Agricultural Systems Project is to produce information on small holder (subsistence) agriculture at provincial and national levels. Information is collected by field observation, interviews with villagers and reference to published and unpublished documents. The information is entered into a computer database (dBase IV), from where it is transferred to a mapping program (ARC/INFO). Methods are described by Bourke et al. (1993). This paper contains a written summary of the information on the Agricultural Systems in this Province, maps of selected agricultural features, a complete listing of all information in the database in coded form, and lists of villages with National Population Census codes, indexed by Agricultural Systems. This information will eventually be available on disk as a map-linked database suitable for use on a personal computer.

## **Identification of agricultural systems and subsystems**

An Agricultural System is identified when a set of similar agricultural crops and practices occur within a defined area. Six criteria are used to distinguish one system from another:

1. Fallow type (the vegetation which is cleared from a garden site before cultivation).
2. Fallow period (the length of time a garden site is left unused between cultivations).
3. Cultivation intensity (the number of consecutive crops planted before fallow).
4. The staple, or most important, crops.
5. Garden and crop segregation (the extent to which crops are planted in separate gardens; in separate areas within a garden; or are planted sequentially).
6. Soil fertility maintenance techniques (other than natural regrowth fallows).

Where one or more of these factors differs significantly and the differences can be mapped, then a separate system is distinguished.

Where variation occurs, but is not able to be mapped at 1:500 000 scale because the areas in which the variation occurs are too small or are widely dispersed within the larger system, a subsystem is identified. Subsystems within an Agricultural System are allocated a separate record in the database, identified by the Agricultural System number and a subsystem number.

Sago is a widespread staple food in lowland Papua New Guinea. Sago is produced from palms which are not grown in gardens. Most of the criteria above cannot be applied. In this case, systems are differentiated on the basis of the staple crops only.



## **Relationship to PNGRIS**

The Papua New Guinea Resource Information System (PNGRIS) contains information on the natural resources of PNG (Bellamy 1986). However PNGRIS contains no information on agricultural practices, other than an assessment of land use intensity based on air photograph interpretation by Saunders (1993), and ECOPHYS which is concerned with predicted crop performance in a specific environment (Hackett 1988). The Agricultural Systems Project is designed to provide detailed information on agricultural practices and cropping patterns as part of an upgraded PNGRIS geographical information system. For this reason the Agricultural Systems database contains almost no information on the environmental settings of the systems, except for altitude and slope. The layout of the text descriptions, the database code files and the village lists are modelled on PNGRIS formats (Cuddy 1987).

The mapping of Agricultural Systems has been carried out on the same map base and scale as PNGRIS (Tactical Pilotage Charts, 1:500 000). It is also done within the areas of agricultural land use established by Saunders (1993) from aerial photography. Except where specifically noted, Agricultural Systems boundaries have been mapped without reference to PNGRIS Resource Mapping Unit (RMU) boundaries. Agricultural Systems are defined at the level of the Province (following PNGRIS) but their wider distribution is recognised in the database by cross-referencing systems which cross provincial borders.

A preliminary view of the relationships between RMUs and the Agricultural Systems in this Province can be obtained from the listing of villages by Agricultural System, where RMU numbers are appended (Section 6.3).

### **Note for reprinted edition**

Most of the fieldwork for this project was conducted over a six year period (late 1990 to late 1996). Over this period, a number of minor inconsistencies arose in data classification and presentation. As well, some changes occurred in conventions for the text fields and in the definitions of data fields, for example, for seasonality, fencing and burning. These changes were noted in the Preface of the Provincial Working Papers (first editions) as they occurred. One of the more important changes was that the cutoff points for the classification of cash earning activities were applied more consistently. Because of these inconsistencies and changes in definitions, it was necessary to revise the database so that it was consistent for all 19 provinces and to incorporate changes in agriculture systems since the original papers were produced.

Most changes, as distinct from definitional changes, relate to cash income. The revisions were done in late 1998. The largest number of changes occurred in the first four provincial working papers: East Sepik, West Sepik, Western and Gulf Provinces. Papers for the five Island Region provinces required the least number of changes. Agricultural systems that cross provincial boundaries have been adjusted so that the information is identical on both sides of the boundary, apart from some minor differences in some of the text fields. However the notes have not been updated to incorporate new publications since the Working Papers were completed.

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## 2. DATABASE STRUCTURE, DEFINITIONS AND CODES

Information on agricultural systems is stored in a database, one record per agricultural system (or subsystem where identified) and 108 fields per record. This section lists the field *names* and their database abbreviations [NAMES]. Summary descriptions, explanatory notes and variable codes are given for each field.

### LOCATION AND IDENTIFICATION

**1. Provincial Identification [PROVINCE]:** A two digit National Population Census code. Eg. code 14 = East Sepik Province. Provincial codes are listed in Appendix A.1.

**2. System Identification [SYSTIDNO]:** A two digit number identifying the agricultural system within this province. Eg. code 01 = System 01. Numbers are not assigned to systems within a province in any particular order.

**3. Agricultural System [AGSYST]:** Systems are also identified by a unique Papua New Guinea-wide four digit number. The first two digits are the National Population Census provincial code and the second two digits are the system identification number. Eg. 1401 = System 01 in the East Sepik Province.

**4. Agricultural Subsystem [SUSBSYSDNO]:** Subsystems are identified by a single digit. When referred to in the text they are preceded by the agricultural system number and a hyphen. Eg. 1418-1 is Subsystem 1 of System 1418.

**5. Number of Subsystems [NUMSUBSYS]:** A single digit specifying the number of subsystems that occur within this System.

**6. District [DISTRICT]:** The 1990 National Population Census code for the District within which the System is located. More than one District may be listed. District codes are listed in Appendix A.2.

**7. Census Divisions [CENSUSDIV]:** The 1980 National Population Census code for the Census Divisions that occur within the System. Census Division codes for this Province are listed in Appendix A.2.

### ENVIRONMENTAL

**8. Lowest Altitude [ALTLOW]:** The lowest altitude, in metres (rounded), to which the System extends.

**9. Highest Altitude [ALTHIGH]:** The highest altitude, in metres (rounded), to which the System extends.

**10. Garden Slope [SLOPE]:** The average slope of gardens in the System.

1	Flat	(<2°)
2	Gentle	(2-10°)
3	Steep	(10-25°)
4	Very steep	(>25°)
5	Multiple classes	

**11. Survey Description [SURVDESC]:** A text description of the areas visited or not visited within the system, the length of time spent in different areas, traverses undertaken, the mode of transport used, the month and year of the survey, and the sources of any documentary information used.

**12. Summary Description [SYSSUMM]:** A concise text description of the agricultural system, and subsystems (if any), focussed on the occurrence of the major distinguishing criteria.

**13. System Boundary Definitions [BOUNDDEF]:** A brief description of how the boundaries between systems were identified and mapped. The boundaries between agricultural and non-agricultural land use were taken from Saunders (1993).

**14. Systems Crossing Provincial Borders [OTHPROV]:** A logical field (yes/no) which indicates whether the System crosses a provincial border.

**15. Same System in Adjacent Province [PROVSYS]:** A listing of AGSYST numbers (see Field 3 above) of up to two systems in adjacent provinces which are identical to this system, for systems which cross provincial borders.

**16. Subsystem Extent [SUBSYSEXT]:** An estimate of the proportion of the area of the total system occupied by a subsystem. In the case of there being no subsystems this field is listed as 100 per cent.

1	25 per cent
2	50 per cent
3	75 per cent
4	100 per cent

**17. Type of Fallow Vegetation Cleared [FALLTYPE]:** The predominant type of vegetation cleared from garden sites at the beginning of a new period of cultivation. Where short fallows are used (see Field 18 below), fallow type refers to the vegetation cleared after a long fallow.

1	Short grass ( <i>eg. kunai</i> < 1.5 m tall)
2	Tall grass ( <i>eg. Miscanthus</i> or <i>Saccharum</i> > 1.5 m tall)
3	Grass and woody regrowth ( <i>dense short or tall grass and short woody regrowth</i> )
4	Short woody regrowth ( <i>shrubs/trees</i> < 10 m tall)
5	Tall woody regrowth ( <i>trees</i> > 10 m tall)
6	Forest ( <i>no indication of previous use</i> )
7	No long fallow
8	Savanna ( <i>Scattered woody growth with grass ground cover</i> )

**18. Use of Short Fallows [SHORTFALL]:** A presence and significance measure which indicates whether short fallows are used. Short fallows are brief periods of less than 12 months between plantings during which land is left fallow.

**19. The Long Fallow Period [FALLPER]:** An estimate of the length of time (greater than 12 months) land is left to revert to regrowth, before it is cultivated again. Class 0 refers to situations where very long cropping intervals (40 plantings or more) make long fallows not significant.

0	Not significant
1	1 to 4 years
2	5 to 15 years
3	Greater than 15 years

**20. Cropping Intensity [CROPINT]:** The number of times staple crops are planted in the main gardens before those gardens are returned to a long fallow. Short fallows of less than 12 months (see Field 18 above) are excluded for this purpose: they may occur between plantings without affecting the classification. The class 'More than 40 plantings', refers to situations where land has been planted continuously without a long fallow since the Pacific War (1942-45) or longer. In such cases Field 19, Long Fallow Period, is classed as 'Long fallow period not significant'.

1	1 planting only
2	2 plantings
3	3 to 5 plantings
4	6 to 14 plantings
5	15 to 40 plantings
6	More than 40 plantings

#### CROP COMPONENTS

**21. The Dominant Staple Crops [DOMSTAP]:** The most important staple food crops grown in the subsystem. A major staple is defined as a crop estimated to cover more than one-third of staple garden area, and therefore no more than 3 dominant staples may be identified for a system. An important exception occurs when sago is the staple. Sago is extracted from palms which are not cultivated in gardens. In the text accounts (System Summaries and Notes), dominant staples are described as the '*most important crops*'.

**22. The Subdominant Staple Crops [SUBSTAP]:** Staple food crops of lesser importance grown in the subsystem. A subdominant staple is defined as a crop estimated to cover more than 10 per cent of a staple garden area; up to six crops may be listed. An important exception occurs when sago is the staple. Sago is extracted from palms which are not cultivated in gardens. In the text accounts (System Summaries and Notes), subdominant staples are described as '*important crops*'.

**23. All Staple Crops [ALLSTAP]:** A list of up to 10 staple crops including crops classed as dominant and subdominant, as well as other staple crops which occur commonly. In the text accounts (System Summaries and Notes), staple crops which are classified as neither dominant nor subdominant are described as '*other crops*'.

01	Mixed staple (no dominant staple: a mix of some or all of: banana, taro, sweet potato Chinese taro, yam, cassava and corn)		
02	Banana ( <i>Musa cvs</i> )	13	Taro ( <i>Colocasia esculenta</i> )
03	Breadfruit ( <i>Artocarpus altilis</i> )	14	Yam ( <i>Dioscorea alata</i> )
04	Cassava ( <i>Manihot esculenta</i> )	15	Yam ( <i>Dioscorea esculenta</i> )
05	Chinese taro ( <i>Xanthosoma sagittifolium</i> )	16	Yam ( <i>Dioscorea pentaphylla</i> )
06	Coconut ( <i>Cocos nucifera</i> )	17	Other
07	Corn ( <i>Zea mays</i> )	18	Queensland arrowroot ( <i>Canna edulis</i> )
08	Potato ( <i>Solanum tuberosum</i> )	19	Taro ( <i>Amorphophallus</i> )
09	Sago ( <i>Metroxylon sagu</i> )		( <i>Amorphophallus paeoniifolius</i> )
10	Swamp taro ( <i>Cyrtosperma chamissonis</i> )	20	Yam ( <i>Dioscorea bulbifera</i> )
11	Sweet potato ( <i>Ipomoea batatas</i> )	21	Yam ( <i>Dioscorea nummularia</i> )
12	Taro ( <i>Alocasia macrorrhiza</i> )		

**24. Other Vegetable Crops [VEG]:** A list of up to 10 important vegetable crops:

01	Aibika ( <i>Abelmoschus manihot</i> )	22	Rungia ( <i>Rungia klossii</i> )
02	Amaranthus ( <i>Amaranthus</i> spp.)	23	Tulip ( <i>Gnetum gnemon</i> )
03	Bean, common ( <i>Phaseolus vulgaris</i> )	24	Valangur ( <i>Polyscias</i> spp.)
04	Bean, lablab ( <i>Lablab purpureus</i> )	25	Balbal ( <i>Erythrina variegata</i> )
05	Bean, winged ( <i>Psophocarpus tetragonolobus</i> )	26	Bamboo shoots
06	Cabbage ( <i>Brassica oleracea</i> var. <i>capitata</i> )	27	Bean, snake ( <i>Vigna unguiculata</i> )
07	Chinese cabbage ( <i>Brassica chinensis</i> )	28	Spring onion ( <i>Allium cepa</i> var. <i>cepa</i> )
08	Choko tips ( <i>Sechium edule</i> )	29	Sweet potato leaves ( <i>Ipomoea batatas</i> )
09	Corn ( <i>Zea mays</i> )	30	Taro leaves ( <i>Colocasia esculenta</i> )
10	Cucumber ( <i>Cucumis sativus</i> )	31	Watercress ( <i>Nasturtium officinale</i> )
11	Ferns	32	Other
12	Ginger ( <i>Zingiber officinale</i> )	33	Bean, lima ( <i>Phaseolus lunatus</i> )
13	Highland pitpit ( <i>Setaria palmifolia</i> )	34	Bottle gourd ( <i>Lagenaria siceraria</i> )
14	Kangkong ( <i>Ipomoea aquatica</i> )	35	Dicliptera ( <i>Dicliptera papuana</i> )
15	Kumu musong ( <i>Ficus copiosa</i> )	36	Kalava ( <i>Ormocarpum orientale</i> )
16	Lowland pitpit ( <i>Saccharum edule</i> )	37	Karakap ( <i>Solanum nodiflorum</i> )
17	Nasturtium ( <i>Nasturtium</i> spp.)	38	Basil ( <i>Ocimum basilicum</i> )
18	Oenanthe ( <i>Oenanthe javanica</i> )	39	Bean leaves ( <i>Phaseolus</i> spp.)
19	Peanuts ( <i>Arachis hypogaea</i> )	40	Cassava leaves ( <i>Manihot esculenta</i> )
20	Pumpkin fruit ( <i>Cucurbita moschata</i> )	41	Chilli leaves ( <i>Capsicum frutescens</i> )
21	Pumpkin tips ( <i>Cucurbita moschata</i> )	42	Eggplant ( <i>Solanum melongena</i> )
		43	Pigeon pea ( <i>Cajanus cajan</i> )
		44	Tomato ( <i>Lycopersicon esculentum</i> )

**25. Fruit Crops [FRUIT]:** A list of up to 8 important fruits grown:

01	Avocado ( <i>Persea americana</i> )	21	Granadilla ( <i>Passiflora quadrangularis</i> )
02	Banana ( <i>Musa cvs</i> )	22	Grapefruit ( <i>Citrus paradisi</i> )
03	Bukabuk ( <i>Burckella obovata</i> )	23	Guava ( <i>Psidium guajava</i> )
04	Coastal pandanus ( <i>Pandanus tectorius</i> )	24	Lemon ( <i>Citrus limon</i> )
05	Malay apple ( <i>Syzygium malaccense</i> )	25	Lime ( <i>Citrus aurantifolia</i> )
06	Mandarin ( <i>Citrus reticulata</i> )	26	Parartocarpus ( <i>Parartocarpus venenosa</i> )
07	Mango ( <i>Mangifera indica</i> )	27	Pomelo ( <i>Citrus maxima</i> )
08	Marita pandanus ( <i>Pandanus conoideus</i> )	28	Pouteria ( <i>Pouteria maclayana</i> )
09	Orange ( <i>Citrus sinensis</i> )	29	Raspberry ( <i>Rubus</i> spp.)
10	Passionfruit, banana ( <i>Passiflora mollissima</i> )	30	Soursop ( <i>Annona muricata</i> )
11	Passionfruit, other ( <i>Passiflora</i> spp.)	31	Tree tomato ( <i>Cyphomandra betacea</i> )
12	Pawpaw ( <i>Carica papaya</i> )	32	Watery rose apple ( <i>Syzygium aqueum</i> )
13	Pineapple ( <i>Ananas comosus</i> )	33	Governor's plum ( <i>Flacourtia indica</i> )
14	Rambutan ( <i>Nephelium lappaceum</i> )	34	Lovi-lovi ( <i>Flacourtia inermis</i> )
15	Sugar ( <i>Saccharum officinarum</i> )	35	Mon ( <i>Dracontomelon dao</i> )
16	Ton ( <i>Pometia pinnata</i> )	36	Rukam ( <i>Flacourtia rukam</i> )
17	Watermelon ( <i>Citrullus lanatus</i> )	37	Ficus ( <i>Ficus</i> spp.)
18	Other		
19	Custard apple ( <i>Annona squamosa</i> )		
20	Golden apple ( <i>Spondias cytherea</i> )		

**26. Nut Crops [NUT]:** A list of up to 5 important nuts grown or collected:

01	Breadfruit ( <i>Artocarpus altilis</i> )	09	Karuka, wild ( <i>Pandanus brosimos</i> )
02	Candle nut ( <i>Aleurites moluccana</i> )	10	Okari ( <i>T. kaernbachii</i> / <i>T. impediens</i> )
03	Castanopsis ( <i>Castanopsis acuminatissima</i> )	11	Sis ( <i>Pangium edule</i> )
04	Coconut ( <i>Cocos nucifera</i> )	12	Pao ( <i>Barringtonia</i> spp.)
05	Finschia ( <i>Finschia chloroxantha</i> )	13	Tulip ( <i>Gnetum gnemon</i> )
06	Galip ( <i>Canarium indicum</i> )	14	Other
07	Java almond ( <i>Terminalia catappa</i> )	15	Polynesian chestnut ( <i>Inocarpus fagifer</i> )
08	Karuka, planted ( <i>Pandanus julianettii</i> )	16	Cycad ( <i>Cycas</i> spp.)
		17	Entada ( <i>Entada scandens</i> )
		18	Dausia ( <i>Terminalia megalocarpa</i> )

**27. Narcotic Crops [NARC]:** A list of up to 5 important narcotics grown:

1	Betel nut, highland ( <i>Areca macrocalyx</i> )
2	Betel nut, lowland ( <i>Areca catechu</i> )
3	Betel pepper, highland ( <i>Piper gibbilimum</i> )
4	Betel pepper, lowland ( <i>Piper betle</i> )
5	Tobacco ( <i>Nicotiana tabacum</i> )
6	Kava ( <i>Piper methysticum</i> )

#### FORMS OF GARDEN AND CROP SEGREGATION

**28. Garden Segregation [GARDSEG]:** A presence and significance measure of whether individual staple food crops are planted in different gardens. A garden is a contiguous area of land planted with crops under the management of a social unit such as a family or a household. If some gardens are sited in different vegetation zones, and have different fallow periods, cultivation periods or other agronomic characteristics, then they are assigned to a separate subsystem.

All presence and significance measures are coded as follows:

0	None
1	Minor or insignificant
2	Significant
3	Very significant

**29. Crop Segregation [CROPSEG]:** A presence and significance measure of whether individual staple food crops are planted separately in different parts of the same garden.

**30. Crop Sequences [CROPSEQU]:** A presence and significance measure of whether the harvesting of one crop species is usually followed by the planting of another, eg. yams followed by sweet potato, or sweet potato followed by peanuts followed by sweet potato (see also Field 33 below).

**31. Mixed Vegetable Gardens [MIXGARD]:** A presence and significance measure of whether mixed gardens are used. A mixed garden is typically a garden which is subsidiary to that containing the main staple(s). It is planted with a wide range of either subdominant staples and/or other vegetables. It may or may not be distinguished from the main garden types by different fallow and agronomic techniques.

**32. Household Gardens [HOUSGARD]:** A presence and significance measure of whether house gardens are used. A house garden is typically a garden that is small relative to the main gardens, is located near houses, and which contains a variety of crops. Also known as door yard or kitchen gardens.



#### SOIL FERTILITY MAINTENANCE TECHNIQUES

**33. *Legume Rotation* [LEGUMROT]:** A presence and significance measure of whether a leguminous crop (eg. peanuts or winged bean) is grown between plantings of main food crops.

**34. *Planted Tree Fallow* [TREEFALL]:** A presence and significance measure of whether tree species (eg. *Casuarina oligodon* or *Parasponia* spp.) are planted into gardens or fallows for the stated purpose of improving soil quality during subsequent cultivations. This measure excludes the practice of planting fruit tree species into gardens and fallows, but does not exclude the planted trees being used for timber or firewood.

**35. *The Use of Compost* [COMPOST]:** A presence and significance measure of whether organic matter is placed beneath the surface of the soil.

**36. *The Use of Animal Manure* [MANURE]:** A presence and significance measure of whether animal manure is placed on or in the soil. The measure does not include the deposition of manure by the animals themselves, eg. pigs tethered in gardens.

**37. *The Use of Island Beds*: [ISLBED]:** A presence and significance measure of whether island beds are used. Island beds are beds of soil on which crops are planted and which are raised above the level of a surrounding area of standing or slowly moving water.

**38. *The Contribution of Silt from Flooding* [SILT]:** A presence and significance measure of whether silt from floods is deposited either regularly or sporadically on the soil surface in gardens. It is assumed the flooding is of natural causes, but the measure does not exclude deliberate manipulation of stream channels in order to enhance the delivery of silt or for the partial control of flood waters.

**39. *The Use of Inorganic Fertiliser* [FERT]:** A presence and significance measure of whether inorganic fertiliser is applied to gardens. This measure excludes the use of inorganic fertiliser on cash crops, such as coffee or vegetables.

#### OTHER AGRICULTURAL PRACTICES

**40. *The Placing of Pigs in Gardens* [PIGSIN]:** A presence and significance measure of whether pigs are placed in gardens between plantings. Pigs may be placed in gardens between plantings for a number of stated reasons, eg. to eat earthworms, to eat unharvested crops, or to till the soil. This measure excludes the deliberate breaking of fences to allow pigs to forage after the cropping phase.

**41. *Burning* [BURN]:** A presence and significance measure of whether fallow vegetation cleared and cut in a new garden site is burnt before the planting of the staple crops. The measure includes the burning of material which has been heaped. Significance takes into account the frequency of burning relative to the cropping intensity. So, for example, if the majority of the fallow material cleared from the site is burnt at the initial clearing of a garden, and only one or two plantings are made before fallowing, burning is Very Significant. If the same thing occurs at clearing, but a large number of plantings are made before the next long fallow, with little or no burning between plantings, burning is Minor.

**42. Soil Tillage [TILL]:** A presence and significance measure of whether soil in the staple food gardens is tilled before planting. Tillage includes the breaking up, or turning over, of the whole or the major part of the soil on the garden surface. The measure includes tillage in either the first planting and/or subsequent plantings. The formation of soil mounds and beds (see Fields 53-58 below) involves working the soil into a tilth, but in order to distinguish clearly between these processes, mounds and beds are not automatically classified as soil tillage.

**43. The Use of Deep Holing [HOLE]:** A presence and significance measure of whether deep holing is used. Deep holing is sometimes used in yam cultivation in order to influence the dimensions and shape of the tubers. Deep (> 50 cm) holes are dug, the soil is broken into a fine tilth and the hole re-filled before planting. The use of this technique is usually restricted to the cultivation of *Dioscorea alata*.

**44. Cutting Fallow Vegetation Onto the Crops [FALLCUT]:** A presence and significance measure of whether crops are planted beneath standing fallow vegetation, and the vegetation is later cut down onto the growing crops.

**45. The Use of Fences [FENCE]:** A presence and significance measure of whether gardens are fenced. Fences are linear barriers made of wood, bamboo, cane grass or stones, and may incorporate a ditch or a bank. The measure excludes low ridges which form between fields when stones are thrown to the perimeter during cultivation. In the assessment of the significance of fences, the occurrence of fences around every individual garden is given greater significance than one fence around a large number of gardens.

**46. The Use of Irrigation [IRRIG]:** A presence and significance measure of whether water is applied to crops by the use of channels or aqueducts.

**47. The Use of Mulch [MULCH]:** A presence and significance measure of whether a mulch is used to cultivate the staple crops. A mulch is organic material which is applied to the soil surface. If the material is placed beneath the soil surface it is defined as a compost (see Field 35 above).

**48. The Seasonality of Main Crops [SEASMAJ]:** A presence and significance measure of whether the dominant staples (most important food crops) and the subdominant staples (important food crops) are planted at about the same time each year.

**49. The Seasonality of Other Crops [SEASMIN]:** A presence and significance measure of whether other staple crops and vegetable crops are planted at about the same time each year.

**50. The Use of Drains [DRAIN]:** A presence and significance measure of whether ditches are used in and around gardens to remove surface water or to lower the groundwater table.

**51. The Use of Soil Retention Barriers [SOILRET]:** A presence and significance measure of whether structures (pegged logs, fences or hurdles, stone walls) are constructed along the contour or below individual plants, in order to prevent or reduce the down slope movement of soil.

**52. The Use of Staking [STAKE]:** A presence and significance measure of whether crops are trained or tied up stakes, trellises or standing dead trees to lift them off the soil surface. The practice is usually applied to yams (*Dioscorea* spp.), beans, sugarcane, and sometimes gourds, cucumber and choko.

### **MOUNDING TECHNIQUES**

In many parts of Papua New Guinea the soil is formed into circular mounds of varying dimensions and crops are planted on them. Mounding should not be confused with composting (see Field 35 above). Mounds may or may not contain compost and composting may take place in the absence of mounds. Mounds are usually re-formed at each new planting. Mound formation usually involves extensive soil disturbance. The effect can be similar to complete soil tillage (see Field 42 above).

The following fields contain presence and significance measures of whether mounds of the specified dimensions are used in the system.

**53. *Very Small Mounds* [VSMOUND]:** Mounds up to 10 cm high.

**54. *Small Mounds* [SMMOUND]:** Mounds 10 to 40 cm high.

**55. *Medium Sized Mounds* [MOUND]:** Mounds 40-70 cm high and between 1 m and 2.5 m in diameter.

**56. *Large Mounds* [LRGEMOUND]:** Mounds > 70 cm high and > 2.5 m in diameter.

### **GARDEN BED TECHNIQUES**

In some locations the soil is also raised into beds and crops planted on them. Bed formation usually involves extensive soil disturbance. The effect can be similar to complete soil tillage (see Field 42 above). Two shapes of beds are distinguishable:

**57. *Square Beds* [BEDSQ]:** Square beds are constructed by digging shallow ditches typically 2 to 4 metres apart on a grid layout, and throwing the soil removed onto the surface to form a bed. The outcome is a characteristic chequerboard or gridiron pattern in gardens.

**58. *Long Beds* [BEDLONG]:** Long beds are constructed by digging shallow ditches down slope typically 2 to 4 metres apart and over 10 metres in length, and throwing the soil removed to the centre to form a bed.

**59. *Mechanical Soil Tillage* [MECHAN]:** The use of tractors or hand-held cultivators in the preparation of a garden site for food crops. The measure includes the use of machinery in the cultivation of crops for sale.

### **CASH EARNING ACTIVITIES**

A presence and significance measure of the importance of the following common rural cash income sources. The list includes sources related to agricultural or land based production from the farmers' own resources.

**60. *Animal Products* [ANSKIN]:** The sale of animal skins, furs and bird plumes, but not fresh meat.

**61. *Betel Nut* [BETEL]:** The sale of betel nuts (*Areca catechu* or *A. macrocalyx*) and associated items like pepper and lime.

**62. *Cardamom* [CARDAM]:** The sale of cardamom (*Elettaria cardamomum*).

**63. *Cattle* [CATTLE]:** The sale of cattle as live beasts or as fresh meat.

- 64. Chillies [CHILLIE]:** The sale of dried chillies (*Capsicum frutescens*).
- 65. Cocoa [COCOA]:** The sale of cocoa (*Theobroma cacao*) beans.
- 66. Copra [CNUT]:** The sale of copra and nuts from coconut palms (*Cocos nucifera*).
- 67. Arabica Coffee [COFFARAB]:** The sale of Arabica coffee (*Coffea arabica*).
- 68. Robusta Coffee [COFFROB]:** The sale of Robusta coffee (*Coffea canephora*).
- 69. Crocodile Products [CROC]:** The sale of freshwater and saltwater crocodile (*Crocodylus* spp.) skins or meat, from managed and wild animals.
- 70. Firewood [FIREWOOD]:** The sale of firewood.
- 71. Fish [FISH]:** The sale of fresh or smoked freshwater or saltwater fish, shellfish or crustacea.
- 72. Fresh Food: [FOOD]:** The sale of fresh vegetables, fruits, nuts and fresh or smoked meat from domesticated or wild animals.
- 73. Oil Palm [OILPALM]:** The sale of palm oil fruit (*Elaeis guineensis*).
- 74. Potato [POTATO]:** The sale of Irish potatoes (*Solanum tuberosum*).
- 75. Pyrethrum [PYRETH]:** The sale of dried pyrethrum flowers (*Chrysanthemum cinerariaefolium*).
- 76. Rice [RICE]:** The sale of rice (*Oryza sativa*).
- 77. Rubber [RUBB]:** The sale of latex from rubber trees (*Hevea brasiliensis*).
- 78. Sheep and Wool [SHEEP]:** The sale of sheep as live animals, or meat and the sale of wool.
- 79. Tea [TEA]:** The sale of unprocessed tea (*Camellia sinensis*).
- 80. Tobacco [TOBACCO]:** The sale of the dried tobacco leaf (*Nicotiana tabacum*).
- 81-82. Other [OTHER1] [OTHER2]:** Other unlisted sources of cash include the sale of copal gum (*Agathis* sp.), massoi bark (*Massoia aromatica*), tigasso oil (*Camptosperma* sp.), salt extracted from plants or natural springs and deposits, mineral oil, bêche-de-mer, insects and butterflies, live birds, marsupials, pigs and horses, house building materials including thatching and sheets of woven cane, canoe hulls, clothing, weapons, string bags, carvings and artefacts. This category excludes other sources of cash income such as wages and salaries, logging or mining royalties, gold mining, banditry, gambling and remittances. These are mentioned in Notes (Field 83) if they are important.
- 83. Further Notes [NOTES]:** Additional notes on particularly outstanding features of the system and further information drawn from published and unpublished documents.

## SURVEY DETAILS

Fields **84-101** contain details of dates when observations were made of the system for the purposes of this project and the names of the persons who made the observations. Up to three survey visits can be accommodated. The field names are:

Month of a short visit [SVDATMON]: Eg. 01 = January.

Year of a short visit [SVDATYR]: Eg. 1992.

Period of a longer term study [SVPERYRA]: Eg. 1971-72.

Person making the visit [SURVNAME]: Initials of person(s). Full names are given in a Key on the relevant page in Section 5.

The type of survey [SURVTYPE]

1	Very brief visit to one place (less than an hour), or interviews
2	Short visit to a few places ( less than 1 day)
3	Visits to several places (1 to 3 days)
4	Multiple visits to many places (4 to 15 days)
5	Multiple visits to many locations over several years ( more than 15 days)

**102. Information From the National Nutrition Survey 1982-83 [NNS]:** The National Nutrition Survey 1982/83, selected families in villages across most of the country from a sampling frame based on environments drawn from PNGRIS classifications. Amongst other questions, people were asked what foods they had eaten during the previous day (NNS 1982/3). For systems in which more than 10 families were interviewed, responses for particular foods are presented as percentages of the total number of families interviewed. Results are presented only for staple foods, fresh fish and purchased rice. The entry includes the number of families and number of villages surveyed, and the month and year of survey.

This information is more than 10 years old and is independent of the information collected by the Agricultural Systems Project. It should be used carefully (Smith et al. 1992). In some Systems the sample size is small and villages sampled may be restricted to one part of the System. It is possible that Chinese taro (*Xanthosoma sagittifolium*) has been included in the general term 'taro', increasing the importance of taro (*Colocasia esculenta*) and decreasing the importance of Chinese taro. Where diets change seasonally, the results may also be unrepresentative.

**103. Main References [REF]:** References to published and unpublished documents that contain substantial information on agriculture in the System.

**104. Other References [REF2]:** References to published and unpublished documents that contain additional information directly relevant to the Agricultural System.

**105. The Area of the System [AREA]:** The area, in square kilometres, occupied by the System. The figure is calculated by the mapping program ARC/INFO.

**106. Total Resident Population 1980 [TOTPOP]:** The total population resident within the area covered by the System at the time of the 1980 National Population Census. The 1990 National Population Census figures are not used because of questions over their reliability, but the 1990 National Population Census maps are used to locate most Census Units.

**107. The Number of People Living Outside the System [ABSPOPPER]:** An estimate of the proportion of the population absent from villages in the system in 1978-79, expressed as a percentage of the total population. The figure is the difference between the 'total' population and the 'resident' population listed in the 1978-79 Provincial Data System (PDS) Rural Community Register for the Province. The 'total' population is the total number of persons listed in the Village Book and the 'resident' population the number living in the village, or who have been absent for less than 6 months at the time of the census. In some cases 'total' and 'resident' populations in the PDS are the same.

**108. The Population Density [POPDEN]:** The number of persons per square kilometre in 1980, calculated by dividing Field 106 (total population) by Field 105 (area). There are two situations where adjusted figures are given (indicated by "\*"). In some systems sago is the staple food and there is little or no agriculture or subsistence is based completely on non-agricultural activities (eg. fishing or trading) and no agricultural land use can be identified. For these systems the area has been adjusted to include a 5 kilometre buffer strip around the system boundary, or centred on settlements where no land use is identified. The 5 kilometre buffer zone is assumed to be the area of non-agricultural land, usually forest, in which wild plants and animals are exploited. In the latter case, settlements are identified with point symbols. The second kind of adjustment occurs where the populations of two adjoining systems, both of which use both systems, are unequally distributed in the two system areas due to the locations of the census units. In such cases, adjusted population density figures are shown (for example, Milne Bay Province Systems 0501 and 0502), with explanations in Notes (Field 83).

**109. The Intensity of Land Use [RVALUE]:** The R value (Ruthenberg 1980, 15) is an estimate of the intensity of land use, derived from the ratio of the Cropping Period in years to the length of the cultivation cycle in years. Cropping Period is estimated from the number of plantings of the staple crops before a long fallow (see Field 20 above). The cultivation cycle is the sum of the Cropping Period and the Long Fallow Period (see Field 19 above). The R value is thus:

$$\frac{\text{Cropping Period} \times 100}{\text{Cropping Period} + \text{Long Fallow Period}}$$

Because in this survey both the cropping period and the long fallow period are described as classes, conversion of the class ranges to single year values is necessary in order to calculate R values. The following conversions are used for most crops:

Cropping period	Years	Long fallow period	Years
1 planting only	1	Not used	0
2 plantings	2	1-4 years	3
3-5 plantings	4	5-15 years	10
6-14 plantings	10	>15 years	20
>14 plantings	20		

Triploid banana or Chinese taro may produce for several years from a single planting. In systems in which these crops are dominant staples or subdominant staples with significant land use, the cropping period is adjusted upwards. The adjustment is based on estimates of how long these crops produce from a single planting before a long fallow. Where there is evidence of a cropping period without a long fallow of longer than 20 years, the cropping period is adjusted upwards, to a maximum of 50 years.



### 3. AGRICULTURAL SYSTEMS: TEXT SUMMARIES

Text summaries take two forms: those for the first or only subsystem in an Agricultural System, and those for subsequent subsystems.

1. The headers on text summaries for the first or only subsystem in an Agricultural System are as follows:

<b>PROVINCE</b> 15 West Sepik	<b>AGRICULTURAL SYSTEM No. 1 Subsystem No 1 of 1</b>	
<b>Districts</b> 4 Telefomin	<b>Subsystem Extent</b> 100%	<b>Area (sq km)</b> 1259
<b>Population</b> 8,530	<b>Population Density</b> 7 persons/sq km	<b>Population absent</b> 7%

This header contains information in the top right hand corner on the number of subsystems descriptions which follow.

This header also contains information for the *whole* Agricultural System on Districts, area, population, population density and absenteeism.

2. Headers on text summaries of subsequent subsystems are as follows:

<b>PROVINCE</b> 15 West Sepik	<b>AGRICULTURAL SYSTEM No. 3</b>	<b>Subsystem No 2 of 2</b>
<b>Districts</b> 4 Telefomin	<b>Subsystem Extent</b> 25 %	

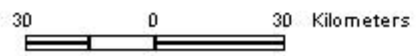
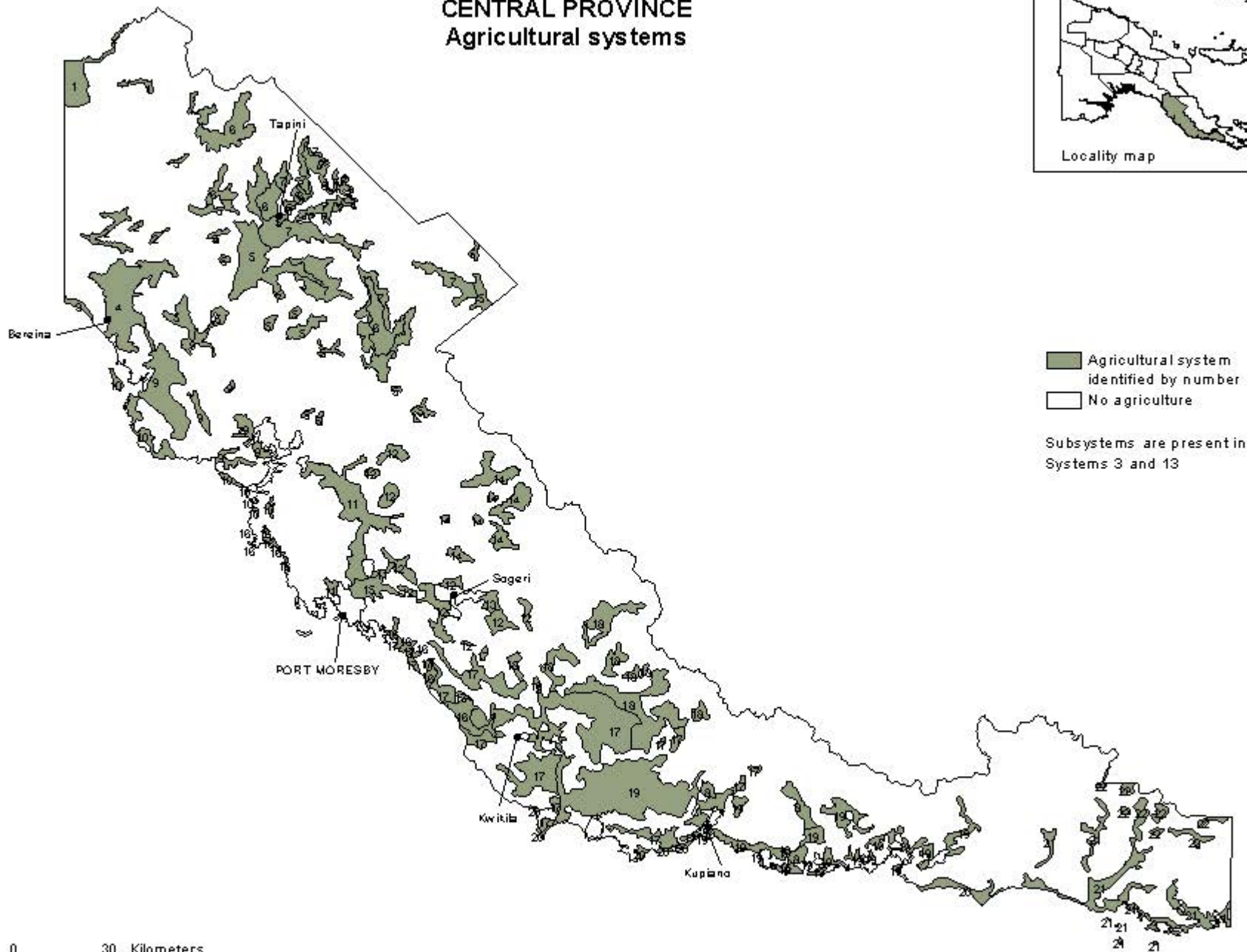
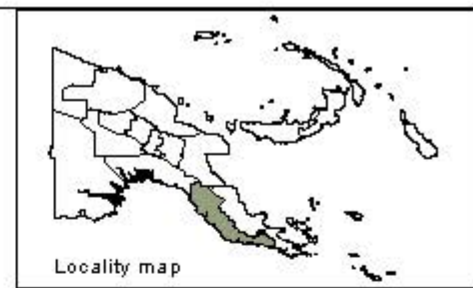
They contain information on Districts and subsystem extent only.

Headers on second and subsequent pages of summaries are as follows:

<b>PROVINCE</b> 15 West Sepik	<b>AGRICULTURAL SYSTEM No. 1</b>	<b>Subsystem No 1 of 1</b>
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# CENTRAL PROVINCE Agricultural systems



<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 1	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 4 Kairuku, 5 Goilala	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 138
<b>Population</b> 0	<b>Population density</b> 0 persons/sq km	<b>Population absent</b> 0 %

### System Summary

Located on the Tauri River and in the foothills at the head of the Olipai and Tiveri Rivers and extending into Morobe Province in the headwaters of the Lakekamu River. Gardens are typically made in tall woody regrowth more than 20 years old. Usually, the undergrowth is cleared, crops are planted and trees are then felled onto the crops without burning. In drier periods, vegetation is felled and burnt before crops are planted. Banana and sweet potato are the most important crops; other crops are Chinese taro, taro, sago and cassava. Sweet potato is more important at higher altitudes away from the Tauri and Olipai Rivers. Only one planting is made before fallowing. Hunting and fishing (the latter for those with river access) are important.

**Extends across provincial border to System(s)** 0213-1238

**Altitude range (m)** 40-1000      **Slope** Gentle (2-10 degrees)

### CROPS

STAPLES DOMINANT	Banana, Sweet potato
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Corn, Cucumber, Ferns, Kumu musong, Lowland pitpit, Pumpkin tips, Pumpkin fruit, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	1 planting
R VALUE	9 (very low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	Minor
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Betel nut	Significant
2 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Minor
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Minor
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	Significant
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	Minor

## **OTHER DOCUMENTATION**

### **Survey description**

In May 1992, boat traverse on the Tauri River (route Malalaua-Moveave-Putei-Tarapo); meetings at Karai, Mirivare and Piria settlements (all probably part of Nemano village), and Putei village; 17 gardens visited (2 days). The Central Province part of the system was not visited.

### **Boundary definition**

The southern boundary with System 0201 on the Tauri River was determined by boat traverse. The western and northern (Olipai and Tiveri Rivers) boundaries with System 0208 were based on interviews at Putei and elsewhere. The boundary with System 0302/0214 was determined by a boat traverse up the Akaifu River. The boundaries with Systems 0305/0602 and 0306 were taken as the southern edge of the Owen Stanley Mountains. The northern boundary with System 1235 was extrapolated along the 1000 m contour.

### **Notes**

This system is distinguished from System 0201 to the south where sago is the most important food; from System 0208 to the west where sweet potato is the most important crop; from System 0214/0302 to the southeast, in a similar river side environment, where banana is the most important crop; from Systems 0305/0602 and 0306 to the east, which are mountain systems where sweet potato is the most important crop, and where in 0306, the fallow vegetation is grass and short woody regrowth; and from System 1235 to the north where two plantings are made before a long fallow and sweet potato only is the most important food.

Census maps show no population resident in this system in Central Province. Settlements are thought to be located along the Lakekamu River in Gulf Province and to be administered from Gulf Province.

Although the altitude range is 40-1000 m, the typical range for settlement and agriculture in this system is much more restricted to 40-100 m. Hunting (pig, wallaby, cassowary, flying fox) is important, and fishing is important for those with river access.

Agriculture and settlement is located along the rivers. Banana and sweet potato are grown in gardens cleared from tall woody fallows on river bank levees.

Some gardens are made in previously unused forest. A few are made in tall cane grass (*Saccharum*) adjacent to the Tauri River in Gulf Province. The grass is cut and burnt before planting. Following the harvest of short term crops such as watermelon and cucumber, more banana may be planted to 'infill' the spaces. Although sweet potato and banana (and sometimes betel nut) are initially planted at the same time, the appearance of a garden changes through time with the initially dominant sweet potato being succeeded by the later maturing banana. Sweet potato is not planted in mounds. Corn, cucumber and watermelon are said to be mainly planted during the drier months (July to September).

In the Gulf province part of this system, betel nut is the major source of cash income and is sold in Port Moresby. The trade started in about 1980 when the road from Central Province was extended to Iokea station in Gulf Province. Some fresh food (bananas, sweet potato, greens) is sold to coastal villagers in System 0201. It is not known whether this statement also applies to the Central Province part of this system, but it is likely.

### **National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

### **Main References**

None.

### **Other References**

None.

<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 2	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 4 Kairuku	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 68
<b>Population</b> 1,144	<b>Population density</b> 17 persons/sq km	<b>Population absent</b> 14 %

**System Summary**

Located along the Inawafunga and Biaru Rivers, and extending into Gulf Province, and on the Akaifu River, north and northwest of Bereina station. Gardens are made on raised river bank levees. Tall woody regrowth, 20-40 years old is felled, often using chain saws, and burnt. All gardens are fenced. Banana is the most important crop; sweet potato and taro are important crops; other crops are rice, cassava, Chinese taro, sago, Alocasia taro, and yam (*D. alata* and *D. esculenta*). Rice is planted in the newly cleared gardens in December, and sweet potato and taro in May and June. Two plantings of sweet potato may occur. Sweet potato is planted in small mounds. As these crops are harvested, the garden is planted with banana, until only banana remains. Banana may remain productive for up to 5 years.

**Extends across provincial border to System(s)** 0214

**Altitude range (m)** 10-20      **Slope** Flat (<2 degrees)

**CROPS**

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Sweet potato, Taro ( <i>Colocasia</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro ( <i>Alocasia</i> ), Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Rice
OTHER VEGETABLES	Aibika, Corn, Cucumber, Kumu musong, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	20 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	Very significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	Minor
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Betel nut	Very significant
2 Betel pepper	Very significant
3 Fish	Minor
4 Fresh food	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, a road traverse from Bereina station to Babanongo village; a canoe traverse from Babanongo to Mapia village, on the Inawafunga and Akaifu Rivers and return; garden observations and interviews with garden owners from Mapia, Akufa, Ameika, Apanaipi and Babanongo villages, along the rivers (2 days). The small area of this system in Gulf Province was not visited.

### Boundary definition

The boundary with System 0201 in Gulf Province was determined from interviews at Miaru village. The boundary with System 0301/0213 was determined by a boat traverse up the Akaifu River. The boundaries with Systems 0305/0602 and 0306 were taken as the southern edge of the Owen Stanley mountain range. The boundary with System 0304 was determined on a road traverse from Bereina station to Babanongo village; and that with System 0303/0204 on a road traverse from Berina to Kivori Poe village.

### Notes

This system is distinguished from System 0201 to the west where sago is the most important food; from System 0301/0213 to the north, in a similar river side environment, where sweet potato is more important; and from Systems 0305/0602 and 0306 to the northwest, which are mountain systems where sweet potato is the most important crop, and where in System 0306, the fallow vegetation is grass and short woody regrowth; from System 0304 to the south where fallows are short woody regrowth, 5-15 years old; and from System 0303/0204 on the south coast, where most gardens follow short grass fallows, 10-15 years old.

This system is occupied by people known as the 'Bush Mekeo'. An Austronesian speaking group, they live along rivers in relatively large villages, and garden mainly on river side levees, above the level of the wet season rise of the rivers. Travel to gardens is largely by canoe. Extensive seasonally inundated swamps lie on both sides of the system and the rugged foothills of the Owen Stanley Mountains are immediately to the northeast. Prior to colonialism, the Bush Mekeo traded weapons, stone tools, dogs' teeth and feathers from the mountains and, together with their own smoked meat, cassowary bone, bark cloth and birds-of-paradise plumes, traded these items to the coast. From the coast, they traded shell ornaments, lime, clay pots and betel nut back into the mountains (Mosko 1985, 16).

Gardens are cleared from tall secondary forest. Many people now use chain saws to fell areas larger than that required for immediate use. When new gardens are required, they return to a site felled earlier and clear from among the felled trees the regrowth that has grown up since the trees were felled. The debris is dried and burnt and fences are constructed on three sides, leaving the river side open.

The garden is divided into blocks and paths are laid out, using saplings laid on the ground. Poles for betel pepper vines are put in place and aibika, corn and betel pepper are planted. Rice, for local consumption, is planted between the corn by dibble in December and is harvested in May the following year. If rice is not planted, sweet potato is planted. If rice is planted, sweet potato is planted after the rice harvest. Within the garden, segregated blocks of taro and smaller blocks of mainly yam (*D. alata*) are also planted. Cassava is planted along the edges of these blocks. Sweet potato is also planted in these blocks following the yam and taro harvests. Sweet potato is planted on small mounds. Chinese taro is planted around the edges of the garden.

In the earlier stages of the garden, banana are planted at very low densities. The density of banana is gradually increased throughout the first eighteen months, until eventually only dense, tall banana, together with betel pepper, some greens, scattered Chinese taro and *Alocasia* taro, remain in the garden. If the banana is weeded and cared for, it can be maintained for five years or more. Dense plantings of betel nut are commonly made in the corner of the garden nearest to a track, and after the garden has gone back into fallow, they are stoutly fenced.

In 1995, taro suckers were being planted low down along the river banks, to keep them alive until sufficient rain was received to make planting them in the new gardens a sensible proposition.

A poorly maintained road from Bereina to Bobanongo village on the Inawafunga River provides a vehicular link to Port Moresby. In 1995, outboard motor power canoes plied daily, water levels permitting, down the Inawafunga to the Biarua River, and then upstream to the uppermost Bush Mekeo villages on the Akaifu River. A large circulation of particularly young people occurs between the villages and settlements in Port Moresby.

**Notes continued**

A particularly important cash crop is betel pepper ('daka' in pidgin, 'awaka' in Mekeo language). The fruit, the leaf and less often, the woody part of the vine itself, are chewed with betel nut. Betel pepper is planted in new gardens from cuttings from a mature vine, and is trained up sturdy poles which are placed in the gardens shortly after clearing is completed and before the betel pepper is planted. The betel pepper is maintained throughout the life of the garden and into the early stages of the fallow. Special betel pepper gardens are also made near the edges of the villages. Betel palms are planted in old gardens and betel nuts are another important cash crop.

During four hours on 15 August 1995 at Bobanongo village, an estimated K10,000 worth of betel pepper fruit and betel nut were unloaded from three canoes that arrived from the Akaifu River. It was loaded onto waiting PMVs for transport to Port Moresby markets. Over the last five years a disease which caused the betel pepper fruit to break open severely reduced production and cash incomes in the area. Production of betel pepper is only just recovering. The disease spread into this system from System 0304.

This source of cash, together with a relatively large number of people employed in Port Moresby, is reflected in the villages having many houses with iron roofs, and small motor powered generators and outboard motors are common possessions. The sale of fish and fresh food at Bereina station and Port Moresby is a minor source of cash income.

The percentage of the population who are absent presented here is calculated using the PDS figures for 86 per cent of the villages assigned to this system.

**National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

**Main References**

None.

**Other References**

Mosko, M.S. 1985 *Quadripartite Structures: Categories, Relations and Homologies in Bush Mekeo Culture*. Cambridge, Cambridge University Press.



Districts 4 Kairuku Subsystem Extent 75 % Area (sq km) 17  
 Population 2,548 Population density 150 persons/sq km Population absent 37 %

**System Summary**

Located on the coastal fringe west of the Angabanga River mouth and extending into Gulf Province as far west as Iokea Patrol Post. Two subsystems are distinguished on the basis of fallow vegetation. For the entire system, banana is the most important crop; coconut is an important crop; other crops are cassava, sago, sweet potato, Amorphophallus taro, Queensland arrowroot, and yam (*D. esculenta*). In Subsystem 1, which occupies an estimated 75 per cent of the total area of land in use, gardens are typically made in short grass, after fallows of 10-15 years, although some fallows are longer. Only one planting is made before a long fallow, although bananas are maintained for up to 6 years. When new gardens are made, the grass is cut, dried and burnt. The soil is completely tilled with hoes.

**Extends across provincial border to System(s)** 0204

**Altitude range (m)** 0-100 **Slope** Gentle (2-10 degrees)

**CROPS**

STAPLES DOMINANT Banana  
 STAPLES SUBDOMINANT Coconut  
 STAPLES PRESENT Banana, Cassava, Coconut, Sago, Sweet potato, Yam (*D. esculenta*), Queensland arrowroot, Taro (*Amorphophallus*)  
 OTHER VEGETABLES Aibika, Corn, Lowland pitpit, Tulip, Bean (snake)  
 FRUITS Mango, Orange, Pineapple, Pawpaw, Watermelon, Guava  
 NUTS Breadfruit  
 NARCOTICS Betel nut (lowland), Betel pepper (lowland)

**FALLOW & CROPPING PERIOD**

FALLOW TYPE Short grass  
 SHORT FALLOW None  
 LONG FALLOW PERIOD 5-15 years  
 CROPPING PERIOD 1 planting  
 R VALUE 29 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION Minor  
 CROP SEGREGATION Minor  
 CROP SEQUENCES Minor  
 MIXED VEGETABLE GARDENS None  
 HOUSEHOLD GARDENS None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION None  
 PLANTED TREE FALLOW None  
 COMPOST None  
 ANIMAL MANURE None  
 ISLAND BED None  
 SILT FROM FLOOD None  
 INORGANIC FERTILISER None

**CASH EARNING ACTIVITIES**

1 Betel nut Very significant  
 2 Fresh food Significant

**OTHER AGRONOMIC PRACTICES**

**Water Management:**  
 DRAINAGE None  
 IRRIGATION None  
**Soil Management:**  
 PIGS PLACED IN GARDENS None  
 BURN FALLOW VEGETATION Very significant  
 TILLAGE Very significant  
 MECHANIZATION None  
 DEEP HOLING None  
 MULCHING None  
 SOIL RETENTION BARRIERS None  
**Mounding Techniques:**  
 VERY SMALL MOUNDS None  
 SMALL MOUNDS Minor  
 MOUNDS None  
 LARGE MOUNDS None  
**Garden Bed Techniques:**  
 BEDS SQUARE None  
 BEDS LONG None  
**Other Features:**  
 FENCES None  
 STAKING OF CROPS Minor  
 FALLOW CUT ONTO CROPS None  
 SEASONAL MAIN CROPS None  
 SEASONAL SEC'DARY CROPS None



## **OTHER DOCUMENTATION**

### **Survey description**

In May 1992, a boat traverse from Malalaua to Iokea and Sarota villages in Gulf Province, interviews and 16 gardens visited (2 days). In August 1995, a vehicle traverse from Bereina station to an overnight stay at Kivori Poe village (1 day).

### **Boundary definition**

The western boundary with System 0201 in Gulf Province was determined by a boat traverse between Iokea station and Miaru villages. To the north, where the Biaru River crosses the Central Province border, the boundary with the small isolated section of System 0214/0302 was based on an interview at Miaru village in Gulf Province. The eastern boundary with System 0304 was determined by a road traverse from Bereina station to Kivori Poe village. The boundary with System 0214/0302 to the northeast was determined from a road traverse from Bereina to Babanongo village.

### **Notes**

This system is distinguished from System 0201 to the west where sago is the most important food. It is distinguished from System 0214/0302 where tall woody regrowth fallows, 20-40 years old, are dominant; and from System 0304 where fallows are short woody regrowth.

The short grass fallows of this subsystem were said to have been adopted relatively recently, between about 1940 and 1960. Although only one planting of banana is made, the banana gardens produce for 3-6 years depending on weed management. Occasionally separate gardens for sweet potato and cassava are made. Sweet potato, cassava, yam, *Amorphophallus taro* and Queensland arrowroot are sometimes planted in separate sections of the banana gardens, but interplanting is usual. Cassava is generally planted around garden edges, and aibika and other crops interplanted in the garden. After short term crops such as yam, sweet potato and *Amorphophallus taro* have been harvested, there is some infilling with banana. The flesh and the seeds of breadfruit are eaten.

Betel nut sales to Port Moresby provide high cash incomes, which are reflected in high levels of consumption of imported food (rice, flour, tinned fish and meat). Fresh food (banana, sweet potato, cassava, sago and greens) is sold in Port Moresby.

Extremely high population densities occur in this system, together with very high levels of absenteeism. These characteristics were not investigated in the field. The system appears to be under pressure, which is giving rise to environmental problems and possibly also social tensions.

### **National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

### **Main References**

None.

### **Other References**

None.

**System Summary**

In Subsystem 2, which covers an estimated one quarter of the system, gardens are made in tall woody regrowth 5-15 years old. The undergrowth is cleared, trees are cut down, the vegetation is allowed to dry and then burnt. Banana is the most important crop; coconut is an important crop; other crops are cassava, sago, sweet potato, Amorphophallus taro, Queensland arrowroot, and yam (*D. esculenta*). Gardens are said to be cleared between June-August, and planted between September-December. One planting is made before a long fallow.

**Extends across provincial border to System(s)** 0204

**Altitude range (m)** 0-100      **Slope** Gentle (2-10 degrees)

**CROPS**

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Lowland pitpit, Tulip, Bean (snake)
FRUITS	Mango, Orange, Pineapple, Pawpaw, Watermelon, Guava
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland)

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	1 planting
R VALUE	28 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Minor
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Betel nut	Very significant
2 Fresh food	Significant

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	None
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

**OTHER DOCUMENTATION**

**Notes**

No gardens in this subsystem were visited. Information is based on interviews only.

Districts 4 Kairuku  
Population 8,282

Subsystem Extent 100 %  
Population density 26 persons/sq km

Area (sq km) 323  
Population absent N/A

### System Summary

Located west of Bereina station on both sides of the Angabanga River in the area known generally as 'the Mekeo'. Short woody regrowth fallows, 10-15 years old, are cleared and burnt. Banana is the most important crop; sweet potato, taro and coconut are important crops; other crops are cassava, rice, Alocasia taro, Amorphophallus taro, Queensland arrowroot, Chinese taro, yam (*D. alata*) and sago. Greens, sweet potato and taro are planted first. Sweet potato is planted on small mounds. After the sweet potato and taro harvest, banana is planted. Banana is maintained for up to 5 years. Commercial rice production has recently ceased (again), but rice is still grown for domestic consumption. Gardens are cleared from June and the main planting in new gardens occurs from October, but crops are planted throughout the year.

Extends across provincial border to System(s) None

Altitude range (m) 10-40 Slope Flat (<2 degrees)

### CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Coconut, Sweet potato, Taro ( <i>Colocasia</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro ( <i>Alocasia</i> ), Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Rice, Queensland arrowroot
OTHER VEGETABLES	Aibika, Amaranthus spp., Corn, Kumu musong, Lowland pitpit, Nasturtium spp., Pumpkin tips, Tulip, Bean (snake), Spring onion
FRUITS	Malay apple, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	38 (medium)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	Very significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	Minor
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Betel nut	Very significant
2 Betel pepper	Very significant
3 Fresh food	Significant

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	Minor
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, road traverse from Port Moresby to Bereina station, Bereina to Babanongo village, Bereina to Beipa village and from Beipa village to Nikura village via Aipeana, Inawi, Inawaia and Jesubaibua villages (1 day).

### Boundary definition

The western boundary with System 0303/0204 was determined by a road traverse from Bereina station to Kivori Poe village, and the boundary with System 0302/0214 to the north on a road traverse from Bereina to Babanongo village. The boundaries with Systems 0309 and 0310 were determined by road traverses from Bereina southeast along the Hiritano Highway and to Aviara-Waima village. The boundary with System 0305/0602 was determined by a road traverse from Bereina to Kubuna mission.

### Notes

This system is distinguished from System 0302/0214 where the fallow period is longer and fallow vegetation is tall woody regrowth; from System 0303/0204 where fallow vegetation is mainly short grass and sweet potato and taro are not important crops; from System 0305 where the fallow period is longer, the fallow vegetation is tall woody regrowth and the most important crop is sweet potato; from System 0310 where cassava is a most important crop and the fallow vegetation is savanna grassland; and from System 0309 where cassava and yam (*D. esculenta*) are important crops, fallow vegetation is tall woody regrowth and the fallow period is longer.

The system is located on the floodplain of the Angabanaga River. Some garden areas are flooded from time to time by the river backing up, but most of the system occurs on well drained, fertile alluvial soils. Patches of grassland are rarely used for cultivation, but are burnt during hunting expeditions, and provide a source of thatching material. The Angabanga River is notorious for changing its channel, and the plain is studded with ox-bow lakes. They are re-filled with water and restocked with fish, mainly tilapia, each wet season. Rainfall is between 1000 mm and 1800 mm; the wetter season is from December to April (Mabbutt et al. 1965, 56).

Fallow vegetation is now a short woody regrowth less than 10 m tall. People say the present gardens are the first to be cut in short woody fallows. Gardens in the previous cycle, 10-15 years ago, were made in tall woody regrowth. The trees are felled by men, allowed to dry and the debris burnt. All gardens are fenced, mainly with wire netting and wooden posts.

Although the system is unremarkable in terms of the crops and the cropping patterns, it is impressive for the great care and neatness which typifies the cultivation of the crops. Gardens are rectangular in shape and large, with a central path running down the longest axis. On either side of the central path, garden sections are laid out in rectangles, with narrow paths between them. Plants with brightly coloured leaves that are said to have magical properties are planted at many places along the paths such that they brush against the legs of people walking down the paths and protect the food crops. Poles for growing betel pepper are placed at regular intervals along the paths.

The system is characterised by a sequence of plantings which proceed over two years until the garden is occupied almost completely by banana, betel nut and betel pepper. The first crops planted following clearing are aibika, corn, ginger, Nasturtium, amaranthus, pumpkin, tomato, an unidentified green, spring onion, beans, cucumber, pineapple and watermelon; betel pepper for sale and rice for domestic consumption. Taro and sweet potato are planted following the rice harvest, together with widely spaced banana. Cassava is planted around the edges of some blocks. Taro and banana are planted in regularly arranged rows. Following the sweet potato and taro harvests, more banana are planted and sweet potato is replanted beneath the banana, where it keeps down weeds. Betel nut is planted in the corners of gardens. *Alocasia taro* is reasonably common and grows beneath the banana. A few people plant small numbers of *Amorphophallus taro*. Yam (*D. alata*) is planted in very small segregated blocks and is not important. Yam (*D. esculenta*) is not cultivated, but is said to be found growing wild in the bush. Sugarcane and yams are staked. Bananas are wrapped and propped. Sweet potato is grown on small mounds. Sago is produced and consumed two or three times a year.

In the small number of gardens made in tall grass fallows, tractors are used to pull a large log back and forth across the site to crush the grass. After it is dry, the grass is burnt. The site is ploughed with a tractor before planting. Tall grass fallows are usually planted in sweet potato only.

**Notes continued**

The villages and paths to gardens are planted in many fruit and nut trees including mango, coconut, breadfruit, Malay apple, orange, lemon, pomelo, okari and an unidentified fruit tree, possibly *Sterculia schumanniana*, which produces red berries. Fish caught in the many ox-bow lakes are an important part of the diet.

Betel nut is planted in the corners of many gardens. After the garden has gone back into fallow, the betel nut is fenced off and maintained for many years. The system is characterised by numerous groves of tall betel nut palms. Nuts are sold in Port Moresby and make the Mekeo people relatively wealthy by rural PNG standards. The betel nut sales, as distinct from traditional trading, began in the 1950s. Figures presented by Stephen (1974) suggest around 2 tons per week were being flown from Bereina and 6 tons per week were going by sea in the late 1950s. In 1968 over 600 tons were exported. Betel pepper is also an important cash earner, but the most important suppliers are the Bush Mekeo to the northwest (System 0302/0214). In this system betel pepper is grown in the gardens, on poles, as it is in System 0302/0214. Another important source of cash income is the sale of fresh food in a large market on the southeastern edge of the system near the Angabanga Bridge, at Bereina station and at Port Moresby. These markets incorporate aspects of traditional exchanges of food for fish with Roro neighbours in System 0310.

The Mekeo, together with their northern neighbours in System 0302/0214 are unusual in that they persist in growing rice for domestic consumption. Rice was first grown by the Mekeo in 1910 under a government village 'plantation' system (Miles 1956). All able bodied males were required to grow commercial crops to pay a much resented head tax. By 1919 people were eating the rice that was surplus to their tax requirements (Stephen 1974, 120). By 1932, over 80 ha of rice was being cultivated and rice was being traded with the Roro. During the war, the Australian Army civil administration unit grew rice on the Angabanga Plains. During this period a mechanical harvester was introduced. In 1948, the then Director of Agriculture, Cottrell-Dormer, resigned his position to manage the Mekeo Rice Scheme. It collapsed in debt in 1953 (Jeffreys 1974). Rice growing began again in 1971 and by 1975 was producing 800 tonnes from 240 ha. However, bad weather destroyed the entire 1975 crop and brought the project to a halt (Hale n.d. (1978), 13). In the 1990s, a rice growing project, again heavily subsidised by the national government, tried to persuade the Mekeo to grow commercial rice, but no rice was being grown in 1995. People complained of poor returns after they had repaid the costs of production to the government. Hale (n.d. (1978), 13-14) argues strongly that unreliable rainfall makes commercial rice growing in this system a marginal activity. Rice varieties grown for domestic consumption are different to that used for commercial production. Domestic rice contains many red grains.

This system is used by the Mekeo, and the closely related Roro, people. They maintain hereditary chiefs which is unusual in PNG, and live in large, regularly laid out villages (Hau'ofa 1981). Contact with the Sacred Heart mission since the 1890s has resulted in relatively large numbers of well educated people, many of whom now live and work in Port Moresby. Income from the sale of betel nut, together with income from urban employment results in almost all houses having iron roofs, and many families owning small generators and vehicles.

Information on the proportion of the population who are absent is inadequate for this system.

**National Nutrition Survey 1982/83**

56 families from 2 villages were asked in September or December 1982 what they had eaten the previous day. 98 per cent reported eating banana, 38 per cent coconut, 4 per cent sweet potato, 2 per cent taro and none cassava, Chinese taro, sago or yam. 70 per cent reported eating rice. 32 per cent reported eating fresh fish. This is similar to the observed crop pattern, except for the low consumption of sweet potato and taro and the higher than expected consumption of coconut. It is probable that some of the rice reported consumed was produced locally.

**Main References**

None.

**Other References**

Hale, P.R. 1978 Rice. In Densley, D.R.J. (ed), Agriculture in the Economy: A Series of Review Papers. Volume 3. Port Moresby, Department of Primary Industry, 13-14.

Hau'ofa, E. 1981 Mekeo: Inequality and Ambivalence in a Village Society. Canberra, Australian National University Press.

Jeffreys, F.J. 1974 The Mekeo Rice Project. MA (Econ) thesis, University of Papua New Guinea, Port Moresby.

**Other References continued**

Mabbutt, J.A., P.C. Heyligers, R.M. Scott, J.G. Speight, E.A. Fitzpatrick, J.R. McAlpine and R. Pullen 1965 Lands of the Port Moresby-Kairuku area, Territory of Papua and New Guinea. Land Research Series No. 14, Commonwealth Scientific and Industrial Research Organization, Melbourne.

Miles, J. 1956 Native commercial agriculture in Papua. *South Pacific* 9, 1, 318-327.

Stephen, M. 1974 Continuity and change in Mekeo society 1890-1971. PhD thesis, Australian National University, Canberra.

Districts 3 Hiri, 4 Kairuku, 5 Goilala Subsystem Extent 100 % Area (sq km) 533  
 Population 2,922 Population density 5 persons/sq km Population absent 18 %

**System Summary**

Located in the Owen Stanley Mountains north and east of Bereina station, in the lower headwaters of the Kunimaipa, Angabanga and Vanapa Rivers and extending into Northern Province in the Mambare Valley. Tall woody regrowth fallows, 15-25 years old, are cleared, burnt and fenced. Sweet potato is the most important crop; banana, taro and Chinese taro are important crops; other crops are cassava and yam (*D. esculenta* and *D. alata*). Sweet potato is planted on small mounds. Only one planting is made before a long fallow. Chinese taro is planted around the edges of gardens.

**Extends across provincial border to System(s)** 0602

**Altitude range (m)** 100-1400 **Slope** Very steep (>25 degrees)

**CROPS**

STAPLES DOMINANT Sweet potato  
 STAPLES SUBDOMINANT Banana, Chinese taro, Taro (*Colocasia*)  
 STAPLES PRESENT Banana, Cassava, Chinese taro, Sweet potato, Taro (*Colocasia*), Yam (*D. alata*), Yam (*D. esculenta*)  
 OTHER VEGETABLES Aibika, Amaranthus spp., Bean (winged), Choko tips, Corn, Kumu musong, Lowland pitpit, Pumpkin tips, Tulip, Bean (snake)  
 FRUITS Mandarin, Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon, Soursop  
 NUTS Breadfruit, Coconut, Okari, Tulip  
 NARCOTICS Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE Tall woody regrowth  
 SHORT FALLOW None  
 LONG FALLOW PERIOD >15 years  
 CROPPING PERIOD 1 planting  
 R VALUE 5 (very low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION Minor  
 CROP SEGREGATION Significant  
 CROP SEQUENCES None  
 MIXED VEGETABLE GARDENS None  
 HOUSEHOLD GARDENS None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION None  
 PLANTED TREE FALLOW None  
 COMPOST None  
 ANIMAL MANURE None  
 ISLAND BED None  
 SILT FROM FLOOD None  
 INORGANIC FERTILISER None

**CASH EARNING ACTIVITIES**

1 Betel nut Significant  
 2 Fresh food Significant  
 3 Coffee Arabica Minor  
 4 Rubber Minor

**OTHER AGRONOMIC PRACTICES**

**Water Management:**  
 DRAINAGE None  
 IRRIGATION None  
**Soil Management:**  
 PIGS PLACED IN GARDENS None  
 BURN FALLOW VEGETATION Very significant  
 TILLAGE None  
 MECHANIZATION None  
 DEEP HOLING None  
 MULCHING None  
 SOIL RETENTION BARRIERS None  
**Mounding Techniques:**  
 VERY SMALL MOUNDS None  
 SMALL MOUNDS Very significant  
 MOUNDS None  
 LARGE MOUNDS None  
**Garden Bed Techniques:**  
 BEDS SQUARE None  
 BEDS LONG None  
**Other Features:**  
 FENCES Very significant  
 STAKING OF CROPS Minor  
 FALLOW CUT ONTO CROPS None  
 SEASONAL MAIN CROPS None  
 SEASONAL SEC'DARY CROPS Minor



## **OTHER DOCUMENTATION**

### **Survey description**

In August 1995, a road traverse from the Port Moresby-Bereina highway to Kubuna mission (1 day). In September 1995, a visit was made by aircraft to Asimba village in Northern Province (1 day). The Kosipe and Yongei mission areas were not visited.

### **Boundary definition**

The boundary with Systems 0301/0213 and 0302/0214 is taken to be the southern edge of the Owen Stanley Mountains. The boundary with System 0304 was determined on a road traverse from Bereina station to Kubuna mission. The boundaries with Systems 0306 and 0307 were determined by walking traverses from Guari station to Tapini station, from Kerau mission to Tapini and from aerial observations between Waitape station, Kerau, Tapini, Guari, and Fane mission, and were extrapolated on the basis of Saunder's (1993) map of regrowth vegetation. The boundary with System 0309 was determined on a road traverse from Bereina station to Kubina mission, and extrapolated along the 100 m contour. The boundaries with Systems 0311 and 0312 were determined by road traverses on the Bereina to Port Moresby highway. The boundary with System 0314 was determined by fieldwork at Kagi and Manumu villagers. This system was distinguished from System 0601/1239 after field visits in the Kira area. The boundary with System 0603/1240 was determined by fieldwork near Ioma station; that with System 0604 by a road traverse between Popondetta and Kokoda station and aerial observations between Kokoda and Asimba village.

### **Notes**

This system is distinguished from Systems 0301/0213, 0302/0214 and 0312 where banana is a most important crop; from Systems 0304 and 0309 where fallow vegetation is shorter and banana is the most important crop; from Systems 0306 and 0307 where fallow periods and fallow vegetation are shorter; from Systems 0311 where banana is a most important crop, and fallow periods and fallow vegetation are shorter; and from System 0314 where yam (*D. alata*) is an important crop. This system is very similar to Systems 0601/1239 and 0603/1240. Chinese taro and banana are more important crops here than in System 0601/1239; and two plantings are made before land is fallowed in System 0603/1240. It is distinguished from System 0604 where fallow vegetation is short woody regrowth and fallow periods are shorter.

This is a low intensity shifting cultivation system. Fallows are 15-25 years old and only one crop is planted before a long fallow. Sweet potato is interplanted with other crops, mainly taro, banana and cassava. Yams (mostly *D. esculenta*) are grown in separate gardens, but are of minor importance as food.

This system is located in lower altitude valleys, from 100 m to 1400 m, in the Owen Stanley Mountains. The people occupying the system are Kuni speakers in the south west and Fuyughe speakers in the north east, known generally by outsiders as 'Goilala'. They have important trade and cultural links with people in the more intensive Goilala mountain systems, and previously acted as middle-men between the lower altitude areas and the mountainous inland. The Kuni were particularly closely associated with the Fuyughe in the eastern Goilala area.

Between 1953 and 1959, over 5000 coffee trees were planted in the area north of Bakoiudu mission, but marketing and transport difficulties caused the development to fail (Gostin 1986, 21). Around 1962, the priest at Bakoiudu mission persuaded about 1300 people to move from their scattered villages and to resettle on 16,000 ha of unoccupied land near Bakoiudu, and to plant rubber as a cash crop (Gostin 1986). Numerous social and economic difficulties have caused many people to return to their old land, and they use their settlement blocks only as a source of cash, by periodically tapping rubber. Sales of betel nut and fresh food are the main sources of cash income. Rubber, coffee, tobacco and animal skins are minor sources of income.

The percentage of the population who are absent presented here is calculated using the PDS figures for 56 per cent of the villages assigned to this system.

### **National Nutrition Survey 1982/83**

7 families from 1 village were asked in February 1983 what they had eaten the previous day. 100 per cent reported eating sweet potato, 29 per cent banana and none cassava, Chinese taro, coconut, taro, sago or yam. 57 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern, except for the lower than expected consumption of Chinese taro and taro. The high consumption of rice probably reflects income from rubber sales which are restricted to the area near Kubuna and Bakoiudu missions, east of Bereina station.

### **Other References**

Gostin, O. 1986 Cash Cropping, Catholicism and Change: Resettlement Among the Kuni of Papua. Canberra, National Centre for Development Studies, Australian National University.

Districts 5 Goilala  
Population 7,677

Subsystem Extent 100 %  
Population density 16 persons/sq km

Area (sq km) 494  
Population absent 27 %

**System Summary**

Located in the Owen Stanley Mountains north and east of Tapini station in the headwaters of the Kunimaipa, Angabanga and Vanapa Rivers. People using this system may also have gardens in Systems 0305/0602 and 0307. Tall grass and short woody regrowth fallows, 5-15 years old, are cleared, burnt and heavily fenced. Sweet potato is the most important crop; other crops are banana, Chinese taro, potato, taro and yam (*D. alata*). Sweet potato is planted on small mounds. Two plantings of sweet potato are made before a long fallow. A short fallow occurs between the plantings of sweet potato. Pigs are placed in the gardens between plantings and during the short fallow. Yams are always planted in separate gardens in valley bottoms. Taro is often only planted in yam gardens. Household gardens are important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 1400-2000 **Slope** Very steep (>25 degrees)

**CROPS**

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Chinese taro, Potato, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> )
OTHER VEGETABLES	Aibika, Bean (common), Bean (lablab), Cabbage, Corn, Cucumber, Highland pitpit, Oenanthe, Pumpkin tips
FRUITS	Passionfruit (purple), Pineapple, Sugarcane, Tree tomato, Ficus
NUTS	Karuka (planted), Karuka (wild)
NARCOTICS	Betel nut (highland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	Significant
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Minor
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Very significant

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Cattle	Minor
2 Fresh food	Minor
3 Potato	Minor
4 Tobacco	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	Minor
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	Very significant
BURN FALLOW VEGETATION	Very significant
TILLAGE	Minor
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Minor
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Very significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Minor
SEASONAL SEC'DARY CROPS	Minor

## OTHER DOCUMENTATION

### Survey description

In August 1995, two parties worked in the Goilala area. One travelled by aircraft from Port Moresby to Kerau via Woitape. The other went on from Kerau to Guari. The first carried out a walking traverse from Kerau mission to Lumio village and from Kerau to Tapini via Kataipa and Tawuni villages (2 days). The second walked from Guari to Tapini via Erumelavava, Buruai, Koilolavava and Gupou villages (2 days). One party travelled by air from Tapini to Fane mission and carried out garden observations in the vicinity of the mission (1 day). The second party flew to Woitape and worked south from Woitape (1 day). Other traverses were conducted from the Port Moresby-Bereina highway to Kubuna mission (1 day), and a visit was made by aircraft to Asimba village in Northern Province (1 day). The Kosipe and Yongei mission areas were not visited.

### Boundary definition

The boundaries with Systems 0301/0213 and 0302/0214 are taken to be the southern edge of the Owen Stanley Mountains. The boundaries with Systems 0305 and 0307 were determined by walking traverses from Guari station to Tapini station, from Kerau mission to Tapini and from aerial observations between Woitape station, Kerau, Tapini, Guari, and Fane mission, and were extrapolated on the basis of Saunder's (1993) map of regrowth vegetation.

### Notes

This system is distinguished from Systems 0301/0213 and 0302/0214 where fallow vegetation is tall woody regrowth and banana is a most important food; it is distinguished from System 0305 where tall woody fallows are used and only one planting is made before a long fallow. The only major difference with System 0307 is the fallow vegetation. System 0307 is higher and the upper boundary gives way to unused montane forest. The lower boundary of this system is unused short grassland. Land use in this system and System 0307 is converting forest to grassland and, as a consequence, is moving upslope into previously uncultivated forest. In this system, the transformation of forest into grassland has proceeded further than in System 0307.

This system is located in extremely rugged and high mountain valleys around Mt Strong (3588 m), Mt Albert Edward (3845 m) and the English Peaks (3838 m). The system has an altitudinal range of 1400 m to 2000 m, but the main garden areas are in the range of 1700 m to 2000 m. Slopes are steep to very steep. Rainfall is seasonal, with 73 per cent of average annual rain at Ononge received between November and April. Because land is owned from the forested mountain ridge to the valley floor, people may have gardens in this system and in System 0307.

Four studies describe agriculture in these systems. In 1910 Robert Williamson made an extended visit to Mafulu, to the east of Fane mission on the Angabanga River headwaters (Williamson 1912); between 1953 and 1957 Margaret McArthur lived in the Kunimaipa Valley at Omu village (McArthur 1961); between 1970 and 1972, C.R. Hallpike, lived near Kerau mission (Hallpike 1977); and in 1985 Eric Hirsch lived at Visi village, south of Ononge mission (Hirsch 1988, 1990). Some information about agriculture and general measures of development are contained in a report on a planning workshop held in 1987 (Tropical Resource Management 1987).

Sweet potato is the most important crop. Land is brought into cultivation by the construction of a boundary fence with timber from within the garden site, or carried from the disturbed forest areas upslope. The trees are cut down about 1.5 m above the ground, the debris is heaped across the whole garden surface to dry, and then burnt. Crude soil retention barriers may be constructed by laying the cut trunks along the contour. Sweet potato is planted in small mounds. Potato, corn and common beans are interplanted between the mounds and are harvested before the sweet potato. When the first sweet potato harvest is completed a short fallow occurs. Pigs are either placed in the garden, or fences are deliberately opened to let them in. Weeds and grasses also invade the garden. After two or three months, the pigs are excluded and the weeds, grasses and old sweet potato vines are pulled up, spread out to dry and burnt. The ashes are spread over the garden surface. A second planting is then made, also in small mounds. Following the second harvest, the pigs are again allowed into the garden and a long fallow begins.

The planting of two crops of sweet potato has most likely been adopted since 1910. Hallpike, McArthur and Hirsch all agree that two crops of sweet potato are planted before a long fallow, and Hirsch (1988, 47) described in some detail how pigs are placed in the gardens between plantings. Williamson (1912, 200) on the other hand, emphatically states that at Mafulu 'they never again plant the same crop in the same garden'. If Williamson was correct, and his other material suggests he was a careful observer, then the two plantings now observed everywhere, have evolved since he made his observations.

**Notes continued**

Sweet potato is planted at any time of the year, but new garden preparation begins from June and continues until October or November. Men dig up cane grass roots, build fences and dig ditches. Women plant sweet potato and do the weeding. Men may also plant sweet potato. Men grow bananas, sugarcane, tobacco, taro and yams, and climb for pandanus nuts.

Using air photographs, Hallpike (1977, 66) estimated the mean area of 8 gardens in 1957 to 1.18 ha, and of 9 gardens in 1970 to be 1.38 ha. He estimated the garden area per person in 1970 to be 0.13 ha, and that 0.05 ha of new land was being brought into cultivation, per person, each year. Hallpike's estimate of the fallow period was 13 years and Hirsch's 15-20 years (Hirsch 1988, 47).

The sweet potato gardens also contain smaller areas of Chinese taro, banana, highland pitpit, sugarcane, pumpkin, peas and cabbage. In 1995 dense plantings of lablab beans were observed growing on stakes in segregated sections of sweet potato gardens, and Williamson also described a 'big, coarse-growing bean' as important. However yams are never planted in sweet potato gardens and taro is planted mainly in yam gardens. A triploid banana known locally as 'Markham' has been introduced in the last five years and is being widely adopted. Williamson (1912, 198-199) described bananas being planted in numbers in old sweet potato gardens at Mafulu in 1910.

In the valley bottoms, gardens are made for yams (mainly *D. alata*). These gardens were not visited in 1995 and there is some question about how important they now are. Williamson (1912, 195-200) described yam planting at Mafulu in some detail: tubers were planted wrapped in *Cordyline* leaves and magical stones, pieces of stalactite from distant caves, and an unidentified magical plant, were used during planting. Photographs of yam (*D. alata*) tied to tall poles and in heaps on the ground for a village feast are shown in Williamson, pages 218 and 226. A patrol report written by K.C. McClelland in 1922 noted, 'They eat sweet potatoes during the wet season and yams in the dry season' and other patrol officers reported yam houses, which 'have long since ceased to exist' (reported by Hallpike 1977, 64). In 1953, McArthur (1971, 156) observed yams in 'terraced gardens' at lower altitudes. The tubers were reserved for ceremonial occasions. In 1970 and 1971, Hallpike thought 'in recent years yams seem to have been much less commonly grown' (1977, 64). People told Hallpike that cross-breed pigs were much more vigorous and broke down fences in these distant gardens, which discouraged the planting of yams. However, he observed large numbers of yams at feasts and assumed they were grown for special occasions. Hirsch (1988, 50) found the amount of yam gardening activity at Visi was associated with planned dance ceremonies and was a more communal activity than sweet potato gardening.

Most Goilala villages are located in this system, on spurs and flatter ridges. They comprise 10 to 12 houses and are fenced. Within the enclosure, household gardens are important. They contain sweet potato, potato, banana, sugarcane, pumpkin, choko, passionfruit, mandarin and large amounts of tobacco.

Pandanus nuts are a very important seasonal food source and cash earner. Impressively extensive groves of pandanus trees occur mainly in the adjacent System 0307. There are three varieties, two planted and one wild. The wild trees grow in the high altitude forest. The planted trees are raised as seedlings and then transplanted. The pandanus trees are tall and people climb over 20 m to harvest them. The nuts are smoked to preserve them and are important in ceremonies. Williamson (1912, 218) contains a photograph of large numbers of karuka nuts tied onto sticks for a village ceremony. Nuts are also sold in the markets of Port Moresby. Pandanus leaves are used for roofing and the bark for binding. Marita pandanus is grown extensively at lower altitudes.

Pigs are an important part of this system. A person's prestige and status is directly related to the number of pigs given away at ceremonies. Pigs are housed by night, but roam freely during the day. They are hand fed cooked sweet potato twice a day. Hallpike found 17 men owned an average of 6.5 pigs each, and McArthur estimated pig herds to be between 5 and 10 pigs. The numbers of pigs cared for depends upon planned ceremonies. Men and women contribute pigs to ceremonies and hundreds of pigs may be killed at one ceremony.

The extremely rugged and mountainous nature of the countryside makes access difficult. The Sacred Heart Mission began working in the Goilala area in the 1900s and, in order to improve access through the mountains, the priests organised the cutting of well graded pony trails to permanent camps. The mission at Fane was established in 1905, at Ononge in 1913, at Kerau in 1938 and at Yongai in 1949. The first government patrol post was built at Guari in 1947 and at Tapini in 1948. A vehicle road now links Tapini township with the main Port Moresby-Bereina highway, but it is in need of maintenance and improved bridging.

**Notes continued**

In the postwar period, cattle, chillies and coffee have been introduced. A number of cattle are kept for ceremonies and for local sale as meat. Chilli production peaked in 1981 at 14 tonne, but ceased in 1985. In 1986, 20 tonne of coffee were produced in Goilala District (Tropical Resource Management 1987, 14), but no coffee was being produced in 1995. Small amounts of vegetables and tobacco leaf were being sent to Port Moresby by air. Some people with access to the Waria River headwaters, in Northern Province, mine alluvial gold there. The area has a very high absentee rate, and large numbers of young men and women are living in informal settlements in Port Moresby (King 1988).

**National Nutrition Survey 1982/83**

91 families from 7 villages were asked in August 1982 or May 1983 what they had eaten the previous day. 97 per cent reported eating sweet potato, 14 per cent taro, 3 per cent yam, 1 per cent banana, 1 per cent sago and none cassava, Chinese taro or coconut. 1 per cent reported eating rice. 3 per cent reported eating fresh fish. This is similar to the crop pattern.

**Main References**

Hallpike, C.R. 1977 *Bloodshed and Vengeance in the Papuan Mountains: The Generation of Conflict in Tauade Society*. Oxford, Clarendon Press.  
Hirsch, E.L. 1988 *Landscapes of exchange: Fuyuge ritual and society*. PhD thesis, London School of Economics and Political Science, University of London, London.

**Other References**

Hirsch, E. 1990 From bones to betelnuts: processes of ritual transformation and the development of 'national culture' in Papua New Guinea. *Man (New Series)* 25, 18-34.  
King, D. 1988 Constant mobility amongst shifting cultivators: rural migration in Kosipe, Goilala. *Yagl-Ambu* 15, 2, 63-83.  
McArthur, A.M. 1961 *The Kunimaipa: the social structure of a Papuan people*. PhD thesis, Australian National University, Canberra.  
Tropical Resource Management 1987 *Goilala District Planning Workshop - Summary*. Cairns, Tropical Resource Management.  
Williamson, R.W. 1912 *The Mafulu: Mountain People of British New Guinea*. London, Macmillan and Company.

<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 7	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 4 Kairuku, 5 Goilala	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 724
<b>Population</b> 13,777	<b>Population density</b> 19 persons/sq km	<b>Population absent</b> 22 %

**System Summary**

Located in the Owen Stanley Mountains north and east of Tapini station in the headwaters of the Kunimaipa, Angabanga and Vanapa Rivers. People using this system may also have gardens in Systems 0305/0602 and 0307. Short woody regrowth fallows, 5-15 years old, are cleared, burnt and heavily fenced. Sweet potato is the most important crop; other crops are banana, Chinese taro, potato, taro and yam (*D. alata*). Sweet potato is planted on small mounds. Two plantings of sweet potato are made before a long fallow. A short fallow occurs between the plantings of sweet potato. Pigs are placed in the gardens between plantings and during the short fallow. Yams are always planted in separate gardens in valley bottoms. Taro is often only planted in yam gardens. Household gardens are important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 1900-2200      **Slope** Very steep (>25 degrees)

**CROPS**

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Chinese taro, Potato, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> )
OTHER VEGETABLES	Aibika, Bean (common), Bean (lablab), Cabbage, Corn, Cucumber, Highland pitpit, Oenanthe, Pumpkin tips
FRUITS	Passionfruit (purple), Pineapple, Sugarcane, Tree tomato, Ficus
NUTS	Karuka (planted), Karuka (wild)
NARCOTICS	Betel nut (highland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	Significant
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Minor
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Very significant

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Cattle	Minor
2 Fresh food	Minor
3 Potato	Minor
4 Tobacco	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	Minor
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	Very significant
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Minor
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Very significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Minor
SEASONAL SEC'DARY CROPS	Minor

## OTHER DOCUMENTATION

### Survey description

In August 1995, two parties worked in the Goilala area. One travelled by aircraft from Port Moresby to Kerau via Woitape. The other went on from Kerau to Guari. The first carried out a walking traverse from Kerau mission to Lumio village and from Kerau to Tapini via Kataipa and Tawuni villages (2 days). The second walked from Guari to Tapini via Erumelavava, Buruai, Koiloalavava and Gupou villages (2 days). One party travelled by air from Tapini to Fane mission and carried out garden observations in the vicinity of the mission (1 day). The second party flew to Woitape and worked south from Woitape (1 day). Other traverses were conducted from the Port Moresby-Bereina highway to Kubuna mission (1 day), and a visit was made by aircraft to Asimba village in Northern Province (1 day). The Kosipe and Yongei mission areas were not visited.

### Boundary definition

The boundaries with Systems 0305/0602 and 0306 were determined by walking traverses from Guari station to Tapini station, from Kerau mission to Tapini and from aerial observations between Woitape station, Kerau, Tapini, Guari, and Fane mission, and were extrapolated on the basis of Saunder's (1993) map of regrowth vegetation.

### Notes

This system is distinguished from System 0305/0602 where tall woody fallows are used and only one planting is made before a long fallow. The only major difference with System 0306 is the fallow vegetation. This system is higher and the upper boundary gives way to unused montane forest. Land use in this system and System 0306 is converting forest to grassland and, as a consequence, is moving upslope into previously uncultivated forest. In System 0306, the transformation of forest into grassland has proceeded further than in this system.

This system is located in extremely rugged and high mountain valleys around Mt Strong (3588 m), Mt Albert Edward (3845 m) and the English Peaks (3838 m). The system has an altitudinal range of 1400 m to 2200 m, but the main garden areas are in the range of 1700 m to 2000 m. Slopes are steep to very steep. Rainfall is seasonal, with 73 per cent of average annual rain at Ononge received between November and April. Because land is owned from the forested mountain ridge to the valley floor, people may have gardens in this system and in System 0306.

Four studies describe agriculture in these systems. In 1910 Robert Williamson made an extended visit to Mafulu, to the east of Fane mission on the Angabanga River headwaters (Williamson 1912); between 1953 and 1957 Margaret McArthur lived in the Kunimaipa Valley at Omu village (McArthur 1961); between 1970 and 1972, C.R. Hallpike, lived near Kerau mission (Hallpike 1977); and in 1985 Eric Hirsch lived at Visi village, south of Ononge mission (Hirsch 1988, 1990). Some information about agriculture and general measures of development are contained in a report on a planning workshop held in 1987 (Tropical Resource Management 1987).

Sweet potato is the most important crop. Land is brought into cultivation by the construction of a boundary fence with timber from within the garden site, or carried from the disturbed forest areas upslope. The trees are cut down about 1.5 m above the ground, the debris is heaped across the whole garden surface to dry, and then burnt. Crude soil retention barriers may be constructed by laying the cut trunks along the contour. Sweet potato is planted in small mounds. Potato, corn and common beans are interplanted between the mounds and are harvested before the sweet potato. When the first sweet potato harvest is completed a short fallow occurs. Pigs are either placed in the garden, or fences are deliberately opened to let them in. Weeds and grasses also invade the garden. After two or three months, the pigs are excluded and the weeds, grasses and old sweet potato vines are pulled up, spread out to dry and burnt. The ashes are spread over the garden surface. A second planting is then made, also in small mounds. Following the second harvest, the pigs are again allowed into the garden and a long fallow begins. Night air temperatures below freezing are sometimes experienced in the higher parts of this system. However, steep slopes appear to protect sweet potato against serious damage.

The planting of two crops of sweet potato has most likely been adopted since 1910. Hallpike, McArthur and Hirsch all agree that two crops of sweet potato are planted before a long fallow, and Hirsch (1988, 47) describes in some detail how pigs are placed in the gardens between plantings. Williamson (1912, 200) on the other hand, emphatically states that at Mafulu 'they never again plant the same crop in the same garden'. If Williamson was correct, and his other material suggests he was a careful observer, then the two plantings now observed everywhere, have evolved since he made his observations.

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**Notes continued**

Sweet potato may be planted at any time of the year, but new garden preparation begins from June and continues until October or November. Men cut down trees, build fences and dig ditches. Women plant sweet potato, taro and do most of the weeding. Men may also plant sweet potato. Men grow bananas, sugarcane, tobacco and yams, and climb for pandanus nuts. Williamson (1912, 258) contains photographs of people harvesting sweet potato in 1910.

Using air photographs, Hallpike (1977, 66) estimated the mean area of 8 gardens in 1957 to 1.18 ha, and of 9 gardens in 1970 to be 1.38 ha. He estimated the garden area per person in 1970 to be 0.13 ha, and that 0.05 ha of new land was being brought into cultivation, per person, each year. Hallpike's estimate of the fallow period was 13 years and Hirsch's 15-20 years (Hirsch 1988, 47). At Kosipe in 1982, King (1983), using air photography, estimated the area in cultivation to be 1-1.2 ha per person, using the 1980 census as the population denominator. However, it is likely King's use of census figures under-estimated the numbers of people who were making gardens in the area, but were living elsewhere (King 1988).

The sweet potato gardens also contain smaller areas of Chinese taro, banana, highland pitpit, sugarcane, pumpkin, peas and cabbage. In 1995, dense plantings of lablab beans were observed growing on stakes in segregated sections of sweet potato gardens, and Williamson also described a 'big, coarse-growing bean' as important. However yams are never planted in sweet potato gardens and taro is planted mainly in yam gardens. A triploid banana known locally as 'Markham' has been introduced in the last five years and is being widely adopted. Williamson (1912, 198-199) described bananas being planted in numbers in old sweet potato gardens at Mafulu in 1910.

In the valley bottoms, gardens are made for yams (mainly *D. alata*). These gardens were not visited in 1995 and there is some question about how important they now are. Williamson (1912, 195-200) described yam planting at Mafulu in some detail: tubers were planted wrapped in *Cordyline* leaves and magical stones, pieces of stalactite from distant caves, and an unidentified magical plant, were used during planting. Photographs of yam (*D. alata*) tied to tall poles and in heaps on the ground for a village feast are shown on pages 218 and 226. A patrol report written by K.C. McClelland in 1922 noted, 'They eat sweet potatoes during the wet season and yams in the dry season' and other patrol officers reported yam houses, which 'have long since ceased to exist' (reported by Hallpike 1977, 64). In 1953, McArthur (1971, 156) observed yams in 'terraced gardens' at lower altitudes. The tubers were reserved for ceremonial occasions. In 1970 and 1971, Hallpike thought 'in recent years yams seem to have been much less commonly grown' (1977, 64). People told Hallpike that cross-breed pigs were much more vigorous and broke down fences in these distant gardens, which discouraged the planting of yams. However, he observed large numbers of yams at feasts and assumed they were grown for special occasions. Hirsch (1988, 50) found the amount of yam gardening activity at Visi was associated with planned dance ceremonies and was a more communal activity than sweet potato gardening. Yam (*D. esculenta*) tubers were seen at Tapini market in 1995, but Tapini is in System 0305/0602 and below 1000 m altitude, and it was not clear where these tubers had been grown.

Most Goilala villages are located in System 0306, on spurs and flatter ridges. They comprise 10 to 12 houses and are stoutly fenced. Within the village enclosure, household gardens are important. They contain sweet potato, potato, banana, sugarcane, pumpkin, choko, passionfruit, mandarin and lemon trees. Large amounts of tobacco are also grown.

Pandanus nuts are a very important seasonal food source and cash earner. Impressively extensive groves of pandanus trees occur mainly within and up slope from this system. There are three varieties, two planted and one wild. The wild trees grow in the high altitude forest. The planted trees are raised as seedlings and then transplanted. The pandanus trees are tall and people climb over 20 m to harvest them. The nuts are smoked to preserve them and are important in ceremonies. Williamson (1912, 218) contains a photograph of large numbers of karuka nuts tied onto sticks for a village ceremony. Nuts are also sold in the markets of Port Moresby. Pandanus leaves are used for roofing and the bark for binding. Marita pandanus is grown extensively at lower altitudes.

Pigs are an important part of this system. A person's prestige and status is directly related to the number of pigs given away at ceremonies. Pigs are housed by night, but roam freely during the day. They are hand fed cooked sweet potato twice a day. Hallpike found 17 men owned an average of 6.5 pigs each, Hirsch estimated 7 pigs per adult male and McArthur estimated pig herds to be between 5 and 10 pigs. The numbers of pigs cared for depended upon planned ceremonies. Men and women contribute pigs to ceremonies and hundreds of pigs may be killed at one ceremony.



The Kosipe basin, which occurs within this system, was unoccupied until the 1950s. However, at an archeological site near the Kosipe mission, waisted stone axes around 26,000 years old were discovered (White et al. 1970). It is likely the site was used as a seasonal, karuka pandanus collecting camp, during the Late Pleistocene.

The extremely rugged and mountainous nature of the countryside makes access difficult. The Sacred Heart Mission began working in the Goilala area in the 1900s and in order to improve access through the mountains the priests organised the cutting of well graded pony trails to permanent camps. The mission at Fane was established in 1905, at Ononge in 1913, at Kerau in 1938 and at Yongei in 1949. The first government patrol post was built at Guari in 1947 and at Tapini in 1948. A vehicle road now links Tapini township with the main Port Moresby-Bereina highway, but is in need of maintenance and improved bridging.

In the postwar period, cattle, chillies and coffee have been introduced. A number of cattle are kept for ceremonies and for local sale as meat. Chilli production peaked in 1981 at 14 tonne, but ceased in 1985. In 1986, 20 tonne of coffee were produced in Goilala District (Tropical Resource Management 1987, 14), but no coffee was being produced in 1995. Small amounts of vegetables and tobacco leaf were being sent to Port Moresby by air. Some people with access to the Waria River headwaters, in Northern Province, mine alluvial gold there. The area has a very high absentee rate, and large numbers of young men and women are living in informal settlements in Port Moresby (King 1988).

### **National Nutrition Survey 1982/83**

117 families from 14 villages were asked in August, September, October or November 1982 or February, April or May 1983 what they had eaten the previous day. 91 per cent reported eating sweet potato, 12 per cent taro, 11 per cent yam, 9 per cent banana, 3 per cent coconut, 1 per cent cassava, 1 per cent sago and none Chinese taro. 12 per cent reported eating rice. 1 per cent reported eating fresh fish. This is similar to the crop pattern, except for the higher than expected consumption of coconut.

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<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 8	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 1 Abau	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 88
<b>Population</b> 3,600	<b>Population density</b> 41 persons/sq km	<b>Population absent</b> N/A

**System Summary**

Located on the Cape Rodney and associated land settlement schemes, north and east of Kupiano township. Gardening occurs on 3 ha of land set aside for subsistence on 7.5 ha blocks. Short woody regrowth, 5-15 years old, is cleared and burnt. Many gardens are fenced against pigs. Sweet potato and banana are the most important crops; taro and yam (*D. esculenta* and *D. alata*) are important crops; other crops are Chinese taro, cassava, *Amorphophallus* taro and Queensland arrowroot. Banana is planted once but produces for up to 3 years. Sweet potato is grown on small mounds. Household gardens are important. Land is cleared for gardening around August each year.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 20-100      **Slope** Gentle (2-10 degrees)

**CROPS**

STAPLES DOMINANT	Banana, Sweet potato
STAPLES SUBDOMINANT	Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Amaranthus spp., Chinese cabbage, Corn, Cucumber, Lowland pitpit, Peanuts, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon, Grapefruit, Guava
NUTS	Breadfruit, Coconut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	1 planting
R VALUE	9 (very low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Significant

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	Minor
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	Minor

**CASH EARNING ACTIVITIES**

1 Fresh food	Very significant
2 Rubber	Very significant

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

**OTHER DOCUMENTATION**

**Survey description**

In November 1988, surveys of gardens and fresh food marketing (2 weeks). In August 1995, a road traverse from Kwikila township to Newtown, and traverses from Newtown to Amau village, and Bomguina and Kupiano townships, with visits to blocks in Ianu North and Manabo divisions (2 days).

**Boundary definition**

The boundaries with Systems 0317, 0318 and 0319 were determined from maps of the location of settlement blocks contained in Bourke (1988), supplemented by road traverses in the area.

**Notes**

This system covers the resettlement schemes of Ianu, Manabo and Cocolands, north of Moreguina (Newtown), which make up the Cape Rodney Agricultural Development Project, and northwest of Kupiano at Upilima, in the Lako River Valley. Settlers are mainly drawn from Central and Gulf Provinces.

The 1980 census population figures for this system appear to be seriously in error. French and Nen (1986, 18) noted serious underenumeration in the 1980 census. The 1990 census also appears to have undercounted population in this system. The population figure used above is based on an estimate of 480 blocks occupied by an average of 7.5 persons per block (Bourke 1988). The population absent cannot be estimated for this system.

The Cape Rodney Scheme began in the 1950s as a resettlement scheme with 14 plantation sized blocks for expatriate farmers and 300 smallholder blocks. The blocks were planted in coconuts and rubber. The expatriates had mostly left the scheme by the 1970s when the plantations were given back to village landowners under the Plantation Redistribution Scheme. At the end of the 1970s, the Magi Highway was extended to Bomguina (French and Nen 1986, 27). By 1988, 229 blocks at Ianu, Manabo and Cocolands were occupied and a further 237 blocks were planted with rubber, and were to be settled in 1989. At Upilima a total of 525 blocks were prepared for settlement (Bourke 1988, 3). The Cape Rodney Scheme has been the subject of a number of detailed studies. They include Benjamin (1983), Asian Development Bank (1983), French and Nen (1986) and Bourke (1988).

The blocks are 7.5 ha in area, of which 4 ha is planted in rubber and 3 ha is available for subsistence gardening. The balance of the block is for housing and fruit trees.

In 1981, Benjamin (1983) observed agriculture on and around the scheme. Sites were cleared of tall woody regrowth and planted in yam (*D. esculenta* and *D. alata*), together with taro, banana, *Amorphophallus* taro, Queensland arrowroot, corn, aibika, amaranthus, snake bean, pumpkin, sugarcane, pawpaw and watermelon. Small segregated taro gardens were also seen. After the yams were harvested, sweet potato was planted with corn and banana. Banana persisted for a further 2-3 years and was often interplanted with Chinese taro, sugarcane, cassava, pawpaw, pumpkins, pineapple, watermelon and pitpit. Corn was particularly important and occupied 5 per cent of garden areas. *Amorphophallus* taro and Queensland arrowroot were planted in all gardens in small amounts. Most yam were not staked. Other greens were *Ficus copiosa*, valangur, choko leaves, kangkong, rungia, oenanthe, watercress, tulip, karakap and basella (*Basella rubra*).

Benjamin (1983) was concerned with the relatively large areas of land being used for subsistence gardens (0.95 ha per block and 0.12 ha per person per year); the long cropping interval (up to 5 years); a fallow period of 8-10 years, which was two-thirds of the fallow period being used by surrounding agricultural systems (System 0319); and the restricted area available to settlers (3 ha). She suggested soil fertility decline could occur relatively rapidly.

In February and March 1986, an estimate of food production from the blocks was 130 kg per block, of which 33 per cent by weight was banana, 25 per cent sweet potato and 8 per cent pitpit, corn, pumpkin, cucumber and peanuts. Yam, taro and cassava were only 7 per cent of production (French and Nen 1986, 70). In addition, blockholders were earning up to K115 per fortnight from wage labour, business and rubber sales (French and Nen 1986, 72). The same study estimated that over two-thirds of all food consumed was produced on the blocks. Banana and sweet potato were the most important source of calories, followed by rice and flour. A further study of food gardening in 1988 found banana and sweet potato the most important crops and taro, yam (*D. alata* and *D. esculenta*) were important crops. Other crops were Chinese taro and cassava. Sugarcane and corn were important. The importance of crops varied greatly between blocks and depended on the origins of the settlers (Bourke 1988, 7).

**Notes continued**

In 1988, the main problems observed were pest and disease problems, including pigs, snails, taro blight, sweet potato weevil and taro beetle (Bourke 1988, 9). Sweet potato crops had yielded very poorly in 1988, possibly as a result of a potash deficiency and waterlogging. Extension services were poor and access to markets was difficult because of bad roads.

Fresh food marketing has long been an important activity for settlers at Cape Rodney. In 1973, 80 per cent of settlers sold food in local markets, and 20 per cent earned more from fresh food sales than from rubber sales (Hulme 1983, 182-183). A 1988 estimate of net earnings from food sales was K278 per blockholder per year, much less than income from rubber sales of K1800 per blockholder per year (Bourke 1988, 12). Sales were made locally at Kupiano and Moreguina townships and Kapari village and sawmill, to the Scheme's agricultural development extension service, and in Port Moresby (Bourke 1988, 15-16). Vegetables are traded for fish with people from System 0319.

In 1995, details of production and of areas of land under cultivation were not collected. Many of the blocks planted in rubber, ready for settlers in Cocolands and Uplima, have not been taken up, allegedly because legal papers of titles to the blocks have not been prepared. The road from Kupiano to Kwikila was poorly maintained and was impassable to two-wheeled drive vehicles after rain. The Department of Agriculture and Livestock had taken over the management of the Scheme, and budgetary restrictions were affecting local employment. The rubber factory was destroyed by a fire in about 1993, but was operating again in 1995, using cup rubber being produced from the blocks. A study conducted in 1992 found that production from the blocks was constrained by low tapping rates, and not by low numbers of trees. It argued that blockholders could increase production significantly by tapping more often. For every 1 per cent extra tapping, they would receive 1.8 per cent increase in income. However, the report noted that the most successful blockholders were investing in transport services and retailing, and not in rubber production which suggested returns to labour in rubber were not as attractive as other enterprises (Agricultural Development Services 1992).

**National Nutrition Survey 1982/83**

27 families from 2 villages were asked in August 1982 what they had eaten the previous day. 85 per cent reported eating yam, 52 per cent banana, 22 per cent sweet potato, 11 per cent coconut, 7 per cent taro and none cassava, Chinese taro or sago. 59 per cent reported eating rice. 11 per cent reported eating fresh fish. There is some question about where these figures were collected, because there are no 'villages' on the blocks. The consumption of yam is higher than expected and the consumption of sweet potato lower than expected from the crop pattern observed in 1995 and from all previous agricultural surveys.

**Main References**

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**Other References**

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<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 9	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 4 Kairuku	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 367
<b>Population</b> 2,826	<b>Population density</b> 8 persons/sq km	<b>Population absent</b> N/A

**System Summary**

Located between the coast and the Hiritano Highway, west of Galley Reach between Port Moresby and Bereina station. Tall woody regrowth fallows, more than 15 years old, on alluvial flats in valley bottoms, are cleared, burnt and fenced. Banana is the most important crop; cassava and yam (*D. esculenta*) are important crops; other crops are Chinese taro, taro, sago, sweet potato and yam (*D. alata*). Two plantings of yam (*D. esculenta*) and one of banana and cassava are made before a long fallow. Banana and yam are planted in separate gardens. Gardens are cleared around August each year. Yams are staked. Sweet potato is grown on small mounds.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 20-100      **Slope** Steep (10-25 degrees)

**CROPS**

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Cassava, Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Lowland pitpit, Peanuts, Pumpkin tips, Bean (snake), Tomato
FRUITS	Malay apple, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	20 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Significant
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Betel nut	Minor
2 Firewood	Minor
3 Fresh food	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Very significant

## **OTHER DOCUMENTATION**

### **Survey description**

In August 1995, a road traverse from Bereina station to Hisiu plantation, via the coast road. From Hisiu plantation, inland to the Hiritano Highway via Duimana, Kaiiau and Tubu villages (1 day).

### **Boundary definition**

The boundary with System 0304 was determined by a road traverse between Bereina station and Delena village; that with System 0305/0602 by a road traverse from Kubuna mission to the Aroa River on the Hiritano Highway; and that with System 0310 by a road traverse from Delena village to Hisiu plantation, and from Hisiu plantation to the Hiritano Highway via Duimana, Kaiiau and Tubu villages.

### **Notes**

This system is distinguished from System 0310 because tall woody fallows are used here, compared to savanna grasslands there. Although this system is located in savanna covered hills, gardens are located in forest remnants. Cassava is a more important crop in System 0310 than in this system. In System 0304 fallows are short woody regrowth, and in System 0305/0602 sweet potato is the most important crop.

This system is located inland of the coast in low undulating hills. There is a high rainfall gradient from the coast inland, and the coastal dry season is more severe than it is here. Gardens are situated on alluvial flats in tall secondary forest. The hills are covered with savanna and thicket, dominated by Themeda and Imperata grass, and Eucalyptus trees. The savanna is not used for gardening.

The land is cleared, burnt and fenced. A first planting is made of yam (mainly *D. esculenta*), cassava and banana, at very low densities; and with corn and greens, aibika in particular. Banana may also be planted in a separate garden. A second planting of yam (*D. esculenta*) is made, with higher densities of banana and cassava. Following the second yam harvest, the density of banana is further increased. Very little sweet potato was observed in this system. At Duimana village, people claimed that sweet potato attracted rats and pigs, which were numerous in the area, and they therefore chose not to plant it.

Yams are staked and banana are propped and wrapped to protect them against birds and bat damage.

Villages in this system are connected to Port Moresby and Bereina via an almost all weather access track to the Hiritano Highway. They sell firewood and fresh food in markets on the highway and in Port Moresby. Little betel nut was observed and betel nut sales were not noted as being important, but they may be. Many people from this system are employed in Port Moresby and cash incomes are relatively high for rural PNG. Purchased foods are important. Fish are obtained from System 0310 in exchange for vegetables.

Information on the proportion of the population who are absent is inadequate for this system.

### **National Nutrition Survey 1982/83**

98 families from 6 villages were asked in September 1982 what they had eaten the previous day. 78 per cent reported eating banana, 18 per cent coconut, 9 per cent sweet potato, 8 per cent cassava, 7 per cent sago, 7 per cent yam, 1 per cent taro and none Chinese taro. 92 per cent reported eating rice. 16 per cent reported eating fresh fish. The high consumption of banana is similar to the crop pattern, but the consumption of yam and cassava is lower than expected. The NNS survey occurred at the end of the dry season, when new gardens are being planted, and this is probably the reason for these differences.

### **Main References**

None.

### **Other References**

None.

<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 10	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 3 Hiri, 4 Kairuku	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 108
<b>Population</b> 2,799	<b>Population density</b> 26 persons/sq km	<b>Population absent</b> 41 %

**System Summary**

Located on beach ridges, low hills and foot slopes on the coast southeast of Yule Island and on Yule Island, in savanna grasslands and semi-deciduous thicket. Savanna grass fallows, more than 15 years old, are cut, burnt and completely tilled with spades. Banana and cassava are the most important crops; coconut and yam (*D. esculenta*) are important crops; other crops are sweet potato, *Alocasia taro*, yam (*D. alata*) and *Amorphophallus taro*. Separate gardens are made for banana and yam. Two plantings of yam are made before a long fallow. Yam is staked and banana is propped and wrapped. Yam and sweet potato are planted on small mounds. Banana may produce for up to 5 years if cared for. Agriculture is highly seasonal and dry season food shortages are common. Seafoods are important. Villages are surrounded by extensive coconut stands, and fruit and nut trees. Root crops and banana, which are obtained from System 0304 and System 0309 in exchange for fish and shellfish, are important sources of food. Processed food purchased using remittances from people working in Port Moresby is also very important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 0-40      **Slope** Gentle (2-10 degrees)

**CROPS**

STAPLES DOMINANT	Banana, Cassava
STAPLES SUBDOMINANT	Coconut, Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro ( <i>Alocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Lowland pitpit, Peanuts, Pumpkin tips, Bean (snake), Tomato
FRUITS	Coastal pandanus, Malay apple, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Savanna
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	20 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Very significant
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Fish	Significant
2 Betel nut	Minor
3 Coconuts	Minor
4 Fresh food	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	Very significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Very significant



## **OTHER DOCUMENTATION**

### **Survey description**

In August 1995, a road traverse from Bereina station to Hisiu plantation, via Nikura, Delena and Nabuapaka villages along the coast road, and from Hisiu plantation to the Hiritano Highway via Duimana, Kaiiau and Tubu villages (1 day).

### **Boundary definition**

The boundary with System 0304 was determined by a road traverse from Bereina station to Delena village. The boundary with System 0309 was determined by a road traverse from Delena village to Hisiu plantation, and from Hisiu plantation to the Hiritano Highway via Duimana, Kaiiau and Tubu villages. The boundaries with Systems 0311 and 0316 were determined from a road traverse from the Hiritano Highway to Galley Reach. The Motu villages east of Redscar Head were not visited.

### **Notes**

This system is distinguished from Systems 0304 and 0311 where short woody regrowth fallows are used and fallow periods are shorter. This system is distinguished from System 0309 because tall woody fallows are used there, compared to savanna grasslands here. Cassava is a more important crop here than in System 0309. There is a high rainfall gradient from the coast inland, and the coastal dry season is more severe here than it is inland. This system is distinguished from System 0316 where cassava is a most important crop and tall grass the fallow vegetation.

Northwest of Yule Island, this system is located on beach ridges, covered with mid-height grasses and semi-deciduous thicket. On Yule Island and along the coast to the southeast, it occupies low spurs, interflaves and footslopes, covered with a savanna comprised of mid-height Themeda and Imperata grass and scattered Euctalyptus trees. Thickets occur along drainage lines. Mangrove flats occur at a number of places along the coast.

Agriculture is extremely seasonal. Average annual rainfall at Kairuku, on Yule Island, is 1230 mm. 84 per cent of this rain is received between December and April and only 16 per cent between May and November. Gardens are cleared from August to September and planted from October to December. A first planting is made of yam (mainly *D. esculenta*), cassava and banana, at very low densities; and with corn and greens, aibika in particular. Banana is planted in a separate garden. A second planting of yam is made, with higher densities of banana and cassava. Following the second yam harvest, the density of banana may be further increased.

Before colonisation, between December and April, food supply became precarious. It now depends on the continuing traditional trading of seafood for root crops and banana with Mekeo people in System 0304 and with inland people in System 0309. Formerly, in drought years, mangrove seeds and cycad seeds were eaten. Today, cassava from gardens, and rice and tinned fish purchased with money from wage earners in Port Moresby, are used instead (Monsell-Davis 1981). The system has a high rate of absenteeism, with many younger people living and working in Port Moresby, and returning to the villages at the weekends.

The percentage of the population who are absent presented here is calculated using the PDS figures for 90 per cent of the villages assigned to this system.

### **National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

### **Main References**

None.

### **Other References**

Monsell-Davis, M. 1981 Nabuapaka: social change in a Roro community. PhD thesis, Macquarie University, Sydney.

<b>PROVINCE</b> 3 Central	<b>AGRICULTURAL SYSTEM No.</b> 11	<b>Subsystem No.</b> 1 of 1
<b>Districts</b> 3 Hiri	<b>Subsystem Extent</b> 100 %	<b>Area (sq km)</b> 297
<b>Population</b> 1,003	<b>Population density</b> 3 persons/sq km	<b>Population absent</b> 16 %

**System Summary**

Located along the Hiritano Highway between the Laloki River and Galley Reach, northwest of Port Moresby. Short woody regrowth, estimated to be 5-15 years is cleared and burnt. Banana is the most important crop; sweet potato is an important crop; other crops are taro, cassava, Chinese taro, Alocasia taro, yam (D. alata and D. esculenta) and sago. The new garden is planted with corn, aibika, sweet potato on small mounds, and banana. Cassava is planted around the edges, and banana is planted throughout the garden at low densities. Small areas of taro and yam are planted in segregated plots. Yams are staked. A second planting of sweet potato occurs following the yam harvest. The density of banana is increased following the harvest of the root crops. The banana garden can be maintained for up to 5 years. Gardens are cleared in July and planted in August every year.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 10-30      **Slope** Flat (<2 degrees)

**CROPS**

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Sweet potato
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (Alocasia), Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Chinese cabbage, Corn, Cucumber, Lowland pitpit, Pumpkin tips, Tulip, Bean (snake), Tomato
FRUITS	Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	33 (medium)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	Minor
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Fresh food	Significant
2 Fish	Minor
3 Game	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	None
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## **OTHER DOCUMENTATION**

### **Survey description**

In August 1995, a road traverse, by two parties, from Bereina station to Port Moresby, with interviews and garden observations at Kerea and Veikabu villages and Iomare Settlement (1 day).

### **Boundary definition**

The boundaries with Systems 0305/0602, 0309, 0310, 0312, 0315 and 0316 were determined from road traverses along, and off, the Hiritano Highway between Port Moresby and Bereina station. The boundary with System 0314 was determined by fieldwork at Kagi and Manumu villages.

### **Notes**

This system is distinguished from Systems 0309 and 0312 because the fallow vegetation in those systems is tall woody regrowth. It is distinguished from System 0310 where savanna is the fallow vegetation and cassava is a more important crop; from Systems 0305/0602 and 0314 where fallow vegetation is tall woody regrowth and sweet potato is the most important crop; from System 0315, an urban system in which sweet potato is the most important crop, the cropping interval is 6-14 plantings and short grasses are the fallow vegetation; and from System 0316 where the fallow vegetation is tall grass and the fallow period is shorter.

Agriculture in this area is relatively recent. It follows the construction of the Hiritano Highway and logging of the original forests in this area in the 1970s. Goilala people, from System 0305/0602, and Koiari people, from Systems 0312 and 0314, have moved to the road. Many people living in this system travel back and forth between their original villages and settlements in this system. Some parts of the system cover formal resettlement blocks (Nalapan et al. 1973). Many areas are inundated seasonally and are swampy, even in the dry season. In general, soils are poor, either immature or swampy, except for narrow strips of alluvial soils along the rivers, which are too small to map as a separate system. Fish are caught in the local rivers and eaten and sold for cash.

Short woody regrowth, with some patches of tall grass, probably more the outcome of logging, followed by burning for hunting, and not agriculture, is cleared and burnt. Fallow lengths are difficult to estimate because some areas have not been cultivated previously, but must be 5-15 years, given the recency of the opening up of what was previously unused primary forest. The new garden is planted with corn, aibika, sweet potato on small mounds, and banana. Cassava is planted around the edges, and banana is planted throughout the garden at low densities. Small areas of taro are planted in segregated plots. Yam (*D. alata*) is also planted in small segregated plots and trained up stakes. A second planting of sweet potato occurs following the yam harvest. The density of banana is increased following the harvest of the root crops. The banana garden can be maintained for up to 5 years. Sago is produced two or three times in a year.

Some garden areas are inundated every year. Elsewhere, the garden land is flooded by shallow water between January and March in some years. Gardens are cleared from July and planted in August each year. Land which is flooded during the wet season is planted earlier.

People have colonised this area following the logging over of tall primary rain forest, in order to have better access to the Port Moresby markets. The Hiritano Highway is sealed to Port Moresby and there is a lot of traffic on the road. The nearby swamps abound in wallaby, pigs and deer. Shotgun owners contract shooters and share the proceeds from the sale of the meat. Fruit, pineapple, cucumber and pawpaw, and some greens are also sold.

### **National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

### **Main References**

None.

### **Other References**

Nalapan, J., R. Wari and M.W. Ward 1973 Report on a study of the Kuriva subdivision, Central District, 1970-72. Papua New Guinea Agricultural Journal 24, 3, 107-118.

Districts 3 Hiri  
Population 1,131

Subsystem Extent 100 %  
Population density 4 persons/sq km

Area (sq km) 269  
Population absent 14 %

**System Summary**

Located on the Sogeri Plateau and the Owen Stanley Mountain foothills, north and northwest of Port Moresby. Tall woody regrowth, 20-25 years old, is cut and burnt. Most gardens are fenced. Banana is the most important crop; yam (*D. esculenta*) is an important crop; other crops are cassava, sweet potato, taro, Chinese taro, yam (*D. alata*) and *Amorphophallus* taro. Two plantings are made before a long fallow. Yams are either replanted or replaced with sweet potato or cassava. Sweet potato is dibbled into the surface. The density of banana plantings is increased in the second planting. Banana continues production for up to 3 years, or longer if cared for. Gardens are cleared from July every year and planting continues until November. Yam and banana are planted separately within the same garden during the first planting. Yam (*D. esculenta*) is staked.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 400-800      **Slope** Steep (10-25 degrees)

**CROPS**

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Bean (common), Choko tips, Corn, Cucumber, Kangkong, Lowland pitpit, Peanuts, Pumpkin tips, Karakap
FRUITS	Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Pomelo
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	None
CROP SEGREGATION	Significant
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Fresh food	Significant
2 Coffee Robusta	Minor
3 Fish	Minor
4 Rubber	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Minor
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Sogeri township. From Sogeri, vehicle traverses were made to Kailakanumu village in the northeast; to Vesilogo village in the northwest; and to Gurinumu village in the southeast, south of Sirinumu Dam (half day).

### Boundary definition

The boundary with Systems 0305/0602, 0311, 0313, 0315 and 0316 were determined on road traverses along, and off, the Hiritano Highway, the Magi Highway, the Sogeri Road and the Sogeri station to Musgrave River road. The boundary with Systems 0317 and 0318 were determined by a road traverse from Kwikila station to Debdegoro village, but those on the eastern edge of the Sogeri Plateau are assumed only and were not determined on the ground. The boundary with System 0314 was determined by fieldwork at Kagi and Manumu villages.

### Notes

This system is distinguished from Systems 0305/0602 and 0313 where sweet potato is the most important crop; from System 0311 because the fallow vegetation in that system is short woody regrowth and the fallow period is shorter. It is distinguished from System 0315, which is an urban system; from System 0314 where only one planting is made before a long fallow and sweet potato is the most important crop; and from System 0316 where the fallow period is shorter. It is distinguished from System 0317 where fallow vegetation is short grass, 5-7 years old. It is similar to System 0318, but there sweet potato and banana are the most important crops.

Relatively large areas in this system are taken up by rubber plantations, cattle ranches and commercial fruit and vegetable production for nearby Port Moresby. Vairarata National Park is located on the southwest edge, and the Sirinumu Dam, Port Moresby's water supply, occupies the centre of the plateau. The natural vegetation across much of the central plateau is a tall savanna, with lowland hill forest around the edges and in some valley bottoms. There is a sharp boundary between the savanna and the forest. The savanna is little used for subsistence agriculture. Average annual rainfall at Subutana is 3610 mm and at Iawarere in the Musgrave River valley, 3390 mm.

Gardens in this subsystem are cleared from tall woody regrowth, which is completely felled and burnt. Gardens are cleared and planted from July-August to October-November each year. Gardens are fenced with bamboo. Banana, corn and greens are planted first. Yam (mainly *D. esculenta*) is planted on what are considered better soils and is planted separately from bananas within the same garden. Taro is interplanted with yam. Yam (*D. esculenta*) is staked on 2 m poles. Yam (*D. alata*) tend to be not staked. Bananas are wrapped as protection against insect and bird damage, and propped with tall sticks. Small areas of pineapples and peanuts are grown in grass fallow gardens. After the first yam harvest, either yams, sweet potato or cassava are replanted and the density of banana is increased. Bananas continue to produce for up to 3 years, and longer if cared for.

Gardens observed in 1995 did not use soil retention barriers, but photographs in Turvey (1974, 21-22) show cross slope barriers made from logs, in gardens in the Sivili Creek catchment, in the headwaters of the Musgrave River. It is not clear whether these gardens were made by local Koiari people or settlers from elsewhere in PNG. Nutrient cycling in this forest has been described by Turvey (1974). Many parts of the system were logged over in the 1950s.

The plateau is well connected by road to Port Moresby. Fresh food, sweet potato in particular, pineapples and peanuts are sold in Port Moresby fresh food markets. Other important sources of cash are compensation paid to landowners for the loss of the land beneath the waters of the dam; and informal rents from settlers from elsewhere in Papua New Guinea, Southern Highlands and Morobe Provinces in particular, who were previously labourers on now defunct plantations. Some people are also tapping rubber trees on plantations returned to them under the Plantation Redistribution Scheme. Fish caught in Sirinumu Dam are sold in local markets. Cash incomes are higher than average for rural PNG and purchased foods, in particular rice, are important.

Less is known about agriculture practiced by large numbers of settlers from other parts of PNG, in particular Chimbu and Southern Highlands Province and Goilala District of Central Province. They are known to produce pineapples, peanuts and greens for the Port Moresby markets on land owned by Koiari villagers, or State owned land, as well as subsistence foods (see also System 0313).

**National Nutrition Survey 1982/83**

40 families from 5 villages were asked in September 1982 what they had eaten the previous day. 55 per cent reported eating sweet potato, 28 per cent banana, 28 per cent cassava, 25 per cent yam, 5 per cent coconut, 3 per cent taro and none Chinese taro or sago. 83 per cent reported eating rice. 20 per cent reported eating fresh fish. This is similar to the crop pattern, except for the higher than expected consumption of sweet potato and cassava, and the lower than expected consumption of banana.

**Main References**

None.

**Other References**

Forbes, D. 1974 Market participation by subsistence based cultivators: the Koiari of central Papua. MA thesis, University of Papua New Guinea, Port Moresby.

Turvey, N.D. 1974 Nutrient cycling and variations in stream water quality under tropical rain forest in central Papua. Department of Geography, Occasional Paper No. 10, University of Papua New Guinea, Port Moresby.



Districts 3 Hiri  
Population 123

Subsystem Extent 75 %  
Population density 5 persons/sq km

Area (sq km) 27  
Population absent 11 %

### System Summary

Located on the northeastern edge of the Sogeri Plateau in steep hill country, from the now abandoned Itikinumu rubber plantation east to the Musgrave River. Two subsystems were identified on the basis of fallow type and important crops. For the entire system, sweet potato is the most important crop; banana and yam (*D. esculenta*) are important crops; other crops are Chinese taro, cassava, taro and yam (*D. alata*). This subsystem occupies an estimated 75 per cent of the land use. Fallow vegetation of short woody regrowth, less than 5 years old, comprising pure stands of *Piper aduncum*, is cleared. The Piper sticks are used to construct barriers across the slope, behind which terraces are constructed, approximately 50 cm high and 150 cm wide. Soil is tilled and mounds are formed from the loose earth. Sweet potato is cultivated on the mounds. In this subsystem, sweet potato is the most important crop; other crops are Chinese taro and banana. Only one planting is made before a long fallow. At least half of the sweet potato produced is sold in Port Moresby fresh food markets. Imported rice is an important food. Household gardens are important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 600-800      **Slope** Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Chinese taro, Sweet potato
OTHER VEGETABLES	Cabbage, Chinese cabbage, Choko tips, Corn, Highland pitpit, Peanuts
FRUITS	Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	1 planting
R VALUE	25 (low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	None
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Significant

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Fresh food	Very significant
2 Rubber	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	None
TILLAGE	Very significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Very significant
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
MOUNDS	Very significant
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	None
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	None



## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Sogeri township and from Sogeri to Kailakanumu village (half day).

### Boundary definition

The boundary with System 0312 was determined on a road traverse from Sogeri station to the Musgrave River; and with System 0314 was determined by fieldwork at Kagi and Manumu villages.

### Notes

This system is distinguished from System 0312 where the fallow vegetation is tall woody regrowth, the fallow period is longer and banana is the most important crop. The second subsystem here is identical to System 0312. The system is distinguished from System 0314 where the fallow is tall woody regrowth; from System 0317 where the fallow is short grass; and from System 0318 where fallow vegetation is tall woody regrowth.

The 1980 censused population of 123 would appear to be a considerable underestimate of the resident population in 1995.

The main valley floors and lower slopes in this area were planted with rubber in the early 1900s. The surrounding hill country was logged over in the 1970s. The hillsides are now covered with either short grass; with pure stands of *Piper aduncum*, a fast growing exotic shrub; or a much reduced hill forest. The area is occupied by the original landowners, Koiari speaking people, and by people who were either labourers on the now abandoned rubber plantations, or have been attracted to the area through family relationships with the former labourers. The newcomers are mainly from Kabwum, in the mountains of the Huon Peninsula (System 1210), or from Tari in the Southern Highlands Province (Systems 0704, 0705, 0706). They have discrete settlements of their own.

This subsystem is located in the Piper covered areas. It is used by both the indigenous Koiari people and the Kabwum and Tari settlers. Subsystem 2 is located in the forest and is used only by the Koiari landowners. Everyone agrees that Subsystem 1 was introduced to the area by settlers from Kabwum District in Morobe Province.

The subsystem has developed out of the availability of sticks from the introduced shrub *Piper aduncum*, the need to prevent soil erosion, and to prevent the invasion of cultivated areas by grasses. During clearing, Piper sticks are cut into appropriate lengths and are hammered into the ground with rough wooden mallets. Other sticks are tied onto these stakes horizontally with vines. Soil is then cut from immediately beneath the fence above and shovelled against the back of the fence below, to form a terrace. The loose soil is then formed into mounds on the terrace, about 1.5 m in diameter and 20 cm high, and sweet potato is planted along the outside half of the mounds.

Long fallows are less than 5 years. During this time, the Piper stakes begin to grow and the fallow site quickly becomes covered in a pure stand of Piper, about 3 m to 5 m tall. The plant is said to maintain a friable soil and to prevent the establishment of kunai grass (*Imperata*). It also provides the material from which the soil retention barriers are constructed at the next cultivation.

Terraces now cover extensive areas of hillside in this area and large areas of Piper fallows also exist. There is evidence in the form of field marks and of terracing in areas which are now under *Imperata*. This suggests that some land has gone out of production due to poor yields and the replacement of the Piper scrub by short grass.

On small areas of flat land, some Tari people use composted mounds to grow sweet potato. Near settlements small areas of corn, peanuts, spring onions and other vegetables are grown in beds. These gardens are probably best represented as household gardens.

**Notes continued**

An estimated 50 per cent of sweet potato production from this subsystem is sold in Port Moresby fresh food markets by the growers. With cash from these sales, villagers purchase imported rice and tinned fish. Some people also tap rubber in nearby abandoned plantations and sell firewood at Sogeri and Port Moresby.

**National Nutrition Survey 1982/83**

8 families from 1 village were asked in September 1982 what they had eaten the previous day. 88 per cent reported eating sweet potato, 75 per cent banana, 50 per cent yam, 38 per cent cassava, 38 per cent Chinese taro, 25 per cent taro, 13 per cent sago and none coconut. 100 per cent reported eating rice. 13 per cent reported eating fresh fish. Although the survey covered only one village, it is similar to the crop pattern for the entire system, except for the consumption of sago and the high consumption of banana.

**Main References**

None.

**Other References**

Forbes, D. 1974 Market participation by subsistence based cultivators: the Koiari of central Papua. MA thesis, University of Papua New Guinea, Port Moresby.



### System Summary

This subsystem occupies an estimated 25 per cent of land use. Fallow vegetation of tall woody regrowth, 20-25 years is cut and burnt. Banana is the most important crop; yam (*D. esculenta*) is an important crop; other crops are cassava, sweet potato, taro, Chinese taro, yam (*D. alata*) and *Amorphophallus* taro. Two plantings are made before a long fallow. In the second planting, yams are either replanted or sweet potato or cassava are replanted in the place of yams. Yam (*D. esculenta*) is staked. The density of banana plantings is increased in the second planting. Bananas continue production for up to 3 years, or longer if cared for. Gardens are cleared from August every year and planting continues until November. Banana and yam are segregated within gardens during the first planting. Household gardens are important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 600-800      **Slope** Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Bean (common), Choko tips, Corn, Cucumber, Kangkong, Lowland pitpit, Peanuts, Pumpkin tips, Karakap
FRUITS	Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Pomelo
NUTS	Breadfruit, Coconut, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Very significant
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Significant

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Fresh food	Very significant
2 Rubber	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	None
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

#### **OTHER DOCUMENTATION**

##### **Notes**

Gardens in this subsystem are cleared from tall woody regrowth, which is completely felled and burnt. Gardens are not fenced. Gardens are cleared and planted between July and October each year. Banana, corn and greens are planted first. Yam (mainly *D. esculenta*) is planted on what are considered better soils and is segregated from bananas, but not from taro. Yam (*D. esculenta*) is staked on 2 m poles. Yam (*D. alata*) tends to be not staked. Bananas are wrapped as protection against insect and bird damage, and propped with tall sticks.

After the first yam harvest, either yam, sweet potato or cassava are replanted and the density of banana is increased. Bananas continue to produce for up to 3 years, and longer if cared for.

This subsystem is used only by the Koiari speakers in the area, who are the original landowners. Settlers cultivating land in this area use Subsystem 1.

The sale of fresh food is an important source of income. Some people also tap rubber in nearby abandoned plantations and sell small amounts of Robusta coffee.

Districts 3 Hiri  
Population 1,811

Subsystem Extent 100 %  
Population density 9 persons/sq km

Area (sq km) 212  
Population absent 23 %

### System Summary

Located in the headwaters of the Brown and Goldie Rivers, in the Owen Stanley Mountains, north of Sogeri, along the Kokoda Track. Tall woody regrowth fallows, more than 15 years old, are felled and burnt. Sweet potato is the most important crop; yam (*D. alata*) and taro are important crops; other crops are cassava, banana, Chinese taro and yam (*D. esculenta*). Only one planting is made before a long fallow. Sweet potato and yam are planted in separate gardens. Yam (*D. alata* and *D. esculenta*) are staked. Chinese taro is planted separately from other crops in the same garden. Sweet potato gardens are cleared and planted between June and August and yam gardens between September and November. Sweet potato is grown in small mounds. Household gardens are important.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 400-1800      **Slope** Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> )
OTHER VEGETABLES	Aibika, Choko tips, Corn, Cucumber, Lowland pitpit, Pumpkin tips, Rungia, Tulip, Bean (snake), Spring onion
FRUITS	Avocado, Mandarin, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Karuka (wild), Okari, Pangium edule
NARCOTICS	Betel nut (highland), Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	1 planting
R VALUE	5 (very low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	Significant
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Very significant

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Fresh food	Significant
2 Animal skins	Minor
3 Coffee Arabica	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Very significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

## OTHER DOCUMENTATION

### Survey description

In March 1982, travel by air from Itokama village (Northern Province) to Efogi village, a walking traverse from Efogi to Manari village, and by air from Manari to Port Moresby (3 days). In August 1992, by air from Port Moresby to Kagi and Nadinumu villages (1 day), and Manumu village, and return to Port Moresby by air (1 day).

### Boundary definition

The boundary with Systems 0305/0602, 0312, 0313, 0318 and System 0608 in Northern Province were made on the basis of field visits and aerial observations.

### Notes

This system is similar to System 0305/0602 but is distinguished because Chinese taro and banana are more important there and yam (*D. alata*) is more important here. It is distinguished from System 0312, where banana is the most important crop and yam (*D. esculenta*) is important; and from System 0313 because the fallow vegetation is shorter, the fallow period is shorter, and the most important crop is sweet potato. The system is distinguished from System 0318 where the cropping period is longer and banana and sweet potato are the most important crops. It is distinguished from System 0608 in the upper Kumusi River Valley in Northern Province where fallows are short woody regrowth, 5-15 years old.

Villages are located on lower spurs and narrow valley floors between massive mountain ridges. Large areas of short woody regrowth and tall grass and scrub occur around the villages, but the majority of gardens are cleared from woody regrowth, more than 10 m tall and 15-20 years old. It is said the forest in the area has been considerably reduced in height and density since the Pacific War. Mature fallows are dominated by thin stemmed, white trunked *Albizia* trees and tree ferns. Early fallows are dominated by bracken fern, weeds and *Imperata* (kunai) grass. A few gardens are made in short grass fallows in the vicinity of Kagi and Efogi villages.

Undergrowth is slashed and allowed to dry. Tall trees are pollarded and left standing. The site is fenced and then burnt. Gardens are subdivided by thin poles laid on the ground running down slope. No attempt is made at soil retention. Sweet potato is planted in small mounds created with a spade or digging stick. Otherwise the soil surface is not disturbed. Many gardens are planted in a sweet potato monoculture, with some taro planted in small segregated blocks. Yam is planted in separate smaller gardens on sites considered to be more fertile. Taro is also interplanted with yam. Yam (*D. alata*) is the most common yam species cultivated. Banana is planted in both sweet potato and yam gardens, at a very low density. Chinese taro is planted separately from other crops around the steeper edges of gardens, and in separate gardens on steep slopes.

Sweet potato is planted from June onwards. Yams are planted from September to November. Some replanting of yam gardens with sweet potato occurs, but in the main sweet potato gardens there is only one planting before a fallow. A second planting in yam gardens was not observed in 1982 and may be a recently adopted practice.

The system ranges from an upper limit of about 1800 m altitude near Myola to 400 m at Manumu and Naoro. There are differences, mainly in fruit and nut trees grown, over this altitudinal range, but the defining features of the system are similar everywhere. In the higher areas, mandarins and temperate vegetables grow well. In the lower areas, the tree crops breadfruit, okari, *Pangium edule* and coconut are grown.

Beans and yams are staked. An unusual practice, seen at Kagi, was the staking of corn.

Household gardens are important. They are located on sloping ground on the edges of villages and contain greens, corn, bananas and fruit trees.

Most cash is earned from the sale of fresh food which is flown to the Port Moresby markets. Crops sold in Port Moresby include mandarins, oranges, pineapples, sweet potato, Chinese taro, taro and potato. During a field visit of 24 hours to Kagi village in August 1995, 550 kg of choko leaves and 220 kg of yam were flown out. Eight airstrips are located within the system and Port Moresby is less than 20 minutes flying time away. Arabica coffee has been planted in the area, but production is very low. The sale of animal skins is also a minor source of income.

**National Nutrition Survey 1982/83**

29 families from 3 villages were asked in January 1983 what they had eaten the previous day. 83 per cent reported eating sweet potato, 28 per cent banana, 17 per cent cassava, 14 per cent yam, 10 per cent taro and none Chinese taro, coconut or sago. 17 per cent reported eating rice. None reported eating fresh fish. This is similar to the observed crop pattern, except for the higher than expected consumption of banana and the lower than expected consumption of taro and yam.

**Main References**

None.

**Other References**

Brough, E.J. and A. Rogers 1982 Citrus cultivation in villages on the Kokoda Trail in Central Province. Science in New Guinea 9, 3, 167-175.





Districts 3 Hiri  
Population N/A

Subsystem Extent 100 %  
Population density persons/sq km N/A

Area (sq km) 68  
Population absent N/A

### System Summary

Located within National Capital District, mainly on open hillsides within the city of Port Moresby, similar to those which support System 0317. The system extends along the Sogeri Road to the base of the Hombrom's Bluff and to the Laloki River in the northwest. The long fallow period is not known but is estimated to be 1-4 years. An estimated 6-14 plantings are made before a long fallow. Short grasses are cut, dried and burnt, or are thrown onto stone walls at the edges of gardens. Soil is completely tilled, and drains are dug directly downslope to form long beds. Agricultural activity is confined to the period approximately December to May, depending on when the rainy season begins. Short fallows occur between plantings, from June to November. Sweet potato is the most important crop; cassava is an important crop; other crops are Chinese taro, banana, taro and yam (*D. esculenta* and *D. alata*). Peanut and corn are important vegetables. Peanuts are planted in rotation with sweet potato. Sweet potato is grown on small mounds. The system also includes the large number of household gardens in informal settlements and suburbs.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 20-80      **Slope** Gentle (2-10 degrees)

### CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	Cassava
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> )
OTHER VEGETABLES	Aibika, Chinese cabbage, Corn, Cucumber, Peanuts, Pumpkin tips, Bean (snake), Spring onion, Tomato
FRUITS	Mandarin, Mango, Orange, Passionfruit (yellow), Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut
NARCOTICS	Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Short grass
SHORT FALLOW	Very significant
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	6-14 plantings
R VALUE	77 (high)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Minor
CROP SEQUENCES	Very significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Very significant

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	Very significant
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	Minor
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	Minor

### CASH EARNING ACTIVITIES

1 Fresh food	Very significant
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### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	Very significant
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	Very significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Minor
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Very significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	Very significant
<b>Other Features:</b>	
FENCES	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## **OTHER DOCUMENTATION**

### **Survey description**

In March to July 1993, garden observations within the city's boundaries, around Burn's Peak, Three Mile Hill, Hohola and East Boroko around Mt Omoganiga between Boroko Drive and Dogura Road. In August and September 1995, numerous road traverses into and out of Port Moresby on the Magi and Hiritano Highways and the Sogeri Road and flights over the area on approaches and departures from Jackson's airport in light aircraft.

### **Boundary definition**

The boundaries with Systems 0311, 0312 and 0316 were determined by road traverses on the Hiritano and Magi Highways and the Sogeri Road.

### **Notes**

This system is distinguished from Systems 0311, 0312 and 0316 by the higher number of plantings before a long fallow, the use of short fallows and the most important crop is being sweet potato, here. A number of studies of suburban gardens exist (see below), but few descriptions are available of the hillside gardens of Port Moresby city. This description draws heavily on observations made by Nick Fereday and John Gibson (formerly of the Department of Agriculture and Livestock, Konedobu), from informal investigations they carried out from March to July 1993, in association with the Mapping Agricultural Systems Project.

This system is located mainly on hills in Port Moresby city and extends onto flatter land north and east of Jackson's airport in the Laloki Valley, and east down the Boroko Valley towards Taurama Barracks. The system is mainly used by migrants to the city from other parts of the country. Land is commonly rented from local Koari landowners who, when they use land for agriculture, use System 0317.

The number of plantings before a long fallow is not known, but is probably in the range 6-14. In some locations, almost all suitable land is cultivated, but in others about half of the suitable land is in fallow. The length of long fallows is also not known. The agricultural cycle is highly constrained by rainfall. At the end of a cultivation period in around May each year, land is left bare and frequently does not grow weeds or grasses until sufficient rain is received which may not be until November or December. Cassava and a few banana are the only crops which are maintained through the dry season. Short grasses are then pulled out and are left on the surface to dry, after which they are burnt, or are thrown onto bordering stone walls. Drains 0.2-0.3 m wide are dug vertically downslope about 1.5-3 m apart and the soil is thrown up to form a long bed. The soil is completely tilled and stones removed and thrown to the edges of plots.

The most important crop is sweet potato. Sweet potato is grown on small mounds and is usually planted separately from other crops in the same garden. Cassava is an important crop; other crops are banana and yam (*D. alata* and *D. esculenta*). Important vegetables are peanuts and corn, which are interplanted with other crops. Corn is commonly planted on either side of the drains, and cassava is commonly planted around the edge of a plot. Other crops are aibika, watermelon, pawpaw and beans. It is common for peanuts to be rotated annually with sweet potato.

In stony areas, stone walls are constructed downslope and across slope. The latter act as very effective soil retention barriers, although the people who construct them deny that is their primary purpose. The walls continue to be built up by stones which come to the surface during tillage. They also serve as boundary markers.

In some gardens, grass is used to cover young plants as protection against the sun.

Theft from gardens is a major problem. Garden owners claim people steal produce and sell it in local markets. Garden owners have taken to sleeping in their gardens when crops are ready for harvesting.

**Notes continued**

Gardening in suburban backyards in Port Moresby has been the subject of a number of studies, for example Levett (1992), Harris et al. (1978), Hernandez (1978), Vasey (1982) and von Fleckenstein (1978). These studies in general, found backyard gardening to be widespread, but as a source of food, important only to the poorest families. A recent study (Levett and Uvano 1992) of 460 households in the suburbs of Morata (which had its origins as a squatter settlement) and Waigani (a suburb near the University) made the following points. Two-thirds of households maintained food gardens. The average size of gardens was 0.035 ha. The estimated value of production from these gardens was K352 per year. The largest gardens were maintained by the poorer households. Poorer households were much more dependent on their gardens for food supply than wealthier households. They spent less than half the amount of money on fresh food per week than the wealthier households (K9.39 per week compared to K21.11 per week). The most important crops, in order, were banana, sweet potato, sugarcane, aibika, peanuts, cassava and beans. One-third of households used inorganic or organic fertilisers. An interesting aspect of suburban gardening in Port Moresby is yam (*D. esculenta*) growing by Trobriand Islanders as an extension of traditional village exchanges into the urban area. The 'backyard' yam gardens are planted in August and September and yams are harvested in May and June (Battaglia n.d.).

The population of Port Moresby was 124,000 in 1980 and 193,000 in 1990. A high proportion of the national population maintain household gardens. A smaller proportion of the households grow food in and near Port Moresby using the larger gardens described here. It is not possible to distinguish, from the 1980 population census, those who have household gardens from those who do not, or identify those who cultivate land for subsistence. For this reason, no population figures have been included for this system.

**National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

**Main References**

None.

**Other References**

- Battaglia, D. n.d. 'Bring home to Moresby': urban gardening and ethnic pride among Trobriand Islanders in the National Capital. IASER Special Publication No. 11, Institute of Applied Social and Economic Research, Port Moresby.
- Harris, G.T. and others 1978 Subsistence food gardening in a Port Moresby suburb: Gerehu, April 1977. *Yagl-Ambu* 5, 3, 87-95.
- Hernandez, J. 1978 A survey of urban gardening in Port Moresby. *Yagl-Ambu* 5, 3, 71-74.
- Levett, M.P. 1992 Urban gardening in Port Moresby: a survey of the suburb of Gerehu. *Yagl-Ambu* 16, 3, 45-66.
- Levett, M.P. and M. Uvano 1992 Urban gardening in Port Moresby: a survey of the suburbs of Morata and Waigani. *Yagl-Ambu* 16, 3, 69-91.
- Vasey, D.E. 1982 Management of food gardens in the National Capital District. *Science in New Guinea* 9, 3, 141-166.
- von Fleckenstein, F. 1978 Dooryard food gardens in Port Moresby: an original study of Morata together with a comparison of other studies, past and present. *Yagl-Ambu* 5, 3, 75-80.



Districts 2 Rigo, 3 Hiri  
Population 3,183

Subsystem Extent 100 %  
Population density 24 persons/sq km

Area (sq km) 132  
Population absent 16 %

### System Summary

Located along the coast from Port Moresby to Redscar Head in the northwest and from Port Moresby to Gabagaba village in the southeast. Tall grass fallows, less than 5 years old, are cut, dried and burnt. The soil is completely tilled, usually with a tractor drawn disc plough. Banana is the most important crop; cassava, yam (*D. alata*) and coconut are important crops; other crops are Chinese taro, sweet potato, taro, yam (*D. esculenta* and *D. bulbifera*), Queensland arrowroot and *Amorphophallus taro*. Banana is planted only once but continues to produce for 4 years, or more with care. Two plantings of yam (*D. alata*) are made before fallowing. Yam gardens are segregated from banana gardens. Sweet potato and yam are planted in small mounds. Banana is propped and the fruit wrapped. Yam (*D. alata*) is not staked, but yam (*D. esculenta*) is. Yam gardens are cleared from September every year and banana gardens from September. Large numbers of people from these villages are employed in Port Moresby. Imported foods, including rice, are important.

Extends across provincial border to System(s) None

Altitude range (m) 5-20 Slope Flat (<2 degrees)

### CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Cassava, Coconut, Yam ( <i>D. alata</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> ), Yam ( <i>D. bulbifera</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Peanuts, Pumpkin tips, Bean (snake), Tomato
FRUITS	Avocado, Malay apple, Mandarin, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall grass
SHORT FALLOW	None
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	2 plantings
R VALUE	57 (medium)

### GARDEN SEGREGATION

GARDEN SEGREGATION	Very significant
CROP SEGREGATION	Minor
CROP SEQUENCES	None
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	None

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Fish	Significant
2 Betel nut	Minor
3 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	Very significant
MECHANIZATION	Very significant
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Kwikila station and Hood Point, with garden observations en route and at Barakau, Gaire, Manubada, Gabagaba and Hula villages (4 days). Villages northwest of Port Moresby near Redscar Head were not visited.

### Boundary definition

The boundaries with Systems 0311, 0312, 0315 and 0317 were determined by a road traverse on the Hiritano and Magi Highways and side roads. The boundary with System 0310 was determined from descriptions by Groves 1991 and a road traverse from Delena village to Hisiu plantation.

### Notes

This system is similar to System 0317 but is more intensive. It is distinguished from it because in that system fallow periods are longer, short grass is the fallow vegetation and sweet potato and banana are the most important crops. It is distinguished from System 0310 where the fallow vegetation is savanna and the fallow period is more than 15 years. In System 0312 the fallow vegetation is tall woody regrowth, 20-25 years old. This system is distinguished from System 0311 where fallow vegetation is short woody regrowth, 5-15 years old; and from System 0315 where the fallow vegetation is short grass.

This system is located on gently sloping to flat alluvial plains, on valley floors in the coastal hill ranges, and on a narrow coastal plain. Soils are Vertisols, dark, swelling and cracking clays and alluvials, which are self mulching and which retain water better than soils on the surrounding hills. Vegetation is mainly tall grass, *Saccharum spontaneum*, with some smaller areas of kangaroo grass (*Themeda australis*) and kunai (*Imperata*). Some gallery forest occurs along stream lines (Scott 1978-79; Eden 1974).

Rainfall is strongly seasonal, with mean monthly maximums between May and November falling below 25 mm. (Mabbutt et al. 1965). Villages are located along the coast. The system is occupied mainly by Motuan people. Motuan villages were formerly built on stilts over a shallow tidal lagoon or on small offshore islands, but most villages are now located on the mainland immediately adjacent to the coast. A barrier reef occurs offshore.

Gardens are situated inland of the villages, and almost all are accessible from vehicle roads and tracks. A bitumen sealed road runs southeast from Port Moresby to inland of Gabagaba village, and northwest to Lealea village. Many people travel daily to and from these villages to Port Moresby for employment. Most houses are constructed from permanent materials and have iron roofs. Villages are connected to the Port Moresby electricity grid.

This system falls within King's (1986; 1989) 'Motu-Koita' Cropping System, in which yam (*D. alata*) is identified as the most important crop and cassava and banana as important crops. Banana has been identified here as the most important crop on the basis of its continual production for up to 5 years from the time of planting, compared to the seasonal production of yam. King (1986, 7) notes that his classification is based on the farmers' perception of the most important crop and he suggests that 'overall, bananas are probably the most important supply of food' on the basis of food derived from the crop. The following draws heavily on King's description of this system.

Yam gardens are cleared from September and are planted from October, before the wet season. The yam harvest begins in April with the main harvest in June, July and August, but some varieties of *D. alata* mature within 6 months. One large sett or two or three smaller setts are commonly used in the first planting. In subsequent plantings, a number of small setts are used. Soil is mounded over the setts and grass or leaves are often placed over the mound to protect the new shoots against the sun. Cassava is planted around the edges of the yam garden. A few banana and some taro may also be planted with the yams. After the first yam harvest, more cassava and banana are planted among the yams. Women are responsible for planting yams.

Reports from Manumanu, the western-most Motu village located west of Galley Reach in System 0310, that stored yams begin to rot by the middle of the wet season in November and December (Groves 1960, 7) could not be verified in 1995 and seems questionable, given that planting material must be carried through the wet season into the next planting season. Groves and others report periodic complete yam crop failures because of drought. In 1980 garden inspections at Gabone village, southeast of Gabagaba village, found all yams in current gardens were wilted and growing poorly, and bananas were producing only very small bunches. Only cassava and *Amorphophallus taro* were

**Notes continued**

growing well. People were eating cassava, small amounts of sweet potato, with corn, pumpkin, pumpkin leaves, tomato, aibika and coconut. Cash was being used on a daily basis to buy food, but enough cash was available to also buy soap, milk powder and cigarettes. Water was being drawn from a 3 m deep hole which had been dug in a dry stream bed 20 minutes walk from the village (Wohlt et al. 1982).

Banana gardens are cleared from September and planted from December, after the yam gardens have been planted. Banana gardens are usually located on heavier, less well drained soils. Few crops are interplanted with banana. In the early stages of a banana garden, aibika, watermelon, corn and pumpkin may be grown.

Sweet potato may also be planted on small mounds in separate gardens from March, at the end of the wet season, but it is not an important crop. King (1985) has shown that sweet potato produces poorly during the wet season in this environment, but that dry season production is also limited by weevil damage. Highest yields occurred from plantings in May, June and July. 'Marketable' yields were achieved experimentally with irrigation during the dry season, an option not available to village gardeners.

Tractor drawn ploughs are used in the preparation of almost all new gardens. In a minority of gardens spades, or a group of men using sticks, working together in a line across the garden, completely till the soil surface.

Staking of yam is variable, but the majority of villages do not stake yam (*D. alata*). Vasey (1982, 135) suggests that not staking *D. alata* conserves soil moisture, and it may, but yam (*D. alata*) elsewhere in PNG in much wetter environments is often not staked. Based on measurements at Gabagaba, King (1986, Table 7) estimated *D. alata* yields to be 600-1000 g/sq m, slightly below the Central Province average. Banana are commonly wrapped and propped.

Wild foods which were previously important, and are still harvested, include cycad fruit and mangrove fruit. Fishing and hunting for wallaby (mainly *Macropus agilis*) are important activities. Fish and wallaby meat are sold in Port Moresby markets.

Oral historical and archaeological work indicate that a number of large settlements existed in this area from around 2000 years ago, at least one of which was on the coast. The number of coastal villages increased from around 900 years ago and from 300 years ago, settlements again increased and spread westwards, with Motuan settlements on the coast and Koiari settlements inland (Bulmer 1979). From around 300 years ago, Motuan villages became involved in annual trading expeditions, known as hiri. They sailed by double-hulled canoes to the Gulf of Papua and exchanged pots for sago. Hiri voyages took place between September and December. Oral historical evidence suggests that the Eastern Motuan villages began participating only in the late 1800s. Oram (1982) argues that hiri voyages evolved because of annual and irregular food shortages caused by an unpredictable and strongly seasonal environment, while Allen (1976) suggests the main motivation was a desire to dominate pre-existing trade and exchange networks along the coast. Based on an analysis of available resources and food production and collecting strategies, Vasey (1982) concluded that the hiri was not the only solution open to people along the Port Moresby coast to solve the seasonal food shortage, but that it offered a number of advantages, nutritional and cultural, which are enough to explain its evolution. Bulmer (1979, 22) agrees that some archaeological work has exaggerated the lack of resources and the extremes of climate. She argues, 'there is an abundance of animal life, a variety of uncultivated plant resources, and prehistoric populations could as well have won a comfortable living from the soil'.

Large amounts of money are now brought into these villages by wage and salary earners. It has been argued that much agricultural production is now diverted into mortuary and marriage payments, using labour paid with cash or kind, such as purchased food and beer (Maleva 1978). Cash is also used to purchase food during the annual dry season, as well as to provide food during years of particularly low rainfall (Wohlt et al. 1982). The sale of fresh fish is also an important source of cash. Only small amounts of cash are earned by selling betel nut and fresh food.

**National Nutrition Survey 1982/83**

131 families from 3 villages were asked in July, August or November 1982 or March or April 1983 what they had eaten the previous day. 47 per cent reported eating cassava, 47 per cent yam, 24 per cent banana, 17 per cent coconut, 2 per cent taro, 1 per cent sago and none Chinese taro or sweet potato. 71 per cent reported eating rice. 33 per cent reported eating fresh fish. This is similar to the observed crop pattern, except for the lower than expected consumption of coconut and banana.



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- King, G.A. 1986 A survey of Central Province yam growing (*Dioscorea* sp.) gardens. Technical Report 86/7, Department of Primary Industry, Port Moresby.
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Districts 1 Abau, 2 Rigo, 3 Hiri  
Population 17,381

Subsystem Extent 100 %  
Population density 18 persons/sq km

Area (sq km) 965  
Population absent 19 %

### System Summary

Located in coastal hills southeast of Port Moresby to Gabagaba village, inland to Kwikila station and immediately inland of the coast east of Hood Lagoon. Short grass fallows, 5-7 years old, are slashed, allowed to dry and burnt. The site is completely tilled, often by tractor drawn plough, or by spades. Banana and sweet potato are the most important crops; yam (*D. esculenta*), coconut and cassava are important crops; other crops are taro, yam (*D. alata*), Chinese taro, *Amorphophallus* taro, Queensland arrowroot and sago. Banana continues to produce for up to 5 years, if cared for. Two plantings of yam or sweet potato are made before a long fallow or sweet potato is planted after the first planting of yam has been harvested. Separate gardens are made for banana, yam and sweet potato. Cassava is planted around the edges of all gardens. Sweet potato is planted on small mounds. Bananas are propped. Yams are not staked. Gardens are cleared around September every year. Yam is planted in October, banana in December and sweet potato in March. Purchased rice is an important food.

Extends across provincial border to System(s) None

Altitude range (m) 0-300 Slope Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Banana, Sweet potato
STAPLES SUBDOMINANT	Cassava, Coconut, Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Peanuts, Pumpkin tips, Bean (snake)
FRUITS	Avocado, Malay apple, Mandarin, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Short grass
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	45 (medium)

### GARDEN SEGREGATION

GARDEN SEGREGATION	Very significant
CROP SEGREGATION	Minor
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Cattle	Minor
3 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	Very significant
MECHANIZATION	Significant
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Very significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Kwikila station and Debadegoro village; to the Ormond River; and to Hood Point, with garden observations en route and at Barakau, Gaire, Manubada, Gabagaba and Hula villages (2 days).

### Boundary definition

The boundary with System 0308 is the boundary of the Cape Rodney and associated settlement blocks. The boundaries with Systems 0312 and 0316 were determined by road traverses on the Magi Highway and side roads. The boundaries with Systems 0318 and 0319 were determined by a road traverse from Kwikila station to Debadegoro village and extrapolated from Saunders' (1993) map of regrowth vegetation. The boundary with System 0320 was determined by walking traverses inland from Maopa and Paramana villages.

### Notes

This system is similar to System 0316 but is less intensive. It is distinguished from it because in that system fallow periods are shorter, tall grass is the fallow vegetation and banana is the most important crop. It is distinguished from Systems 0312, 0318 and 0319 where fallow vegetation is tall woody regrowth, the fallow period is more than 15 years and the important crops differ. It is distinguished from System 0320 where the fallow vegetation is short grass, less than 5 years old; and from System 0308 where the fallow vegetation is short woody regrowth.

This system occurs along the coast southeast of Port Moresby, inland to Kwikila and southeast to inland Hood Bay. Between Gabagaba village and Port Moresby city, people who have gardens in this system also garden in System 0316.

The fallow vegetation is either disclimax grassland (east of the Kemp Welch River) or savanna, dominated by Themeda and Imperata species, and Eucalyptus trees. A minority of gardens are made in strips of gallery forest along water courses. Eden (1974) estimated that 22 per cent of such forested land which was cleared for cultivation did not revert to forest, but was converted to savanna. Approximately 2 per cent of forest was being converted to savanna every year by gardening and subsequent burning.

Rainfall is strongly seasonal. At Kwikila, on average 34 per cent of the mean annual rainfall (1150 mm) is received between May and November, and 66 per cent between December and April (Blake et al. 1973, 52-53). The period January to April was previously a period of food shortages, some very severe (see for example British New Guinea Annual Reports 1889-90, 102). Cassava, introduced around the 1890s, and imported foods purchased with cash have overcome this problem (Wohlt et al. 1981).

This systems falls within King's (1986; 1989) 'Rigo' Cropping System, in which banana is identified as the most important crop and yam (*D. esculenta*) and cassava as important crops. Fieldwork in the area in 1995 confirmed this finding. The following draws heavily on King's description of this system.

Gardens are cleared from September to October. Yams are planted from October to December, banana from December to February, cassava from December to January, sweet potato from March to April and taro, which is relatively unimportant, from January to February. Sweet potato is also planted in banana gardens as a cover crop. Cassava is planted around the edges of all three garden types. Banana is planted in poorer drained, heavier soils. Corn, watermelon, pineapples and pawpaw are also planted in the banana and sweet potato gardens. A second crop of sweet potato is planted after the first harvest, and the density of bananas is increased. After two years this garden has become a banana-cassava garden. The bananas will continue to produce for up to 5 years, if cared for.

Yam (*D. esculenta*) is cultivated with aibika, the most important green vegetable, with cassava and a few pineapples around the edges of the garden. Yam is replanted following the first harvest and the garden is then abandoned, or occasionally replanted a third time with sweet potato or cassava. Neither *D. esculenta* nor *D. alata* yam is staked. A number of wild yams species are also described for this system and have been used in the past as famine foods (King 1986). A wild *Amorphophallus taro* can be used for the same purpose, but is said to cause diarrhoea.

Sago is available but is little used as a food. It is important for house thatching and cladding.

Fruit and nut trees are important. Villages grow large numbers of coconuts and are surrounded by mango, Malay apple and okari trees. Two types of breadfruit occur.

The Magi Highway linking this area with Port Moresby was completed in 1965. This road is sealed as far as Gabagaba village, and partially sealed to Kwikila station. Feeder roads to most villages have been constructed since then. Many people from this area work in Port Moresby and money from wages and salaries is the most important source of cash. Most houses are constructed of permanent materials and some are connected to the national electricity grid. Imported, purchased foods are important, in particular rice; tinned meat and fish; and sugar, milk and instant coffee. The most important agricultural source of cash is the sale of bananas in Port Moresby fresh food markets together with the sale of betel nut. Villages south of Kwikila are involved in a cattle project. Hunting of wallaby and pigs is an important source of protein.

The percentage of the population who are absent presented here is calculated using the PDS figures for 90 per cent of the villages assigned to this system.

#### **National Nutrition Survey 1982/83**

288 families from 20 villages were asked in August, September or November 1982 or May 1983 what they had eaten the previous day. 72 per cent reported eating yam, 52 per cent banana, 35 per cent sweet potato, 28 per cent coconut, 27 per cent taro, 18 per cent cassava, 2 per cent Chinese taro and 1 per cent sago. 78 per cent reported eating rice. 39 per cent reported eating fresh fish. The diet will vary considerably with the seasons. This is similar to the crop pattern except for the higher than expected consumption of yam and taro which is probably caused by the seasonal variation in food supply.

#### **Main References**

- King, G.A. 1986 A survey of Central Province yam growing (*Dioscorea* sp.) gardens. Technical Report 86/7, Department of Primary Industry, Port Moresby.  
 King, G.A. 1989 A systems approach to improving subsistence yam production in Central Province, Papua New Guinea. *Agricultural Systems* 31, 157-168.

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Districts 2 Rigo  
Population 4,437

Subsystem Extent 100 %  
Population density 9 persons/sq km

Area (sq km) 521  
Population absent N/A

**System Summary**

Located in an area of high relief and steep slopes, in the flanking ranges of the Owen Stanley Mountains, north and east of Kwikila station. Tall woody regrowth, 25-30 years old, is felled and burnt. Banana and sweet potato are the most important crops; yam (*D. esculenta*) is an important crop; other crops are cassava, taro, yam (*D. alata*), Chinese taro and sago. Separate gardens are made for yam and sweet potato, and yam and taro are planted in separate parts of the same garden. Bananas are interplanted in both yam and sweet potato gardens. Two plantings of sweet potato occur before a long fallow, with plantings of peanuts between the sweet potato plantings. After the first yam harvest, sweet potato is planted in place of the yams. Yam gardens are cleared from August and planted until November. Sweet potato gardens are cleared and planted in March and April. Yam (*D. esculenta*) is staked.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 400-800      **Slope** Steep (10-25 degrees)

**CROPS**

STAPLES DOMINANT	Banana, Sweet potato
STAPLES SUBDOMINANT	Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> )
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (common), Corn, Cucumber, Highland pitpit, Lowland pitpit, Peanuts, Pumpkin tips
FRUITS	Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Guava
NUTS	Breadfruit, Coconut, Karuka (wild), Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

**FALLOW & CROPPING PERIOD**

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	8 (very low)

**GARDEN SEGREGATION**

GARDEN SEGREGATION	Significant
CROP SEGREGATION	Minor
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

**SOIL FERTILITY MAINTENANCE**

LEGUME ROTATION	Minor
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

**CASH EARNING ACTIVITIES**

1 Animal skins	Minor
2 Firewood	Minor
3 Fresh food	Minor
4 Betel pepper	Minor

**OTHER AGRONOMIC PRACTICES**

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	None
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Kwikila station and Debadegoro village; to Hood Point; and to Kupiano station, with garden observations and interviews at Debadegoro, Seba, Karaikomana, Boregaina, Kemabolo, Kalo, Hula and Lepamagana villages (2 days).

### Boundary definition

The boundary with System 0312 was defined by fieldwork on the Sogeri Plateau. The boundaries with Systems 0317 and 0319 were determined by road traverses on the Magi Highway, and a road traverse from Kwikila station to Debadegoro village and extrapolated from Saunders' (1993) map of regrowth vegetation.

### Notes

This system is distinguished from Systems 0312 and 0319 where sweet potato is not as important. This system is distinguished from System 0317 where fallow vegetation is short grass.

Rainfall in this system is over 2500 mm per year, more than twice that received in adjacent Systems 0316 and 0317 (Mabbutt et al. 1965, 88). Seasonality is also less pronounced.

This system falls within King's (1986; 1989) 'Wiga' Cropping System, in which yam (*D. esculenta*) is identified as the most important crop and taro and banana as important crops. Banana and sweet potato have been identified here as the most important crops on the basis of the almost continual production over 2 years from the time of planting for sweet potato and 5 years for banana, compared to one planting of yam. King (1986, 7) notes that his classification is based on the farmers' perception of the most important crop, and not the crop most likely contributing the greatest nutritional benefits. King provides no detailed description of this system.

Tall secondary forest is felled and burnt. Fences are not used. Yam (*D. esculenta*), taro and banana are planted together in one garden. Sweet potato is planted in separate gardens, after the yam planting is completed. Chinese taro may also be planted as a single crop in a separate garden. Yam gardens are cleared from August and planted until November. Sweet potato gardens are cleared and planted in March and April. Sweet potato is harvested from August and yam is harvested in December.

After the first harvest, the yam garden is replanted either with sweet potato, or with Chinese taro and cassava, and the density of banana is increased, so that the garden becomes a banana-Chinese taro-cassava garden. Cassava is planted mainly around the outside edges on the upper slopes and Chinese taro around the edges on the lower slopes. The sweet potato garden is replanted with sweet potato, but it is becoming common to plant peanuts between the sweet potato plantings as a legume rotation. Up to three plantings of sweet potato and two plantings of peanuts are said to occur, but it is not known how widespread this is. Sago is consumed only two or three times a year.

The northernmost villages have access to wild karuka pandanus on the slopes of Mt Brown. Hunting for cassowary and pigs is important.

Relative to Systems 0316 and 0317, this system is isolated. Access to this system is by a very steep, dry weather only, four-wheel-drive vehicle track from the Magi Highway to Bokukomana village, by aircraft at Dorobisoro, Oram and Iaura, or by walking. Cash is earned by selling fresh vegetables, betel pepper, firewood, bird plumes and animal skins. Remittances from people employed in Port Moresby are important.

Information on the proportion of the population who are absent is inadequate for this system.

### National Nutrition Survey 1982/83

74 families from 14 villages were asked in August or December 1982 what they had eaten the previous day. 69 per cent reported eating banana, 68 per cent yam, 49 per cent taro, 36 per cent sweet potato, 14 per cent coconut, 5 per cent cassava, 3 per cent Chinese taro and none sago. 43 per cent reported eating rice. 15 per cent reported eating fresh fish. This is similar to the crop pattern, except for the higher than expected consumption of taro and yam and lower than expected consumption of sweet potato. December is the time of yam harvesting and the high yam consumption at this time of the year is expected.

**Main References**

- King, G.A. 1986 A survey of Central Province yam growing (*Dioscorea* sp.) gardens. Technical Report 86/7, Department of Primary Industry, Port Moresby.
- King, G.A. 1989 A systems approach to improving subsistence yam production in Central Province, Papua New Guinea. *Agricultural Systems* 31, 157-168.

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- Blake, D.H., P. Paijmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Mabbutt, J.A., P.C. Heyligers, R.M. Scott, J.G. Speight, E.A. Fitzpatrick, J.R. McAlpine and R. Pullen 1965 Lands of the Port Moresby-Kairuku area, Territory of Papua and New Guinea. Land Research Series No. 14, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Wohlt, P.B., B.J. Allen, A. Goie and P.W. Harvey 1982 An investigation of food shortages in Papua New Guinea: 24 March to 3 April, 1981. IASER Special Publication No. 6, Institute of Applied Social and Economic Research, Port Moresby.





Districts 1 Abau, 2 Rigo  
Population 12,838

Subsystem Extent 100 %  
Population density 13 persons/sq km

Area (sq km) 994  
Population absent 23 %

### System Summary

Located east and west of Kupiano station, between the Ormond River in the west and the Bonua River in Table Bay in the east, on low lying alluvial plains and coastal hill country. Tall woody regrowth fallows, 20-25 years old, are cut and burnt. Banana is the most important crop; cassava, sweet potato and coconut are important crops; other crops are sago, taro, yam (*D. alata* and *D. esculenta*), Chinese taro, Queensland arrowroot and *Amorphophallus* taro. Two plantings are made before a long fallow, but banana may produce for more than 5 years. Banana, cassava, yams and taro are planted separately within the one garden. Banana and sweet potato are replanted after the first harvest. Sweet potato and yam are planted in small mounds. Fallows are cleared around August and September every year. Fruit and nut trees are important. Fresh fish is an important food. Inland villages trade fresh food for fish with coastal villages.

**Extends across provincial border to System(s)** None

**Altitude range (m)** 20-200      **Slope** Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Cassava, Coconut, Sweet potato
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, <i>Amaranthus</i> spp., Corn, Cucumber, Highland pitpit, Kumu musong, Lowland pitpit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Malay apple, Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	23 (low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Very significant
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Coconuts	Minor
3 Fish	Minor
4 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

From November 1985 to March 1986, a baseline study of villages in the vicinity of the Cape Rodney Agriculture Development Project. In August 1995, vehicle traverses from Port Moresby to Hood Point, to Kupiano station, and to Moreguina township on the Cape Rodney Resettlement Scheme. By outboard dinghy to Paramana Point from Marshall Lagoon; and walking traverses through gardens and interviews at Lepamagana, Amau, Mori, Maopa and Paramana villages (1 day). The areas east of Amau village were not visited because of bad weather and infrequent air services. Interviews were conducted at Moreguina, with settlers from Domara village and Amazon Bay.

### Boundary definition

The boundaries with Systems 0317 and 0318 were determined by road traverses on the Magi Highway, and a road traverse from Kwikila station to Debadegoro village, and extrapolated from Saunders' (1993) map of regrowth vegetation. The boundary with System 0308 is the boundary of the Cape Rodney Resettlement Scheme. The boundary with System 0320 is based on the landform map in Blake et al. (1973). The boundary with System 0321/0529 is based on interviews with settlers at Moreguina. The area east of Amau village was not visited.

### Notes

This system is distinguished from System 0317 where fallow vegetation is short grass; and from System 0318 where sweet potato is more important. It is distinguished from System 0320 where fallows are short grass, fallow periods are less than 5 years and sweet potato is the most important crop. It is distinguished from System 0321/0529 where banana is less important. The system differs from that used on the Cape Rodney Resettlement Scheme where fallow vegetation is short woody regrowth, 5-15 years old.

Gardens are made in tall woody regrowth. On the alluvial plains, it is not uncommon for gardens to be flooded for one or two days, three or four times a year. There is a short 'dry' season from October to December. All other months receive, on average, more than 200 mm of rain (Blake et al. 1973, 52-53). Many villages at the eastern end of the system were studied for three months as part of a base-line survey of the social and economic impact of the Cape Rodney Agriculture Development Project (French and Nen 1986).

Land is cleared for gardening from August to September, and crops are planted from October to December. Undergrowth is slashed, trees are felled and the debris burnt. Most gardens are fenced against pigs. Sweet potato is planted with banana at low densities, and with sugarcane, corn, aibika and other vegetables, including amaranthus, cucumber, pumpkin, highland pitpit, lowland pitpit, beans, spring onion, watermelon, pawpaw and pineapple. Cassava is planted around the outside of the garden. Taro and yam are planted in separate sections of the same garden. After the sweet potato, yam and taro harvests, the density of banana is increased and sweet potato is replanted all over the garden, where it also serves to keep down weeds. By year three, sweet potato has all but disappeared and only tall banana and cassava remain. If the banana are cared for, they will continue to produce for 5 years or more.

In 1981, taro blight was said to be severely reducing yields (Anon 1981, 24). Yam (*D. alata*) is the more important yam. It is not staked. Yam (*D. esculenta*) is staked. Yams, and taro, are ritually important, but it is clearly recognised that banana, with sweet potato and cassava, are the main staples.

From March to May, a time when garden production is lowest, sago, cassava, lowland pitpit and breadfruit are eaten with banana. Villages are surrounded by breadfruit and mango trees, as well as numerous coconuts. Other fruits and nuts of note are pawpaw, pineapple, marita pandanus, Malay apple and okari. Within the area occupied by this system, particularly in the eastern part of the system, savanna grasslands occur. Gardens are not made in the savanna. The savanna grasses are frequently burnt however, during hunting, or for no apparent reason.

There appears to have been considerable historical movement of settlements in this system. Many villages have moved from the mountains onto the plains over the last 100 years under the influence of the Kawto mission (Anon 1981, 2-13). More recently a number of villages have sold land to what is now the Cape Rodney Resettlement Scheme. Many small plots of cocoa, Robusta coffee and cardamom are planted near the villages, but they are overgrown and there was no production of these crops in 1995 because of dissatisfaction with prices. The most common source of cash is the sale of fresh food in local markets, particularly at the nearby Cape Rodney scheme and in Port Moresby. People from coastal villages regularly sell fish in local markets or exchange fish for fresh food with inland villagers.

**Notes continued**

Most parts of the system are connected to Port Moresby, and Kupiano and the Cape Rodney Resettlement Scheme, by road. Roads are poorly maintained and become impassable in wet weather. The extent of movements to and from Port Moresby at Kapari village in 1979, prior to the construction of the Magi Highway, is described by Temu (1979).

**National Nutrition Survey 1982/83**

264 families from 14 villages were asked in August 1982 what they had eaten the previous day. 51 per cent reported eating banana, 49 per cent yam, 26 per cent sweet potato, 19 per cent cassava, 14 per cent coconut, 14 per cent taro, 11 per cent sago and none Chinese taro. 52 per cent reported eating rice. 22 per cent reported eating fresh fish. This is similar to the observed crop pattern, except for the higher than expected consumption of yam, which is due to seasonal variation.

**Main References**

None.

**Other References**

Anon 1981 Rural development in the Abau District, Central Province: the affect (sic) of the Cape Rodney Resettlement Scheme. Report of a survey in selected villages carried out by third year Agricultural students, August 31-September 12, 1981, Department of Anthropology and Sociology, University of Papua New Guinea, Port Moresby.  
Blake, D.H., P. Paijmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.  
French, W. and T. Nen 1986 Benchline study of the Cape Rodney Agriculture Development Project. Report to the Department of Finance and Planning, Institute of Applied Social and Economic Research, Port Moresby.  
Temu, I. 1979 Work and travel behaviour of migrants from Kapari village, Marshall Lagoon District Central Province. Yagl-Ambu 6, 1, 61-69.



Districts 1 Abau, 2 Rigo  
Population 7,240

Subsystem Extent 100 %  
Population density 80 persons/sq km

Area (sq km) 90  
Population absent 39 %

### System Summary

Located on exposed southern facing coastal areas east and west of Kupiano station, from Hood Bay to Marshall Lagoon and the Bonua River, on poorly drained, sandy, beach ridges. Short grass fallows, less than 5 years old, are cut and then completely tilled, by tractor drawn plough, or with spades. Sweet potato is the most important crop; banana, yam (*D. esculenta*), coconuts and cassava are important crops; other crops are taro, yam (*D. alata* and *D. bulbifera*), Chinese taro, Queensland arrowroot and *Amorphophallus* taro. Sweet potato is planted in separate gardens from banana and yam. Sweet potato is planted on small mounds. Only one planting is made before fallowing, although bananas may produce for up to 5 years. Fishing is an important source of food. Purchased rice is also important, particularly at Hood Lagoon and Marshal Lagoon, where many people are employed in Port Moresby. Yam gardens are cleared in September. Sweet potato is planted in March.

Extends across provincial border to System(s) None

Altitude range (m) 5-20 Slope Flat (<2 degrees)

### CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Yam ( <i>D. esculenta</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Queensland arrowroot, Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Peanuts, Pumpkin tips, Bean (snake)
FRUITS	Avocado, Malay apple, Mandarin, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Okari, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Short grass
SHORT FALLOW	None
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	1 planting
R VALUE	25 (low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	Very significant
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Fish	Significant
2 Betel nut	Minor
3 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	Minor
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Minor
TILLAGE	Very significant
MECHANIZATION	Significant
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Very significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

In August 1995, vehicle traverses from Port Moresby to Hood Point, to Kupiano station, and to Moreguina township on the Cape Rodney Resettlement Scheme (2 days); and a boat traverse to Paramana Point, with garden observations and interviews at Lepamagana, Amau, Mori, Maopa, Paramana villages (1 day). Domara and Batumata Point were not visited. People from there were interviewed at Moreguina.

### Boundary definition

The boundaries with Systems 0317 and 0318 were determined by road traverses on the Magi Highway, and a road traverse from Kwikila station to Debadegoro village and extrapolated from Saunders' (1993) map of regrowth vegetation. The boundary with System 0319 is based on the landform map in Blake et al. (1973). The boundary with System 0321/0529 is based on interviews with settlers at Moreguina and on fieldwork in Milne Bay Province.

### Notes

This system is distinguished from System 0317 where the fallow period is longer and banana is more important; and from System 0318 where fallows are tall woody regrowth. It is distinguished from Systems 0319 and 0321/0529 where fallow vegetation is tall woody regrowth, more than 15 years and two plantings occur before a long fallow.

This system occupies low lying and poorly drained alluvial and sandy flats between beach ridges, which are sometimes flooded for short periods. Large areas of coconuts are planted immediately inland of the coastal villages, a result of pre-1942 colonial policy which required all adult men to plant economic trees and produce copra to pay head taxes. Strips of land between the coconuts are used for gardening, as well as land beyond the coconuts. The sale of husked nuts in Port Moresby and Moreguina is an important source of income.

Although rainfall is distinctly less seasonal than in Systems 0316 and 0317 to the west, land preparation and planting have a strong seasonal pattern.

Sweet potato is planted in separate gardens from banana and yam. Sweet potato is planted on small mounds, mainly in March at the end of the wet season and is harvested in June, July and August, but it may also be planted at other times of the year.

Yam gardens are cleared from September and are planted from October, before the wet season. The yam harvest begins in April with the main harvest in June, July and August. Soil is mounded over the seed tubers and grass or leaves are often placed over the mound to protect the new shoots from the sun. Cassava is planted around the edges of the yam garden. A few banana and some taro may also be planted with the yams. After the first yam harvest, more cassava and banana are planted amongst the yams. Women are responsible for planting yams.

Banana gardens are cleared from September and planted from December, after the yam gardens have been planted. Banana gardens are usually located on heavier, less well drained soils. Few crops are interplanted with banana. Cassava is often planted around the edges of the banana garden. In the early stages of a banana garden, aibika, watermelon, corn and pumpkin are grown. Banana gardens continue to produce for up to 5 years, if they are weeded and cared for.

How long sweet potato has been the most important crop in this system is not known. Sweet potato gardens were observed at Kalo by Lindt in 1885 who passed through 'country ... richly cultivated, containing miles of plantations devoted to bananas, sweet potato and yams', but he gives no hint of which is the most important crop. He also notes the importance of coconuts.

A large number of fruit and nut trees are planted around and behind the villages, in particular breadfruit, Polynesian chestnut, mango and okari.

Gardens are generally not fenced, because a long perimeter fence of wire netting, keeps pigs restricted to the villages and the beach. Many pigs scavenge on the beach at low tide.

**Notes continued**

Trading was previously an important part of the economy of this system and associated systems along this coast. In the 1900s, the villages immediately west of Marshall Lagoon traded pigs, dogs, feathers and string bags for clay cooking pots and armshells with people from Mailu Island in Amazon Bay (System 0321/0529). The string bags were in turn acquired from people in the Rigo area (Systems 0317 and 0318) in exchange for fish (Dutton 1978, 343). In some places, trading is still important. Paramana village on Paramana Point west of Kupiano, is said to be short of land suitable for agriculture because of frequent flooding and relies mainly on fishing. Fish are exchanged for root crops or sold at local markets with inland villages in Systems 0317 and 0319. Fish and food are sold at Moreguina market at the Cape Rodney Resettlement Scheme (Bourke 1988, 10).

Cash is now of greater importance than trading. Villages in this system in the vicinity of Hood Bay and Marshall Lagoon have produced a large number of well educated people, many of whom are now in wage and salary employment. Except for those villages east of Cloudy Bay, there is a road connection to Port Moresby. Many houses are built of permanent materials with iron roofs, on tall piles. Outboard motors are a common possession. Electrical generators are less common. Many families own vehicles and small tractors. A number of houses display television antennas. Purchased imported foods, rice in particular, are important. Cash is also earned from the sale of fish, betel nut, fresh food and husked coconuts in Port Moresby.

**National Nutrition Survey 1982/83**

84 families from 4 villages were asked in August 1982 what they had eaten the previous day. 62 per cent reported eating yam, 43 per cent banana, 33 per cent cassava, 29 per cent sago, 23 per cent sweet potato, 20 per cent coconut, 15 per cent taro and none Chinese taro. 42 per cent reported eating rice. 52 per cent reported eating fresh fish. This is similar to the observed crop pattern, except for the high consumption of yam and sago, and the relatively low consumption of sweet potato. August is a time of the year when yam is usually in good supply.

**Main References**

None.

**Other References**

- Blake, D.H., P. Pajmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Bourke, R.M. 1988 Report by food crop agronomist. Cape Rodney Agricultural Development Project, Papua New Guinea Department of Agriculture and Livestock, Canberra.
- Dutton, T. 1978 Language and trade in central and south-east Papua. *Mankind* 11, 341-353.
- Lindt, J.W. 1887 Picturesque New Guinea. London, Longmans, Green and Company.





Districts 1 Abau  
Population 4,178

Subsystem Extent 100 %  
Population density 12 persons/sq km

Area (sq km) 341  
Population absent 29 %

### System Summary

Located along the coast of Table Bay and Amazon Bay and inland in the Liba, Bonua and Bailebo River valleys and extending a short distance into Milne Bay Province. Tall woody regrowth, 15-30 years old, is cut, dried and burnt. Sweet potato, taro, cassava, banana and coconut are important crops; other crops are Chinese taro, yam (*D. esculenta* and *D. alata*), *Amorphophallus* taro and sago. Two plantings are made before fallowing. The first planting is dominated by taro and the second by sweet potato and cassava. New gardens are planted between October and January. Fruit and nut trees are significant sources of food. Sweet potato is planted on small mounds. Banana and yam are planted separately from taro in the same gardens.

Extends across provincial border to System(s) 0529

Altitude range (m) 10-300 Slope Multiple classes

### CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Taro ( <i>Colocasia</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Taro ( <i>Amorphophallus</i> )
OTHER VEGETABLES	Aibika, Corn, Cucumber, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Spring onion
FRUITS	Malay apple, Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon, Rukam
NUTS	Breadfruit, Java almond, Tulip, Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	9 (very low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Significant
CROP SEQUENCES	Very significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Minor

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Coconuts	Minor
3 Fish	Minor
4 Fresh food	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Minor
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

## OTHER DOCUMENTATION

### Survey description

In January 1994, road traverses from Alotau to Hagita, Waigani, Naura, Watunou, Maiwara, Wagawaga, Daio and Gelemalaia villages; and from Alotau to Sagarai, and Borowai and Suaibina villages in System 0511 in Milne Bay Province (2 days). A traverse was also made by work boat along the Suau Coast, from Sideia Island to Aloalo village via Suau Island, and Ipulei and Saga'aho villages (4 days). This description is based on extrapolation from that fieldwork. In Central Province no fieldwork was conducted in this system.

### Boundary definition

The boundary with System 0320 is based on interviews with settlers at Moreguina. The area east of Amau village was not visited. The boundary with System 0322/0506 is based on fieldwork in the Aguan area in Milne Bay Province and is taken to be the 600 m contour. The boundary with System 0511 is based on the estimated area of influence of the large oil palm estate and road developments in Milne Bay Province.

### Notes

This description is based on field surveys in Milne Bay Province in System 0511 and on a review of literature on the Amazon Bay part of the system. The system was distinguished from System 0511 on the basis of the extensive oil palm developments in that system, but is otherwise very similar to System 0511. It is distinguished from System 0320, where the fallow vegetation is short grass, less than 5 years old; and from System 0322/0506 where sweet potato is the most important crop.

This system is characterised by the cultivation of taro as a first planting everywhere, followed by a second planting of sweet potato and cassava. Banana, planted with the taro, matures over the two year life of the garden. Sweet potato is planted in small mounds in most gardens. All gardens have a small area of yams planted separately from other crops, but yams are a minor crop.

In Central Province the system is occupied mainly by people known as the Magi or the Mailu, after the small offshore island in Amazon Bay. The land is mainly alluvial coastal plain, interspersed with sago and mangrove swamps. The plains extend inland about 15 km, up the valleys of the Bouna, Bailebo and Liba Rivers. Inland steep hills separate the valleys and in places they reach the coast. Between Table Point and Mogubo Point, and to the east of Baibara Island, there is no barrier reef to protected the coastline from large seas. Most of the population is concentrated around Amazon Bay where there are good harbours and a protected coastline. Two main seasons are recognised: the northwest (calm, warm and relatively dry) from December until April, and the southeast (cool, rainy, windy and rough seas) from May to November.

Three studies have been made of the Amazon Bay area, but all have been concentrated on the islands in Amazon Bay and not the mainland. From September 1914 to February 1915, Malinowski (1988) lived on Mailu Island. In 1960, for a year and again for eight months in 1962, Abbi (1975) lived on Mailu and Loupom Islands and travelled widely on the mainland. In 1973, Irwin (1985), an archaeologist, lived at Kurere Asioro and Mailu villages. These reports allow an assessment to be made of change in the system over 80 years.

Malinowski found banana and taro were the most important foods and noted that the bananas included 'several introduced sorts' (1988, 160). He noted four types of yam, including *D. esculenta*. In 1914, sweet potato was becoming increasingly important, mainly because it required little care or weeding compared to taro. Other recent introductions were pumpkin and pawpaw.

Malinowski (1988, 213-219) contrasted agriculture on the small islands with that on the mainland. Even by 1914, the gardens on Mailu Island were 'very much neglected' in favour of trading. Tall grass fallows were being used on Mailu Island at that time and the soil was tilled by a row of men with digging sticks working their way backwards across the garden. On the mainland, tall woody fallows were used. Gardens were fenced. Banana and taro were segregated from yam and sugarcane. Only one planting of taro and yam was made before fallowing, but bananas were maintained for up to two years. The use of aromatic plants in gardens was noted. Sago making was 'an important agricultural activity' (1988, 215) with every village having access to mainland sago swamps. Coconuts and betel palms were planted around the village houses and not in gardens. This staple combination of 'taro, sweet potato, yam, banana, and coconut, with sago as a standby' was also recorded 70 years ago on the Suau Coast (Williams 1933, 37).

**Notes continued**

Fishing was historically much more important on the islands than the mainland, but with the cessation of fighting, many mainland villages moved from hilltops down to the coast and adopted island fishing methods.

Abbi (1975, 7) in 1960-62 added little to this picture. He thought taro was the most important food, followed by banana, sago and sweet potato. Coconut was eaten with almost every meal, but 'substantial quantities' of flour, rice, tinned fish and meat, dripping, sugar and tea were also consumed. Irwin (1985, 17) shows that this area was first settled around 2000 years ago by people who gardened and fished for subsistence. Over a period of time, Mailu Island became an important centre of pottery making and came to depend more on trading than agriculture for subsistence. Pottery and arm shells manufactured from conus shells, were traded to Aroma, west of Marshall Lagoon (System 0320) for unworked shells, pigs, dogs and betel nut, and to Mullins Harbour in the east where the pots, pigs and dogs were traded for another form of arm shell and stone tools. As well as having a monopoly on pots, the Mailu, alone in the area, had a fleet of sea-going canoes. They linked the D'Entrecasteaux Islands kula networks and the Louisiade Archipelago networks which terminated at Mullins Harbour, with the Motuan people to the west at Aroma.

Although gardens were not observed in this system in 1995, observations in Milne Bay Province and interviews with people from Amazon Bay at Cape Rodney, suggest that sweet potato, cassava and Chinese taro have joined taro and banana as important crops. It seems fair to conclude that taro has declined in importance over the last 50 years (at least partly due to disease); that cassava, and perhaps Chinese taro, have been adopted since 1960 (they were not mentioned by Abbi); and that a second planting, using sweet potato and cassava, now occurs. Sago remains an important food.

Villages are surrounded by numerous fruit and nut trees including mango, Malay apple, rukam, Polynesian chestnut, Java almond, breadfruit and coconut. Other fruit trees include orange, watery rose apple, mon (Dracontomelon), guava, golden apple and *Baccaurea papuana* (known as 'mabeo'). Other nuts include *Pangium edule* and cycads.

From once being a 'central place', the Amazon Bay area is now relatively isolated from modern market places. Apart from a once weekly air service to Magarida station, all movement is by outboard dinghy to either Durama village, from where Port Moresby can be reached by road, or to Mullins Harbour where the road to Alotau begins. Between May and November travel is restricted by rough seas, but the almost universal use of outboard motors also requires cash to purchase petrol. In the 1960s, a vigorous co-operative movement managed by local people developed to market copra (Abbi 1975, 89-110). The main source of cash in 1995 is the sale of betel nut and arm shells, which are transported northwest as far as Port Moresby; and locally, fresh food and fish.

While of little relevance to agriculture, it is of interest to note that in 1606 on the 24 August, Spanish sailors under Torres, landed on Mailu Island, killed a number of people with guns and abducted 14 children, who were taken to Manila and never returned. At this time, Mailu appears to have been a large village, well equipped with canoes, where people had relationships with villages on the nearby mainland (Stevens 1930).

**National Nutrition Survey 1982/83**

98 families from 8 villages were asked in August or September 1982 what they had eaten the previous day. 80 per cent reported eating sweet potato, 50 per cent cassava, 44 per cent banana, 22 per cent taro, 10 per cent yam, 6 per cent sago, 3 per cent coconut and 1 per cent Chinese taro. 35 per cent reported eating rice. 26 per cent reported eating fresh fish. This is similar to the described crop pattern, except for the lower than expected consumption of coconut.

**Main References**

Malinowski, B. 1988 *Malinowski among the Magi: 'The Natives of Mailu'*. London, Routledge.

**Other References**

Abbi, B.L. 1980 *Traditional Groupings and Modern Associations: A Study of Changing Local Groups in Papua and New Guinea*. Simla, Indian Institute of Advanced Study.

Blake, D.H., P. Pajmans, J.R. McAlpine and J.C. Saunders 1973 *Land-form types and vegetation of eastern Papua*. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.

Irwin, G. 1985 *The Emergence of Mailu: As a Central Place in Coastal Papuan Prehistory*. Canberra, Department of Prehistory, Research School of Pacific Studies, Australian National University

**Other References continued**

Stevens, H.N. 1930 New Light on the Discovery of Australia as Revealed by the Journal of Captain Don Diego de Prado y Tovar. London, Henry Stevens, Son and Stiles.

Williams, F.E. 1933 Depopulation of the Suau District. Anthropology Report No. 13, Government Printer, Territory of Papua, Port Moresby.

Districts 1 Abau  
Population 583

Subsystem Extent 100 %  
Population density 5 persons/sq km

Area (sq km) 124  
Population absent 17 %

### System Summary

Located on steep mountain sides and gorges on the northern and southern sides of Mt Dayman; around Agaun station in Milne Bay and Central Provinces; in the area of Param, Bonenau and Nawata villages in Milne Bay Province; and along the both sides of the Owen Stanley Range. Tall woody regrowth, more than 30 years old, near the forest-grassland boundary, is felled and burnt. Many gardens are fenced. Sweet potato is the most important crop; taro is an important crop; other crops are banana, cassava, Chinese taro, potato and yam (*D. esculenta*, *D. alata* and *D. bulbifera*). Two plantings are made before a long fallow. Taro, yam and sweet potato are planted first, in separate sections of the same garden. The second planting is sweet potato. Sweet potato is planted in small mounds. Gardens are cleared seasonally from September and planted during November and December. Soil retention barriers are made in all gardens. Fruit and nut trees are significant sources of food. Household gardens are important.

Extends across provincial border to System(s) 0506

Altitude range (m) 600-1400 Slope Steep (10-25 degrees)

### CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	Taro ( <i>Colocasia</i> )
STAPLES PRESENT	Banana, Cassava, Chinese taro, Potato, Sweet potato, Taro ( <i>Colocasia</i> ), Yam ( <i>D. alata</i> ), Yam ( <i>D. esculenta</i> ), Yam ( <i>D. bulbifera</i> )
OTHER VEGETABLES	Aibika, Bean ( <i>lablab</i> ), Corn, Cucumber, Highland pitpit, Kumu musong, Lowland pitpit, Pumpkin fruit, Tulip, Bean ( <i>snake</i> )
FRUITS	Malay apple, Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Castanopsis, Karuka ( <i>wild</i> ), Okari, Tulip
NARCOTICS	Betel nut ( <i>highland</i> ), Betel nut ( <i>lowland</i> ), Betel pepper ( <i>highland</i> ), Betel pepper ( <i>lowland</i> ), Tobacco

### FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	9 (very low)

### GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	Significant
CROP SEQUENCES	Significant
MIXED VEGETABLE GARDENS	None
HOUSEHOLD GARDENS	Significant

### SOIL FERTILITY MAINTENANCE

LEGUME ROTATION	None
PLANTED TREE FALLOW	None
COMPOST	None
ANIMAL MANURE	None
ISLAND BED	None
SILT FROM FLOOD	None
INORGANIC FERTILISER	None

### CASH EARNING ACTIVITIES

1 Coffee Arabica	Minor
2 Coffee Robusta	Minor
3 Fresh food	Minor
4 Potato	Minor

### OTHER AGRONOMIC PRACTICES

<b>Water Management:</b>	
DRAINAGE	None
IRRIGATION	None
<b>Soil Management:</b>	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Very significant
<b>Mounding Techniques:</b>	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
<b>Garden Bed Techniques:</b>	
BEDS SQUARE	None
BEDS LONG	None
<b>Other Features:</b>	
FENCES	Significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

## **OTHER DOCUMENTATION**

### **Survey description**

In January 1994 in Milne Bay Province, a walking traverse from Agaun mission to Pumani health centre via Danawan, Gwawi, Nauwandowan and Bimat villages (4 days), an aerial inspection en route from Rabaraba airstrip to Agaun airstrip, from Pumani airstrip to Biniguni airstrip and from Gumeiy to Port Moresby. The Central Province part of this system was not visited.

### **Boundary definition**

The boundaries with Systems 0505, 0507, 0508, 0510 and 0511 are based on field and aerial observations and published documents. The landforms and vegetation maps in Blake et al. (1973), Land Systems 1, 4, 8, 18 and 21 in Haantjens et al. (1964) and the agricultural land use map in Saunders (1993) were used to distinguish between forested and grass covered mountains, hilly land, low hills and alluvial plains. The boundary with System 0321/0529 is based on the landform map in Blake et al. (1973).

### **Notes**

This system is similar to Systems 0505, 0510, 0511 and 0321/0529 in terms of fallow vegetation, and fallow and cultivation periods, but has been distinguished from them by the combination of most important and important crops. It is distinguished from System 0507 where fallow vegetation is tall grass and low shrubs, 5-10 years old. It is distinguished from System 0508 where fallow vegetation is short grass, 25-30 years old.

The system is restricted to very steep, forested, mountainous land and gorges above 600 m altitude. At present, cultivation rarely goes over 1400 m altitude. Garden slopes are steep and soil retention barriers are important. After the fallow vegetation is felled and burnt, logs are laid across the slope behind stumps and pegs. In addition, small cross slope fences about 30 cm high are constructed approximately every 5 m down the slope. Yam and taro are planted first, both with corn and greens, in separate blocks in the centre of the garden. Sweet potato is planted around the edges and Chinese taro on steeper lower edges. After the harvest of these crops, sweet potato is planted over the whole garden. People using this system have access to land at lower altitudes and also harvest wild panadanus at higher altitudes.

In the Agaun and Param areas in Milne Bay Province, people also make gardens in System 0507, and residents in System 0507 also make gardens in this system.

Small amounts of cash are earned from the sale of coffee and fresh food, including potatoes.

### **National Nutrition Survey 1982/83**

No villages from this system were included in the survey.

### **Main References**

None.

### **Other References**

Blake, D.H., P. Paijmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.  
Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

## 4. AGRICULTURAL SYSTEMS: MAPS

The maps show the location of the Agricultural Systems identified in the Province and selected important characteristics of the systems. Where subsystems exist within an Agricultural System, the maps display information from the first subsystem only. Subsequent subsystem information is not displayed, but it is available in the text summaries. For crop combinations, cash income activities, population density and population absent, the maps show information for the entire system. A note in the key on the Agricultural Systems map lists the systems in which subsystems occur. Maps can be produced from computer files at any scale down to 1:500 000.

The following notes explain the classes used on the maps.

Map title	Notes
1. Agricultural Systems	Boundaries and identification numbers (eg. 1 = System 1401). See key for subsystem occurrences.
2. Fallow vegetation	The vegetation cleared from garden sites at the beginning of a new period of cultivation (8 classes).
3. Long fallow period	An estimate of the length of time land is left fallow before it is cultivated again (4 classes).
4. Number of plantings before fallow	The number of times staple crops are planted in the main gardens before those gardens are returned to a long fallow (5 classes).
5. Intensity of land use	Ratio of the cropping period (estimated from the number of plantings) to the length of the complete cultivation cycle, ie. cropping period plus fallow period (4 classes based on Ruthenberg's R factor) <sup>1</sup> . Very low: (R < 10) Low: (R = 10 - 32) Medium: (R = 33 - 66) High: (R > 66).
6. Crop combinations	Combinations of the most important (dominant staple) and important (subdominant staple) crops in this Province.

---

<sup>1</sup>  $R = (\text{Number of years of cultivation} \times 100) / (\text{Number of years of cultivation} + \text{Number of years of long fallow})$ , (Ruthenberg 1980, 15)



## Map title

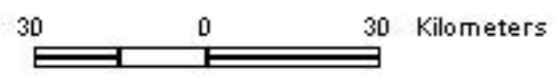
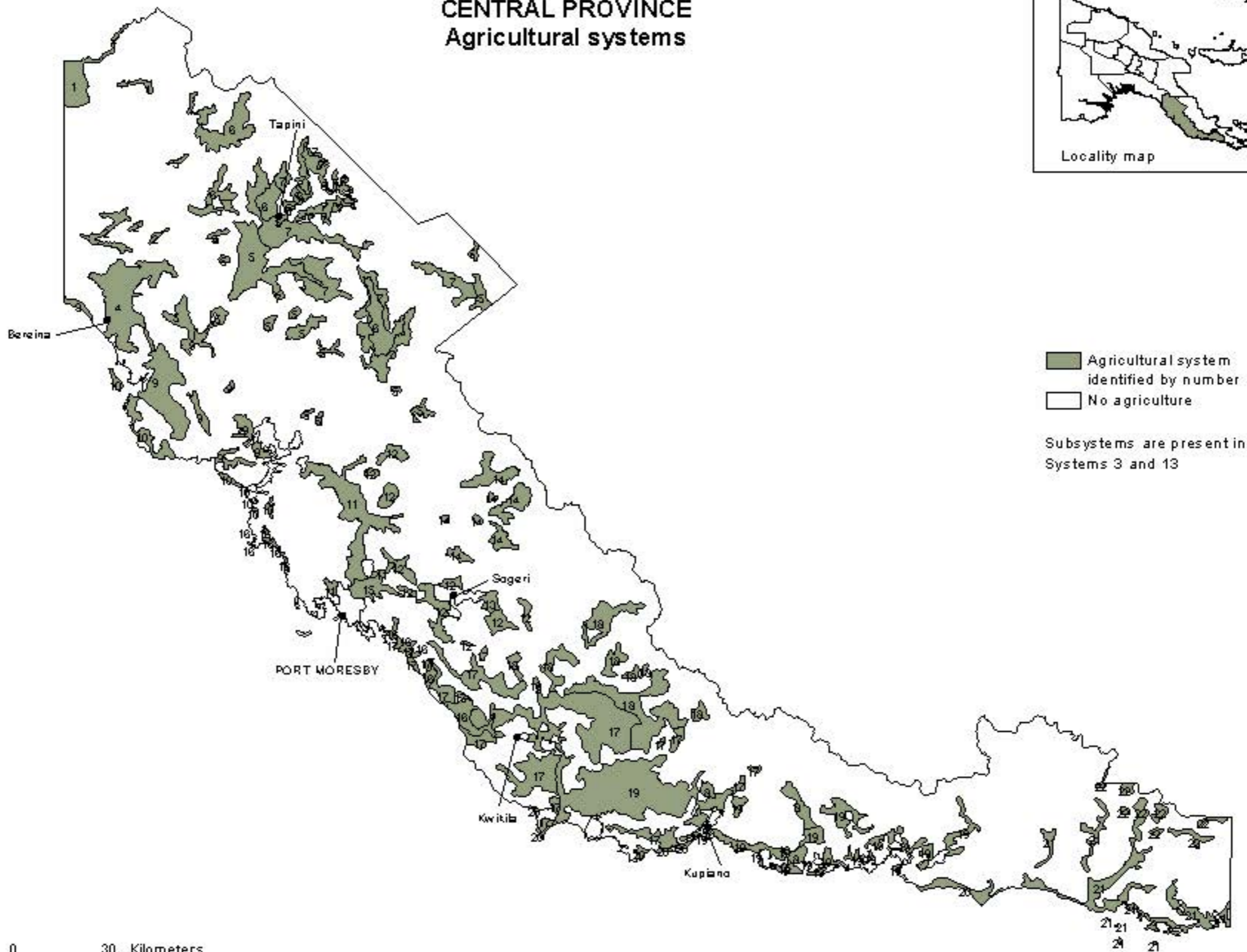
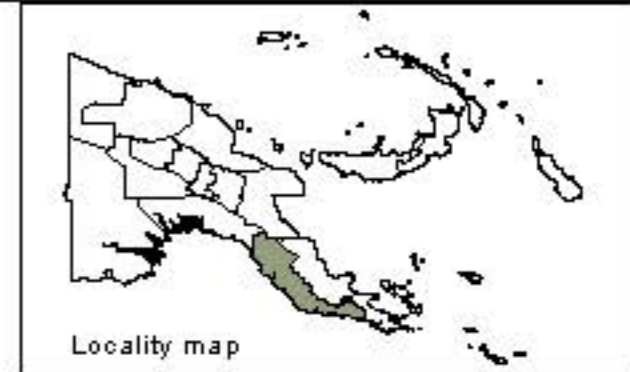
## Notes

7. Garden and crop segregation
- Separation of crops into different gardens or into different plots within a garden (4 classes). A combination of Fields 28 and 29. For both fields, 'nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present'. Classes are: both absent = 'No segregation'; garden segregation present only = 'Garden segregation'; crop segregation present only = 'Crop segregation'; both present = 'Garden and crop segregation'.
8. Soil fertility maintenance
- The presence or absence of the following: legume rotation, planted tree fallow, composting and mulching. For all features, 'nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present'.
9. Soil tillage
- The use of tillage in the preparation of land for cultivation (4 classes).
10. Fallow clearing practices
- A combination of the practices of burning fallow vegetation before planting, and cutting down fallows onto crops after planting. For both features, 'none' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present' (3 classes).
11. Soil mounds and beds
- A combination of measures of significance for mounds and beds: Medium and large mounds are classed together as 'large mounds'. Square and long beds are classed together as 'beds'. Very small mounds are excluded. Absent = 'none' and 'minor or insignificant' for all mounds and beds. Present = 'significant' and 'very significant' for all mounds and beds (6 classes).
12. Water management techniques
- The presence or absence of the following: drainage, irrigation and soil retention barriers. For all features, 'nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present' (4 classes).

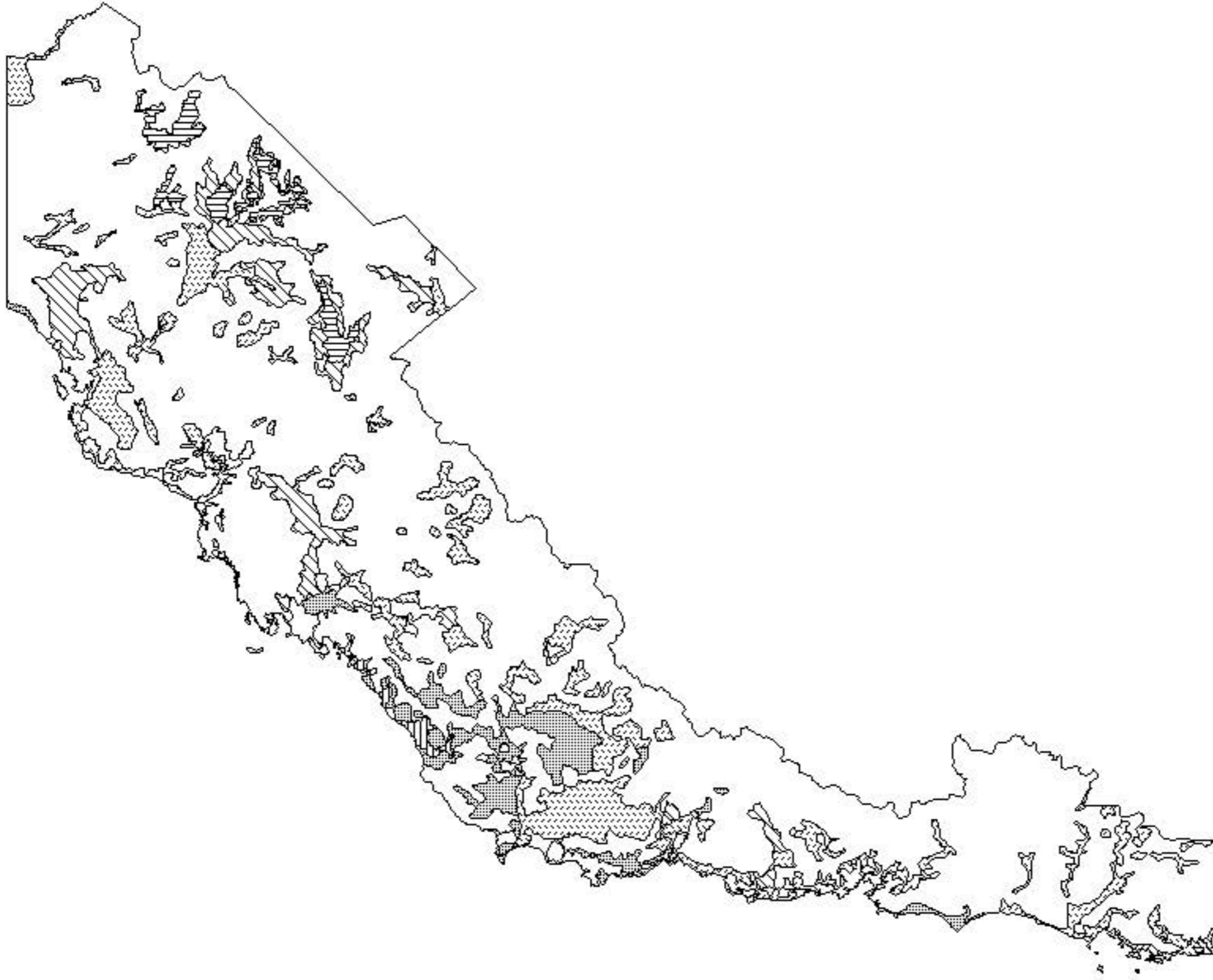
Map title	Notes
13. Cash income activities	Combinations of cash earning activities specific to this province. For all activities, 'nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present'.
14. Seasonality of the main food crops	Whether the dominant staple (most important) crops and the subdominant staple (important) are planted at about the same time each year. 'Nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present' (2 classes).
15. Population density	Persons per square kilometre, based on the 1980 National Population Census and the area occupied by the System (6 classes). 'Not applicable' refers to Systems where there are no census points.
16. Population absent	The proportion of the 'total' population listed in the 1979 Provincial Data System Rural Community Register as being 'absent 6 months or more' from the Census Unit (5 classes). 'Not applicable' refers to Systems where either there are no census points, or where the PDS data do not distinguish between the 'total' and 'resident' populations.










# CENTRAL PROVINCE Agricultural systems




# CENTRAL PROVINCE



## Fallow vegetation

-  Long fallow not used
-  Short grass
-  Tall grass
-  Grass and woody regrowth
-  Short woody regrowth
-  Tall woody regrowth
-  Savanna

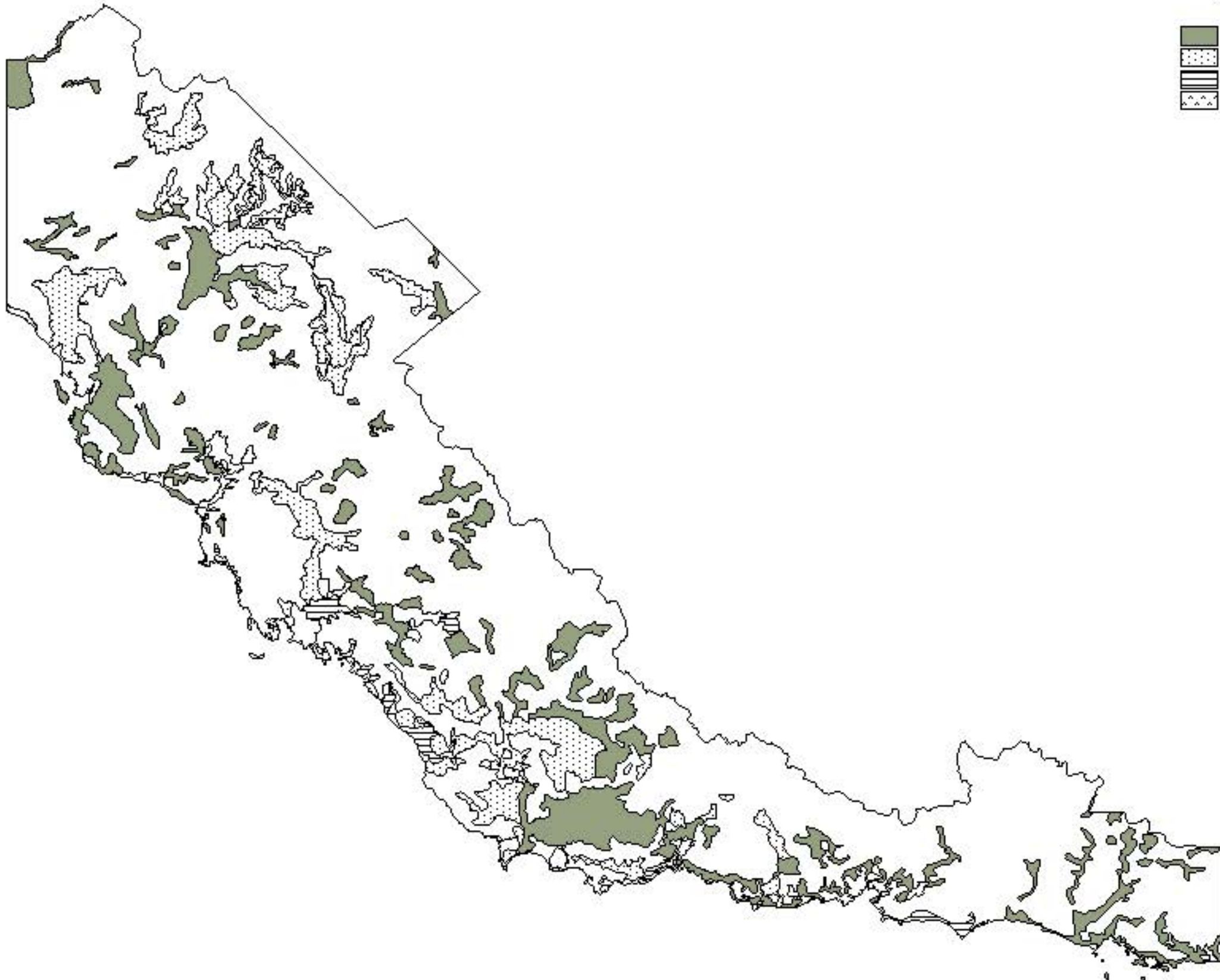
30 0 30 Kilometers



# CENTRAL PROVINCE

## Long fallow period




- Greater than 15 years
- 5 to 15 years
- 1 to 4 years
- Long fallow not significant

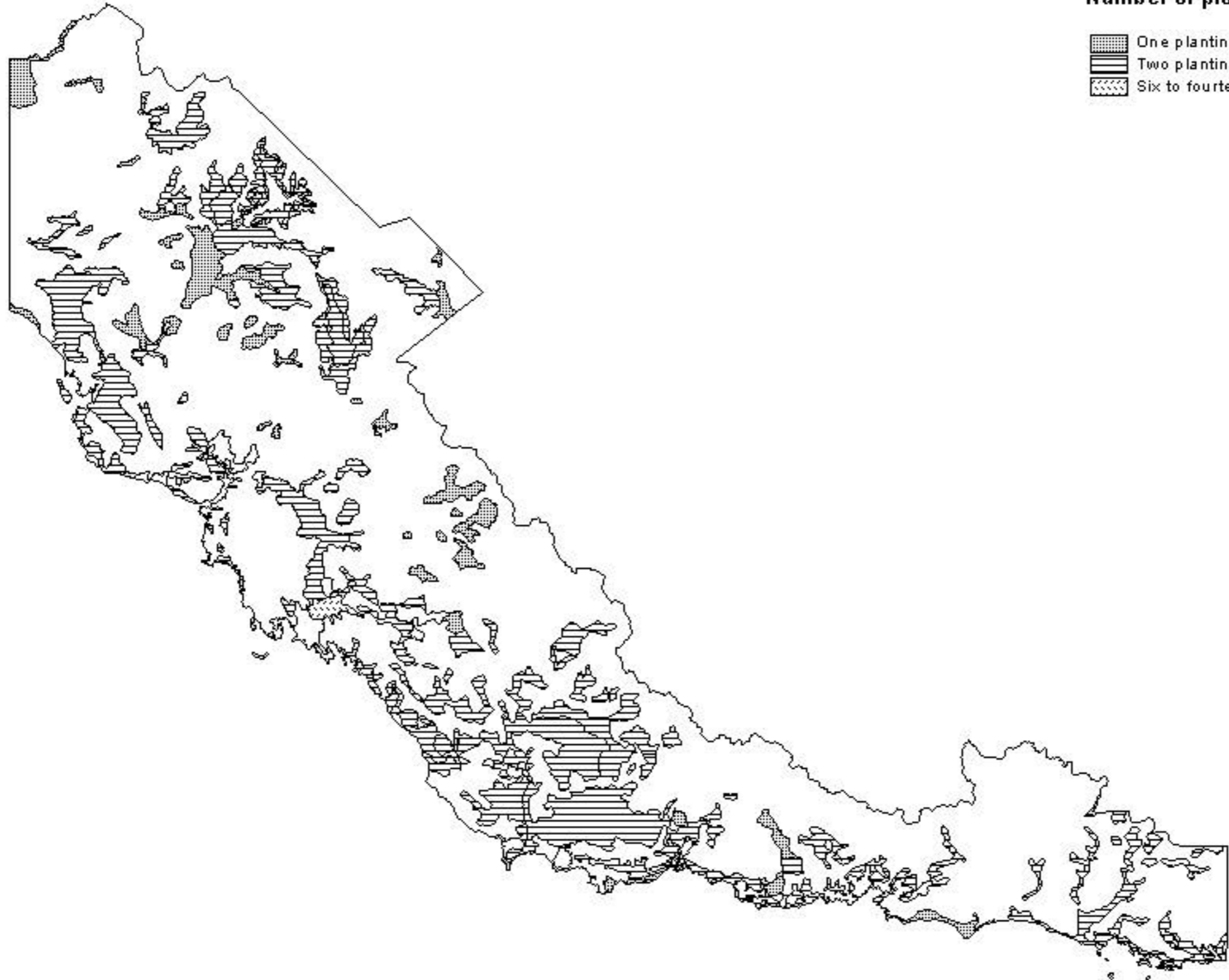


30 0 30 Kilometers

# CENTRAL PROVINCE

## Number of plantings before fallow

-  One planting only
-  Two plantings
-  Six to fourteen plantings

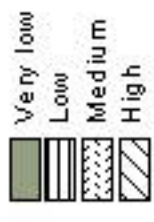


30 0 30 Kilometers



# CENTRAL PROVINCE

## Intensity of land use

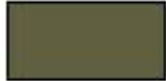

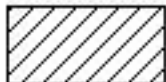





## CENTRAL PROVINCE

### Crop combinations

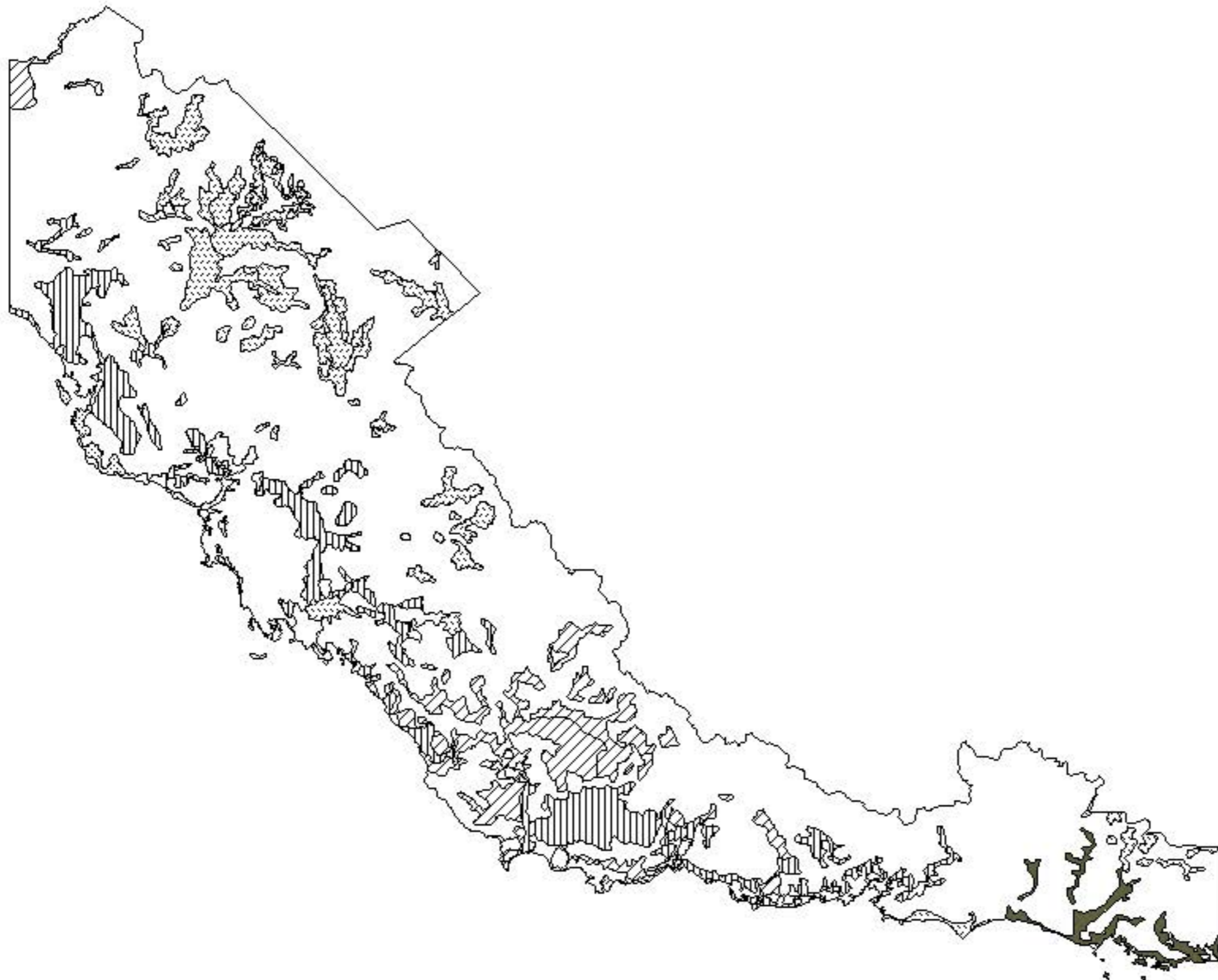
#### Most important crops    Important crops

	None	Banana/cassava/coconut/sweet potato/taro
	Banana	Cassava/coconut/yam ( <i>D. alata</i> )
	Banana	Cassava/coconut/sweet potato
	Banana	Cassava/sweet potato
	Banana	Cassava/yam ( <i>D. esculenta</i> )
	Banana	Coconut
	Banana	Sweet potato
	Banana	Sweet potato/taro
	Banana	Yam ( <i>D. esculenta</i> )
	Banana	Coconut/sweet potato/taro
	Banana	Coconut/yam ( <i>D. esculenta</i> )
	Banana/sweet potato	None
	Banana/sweet potato	Cassava/coconut/yam ( <i>D. esculenta</i> )
	Banana/sweet potato	Yam ( <i>D. esculenta</i> )
	Banana/sweet potato	None
	Banana/sweet potato	Taro, yam ( <i>D. alata</i> and <i>D. esculenta</i> )
	Sweet potato	Banana/cassava/coconut/yam ( <i>D. esculenta</i> )
	Sweet potato	Banana/Chinese taro/taro
	Sweet potato	Cassava
	Sweet potato	Taro
	Sweet potato	Taro/yam ( <i>D. alata</i> )
	Sweet potato	None

# CENTRAL PROVINCE

## Crop combinations

Legend on facing page



30 0 30 Kilometers

# CENTRAL PROVINCE

## Garden and crop segregation

- No segregation
- Garden segregation
- Crop segregation



30 0 30 Kilometers

# CENTRAL PROVINCE

## Soil fertility maintenance

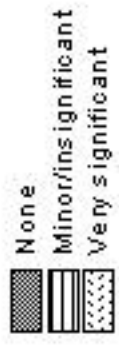
- None
- Legume rotation



30 0 30 Kilometers

# CENTRAL PROVINCE

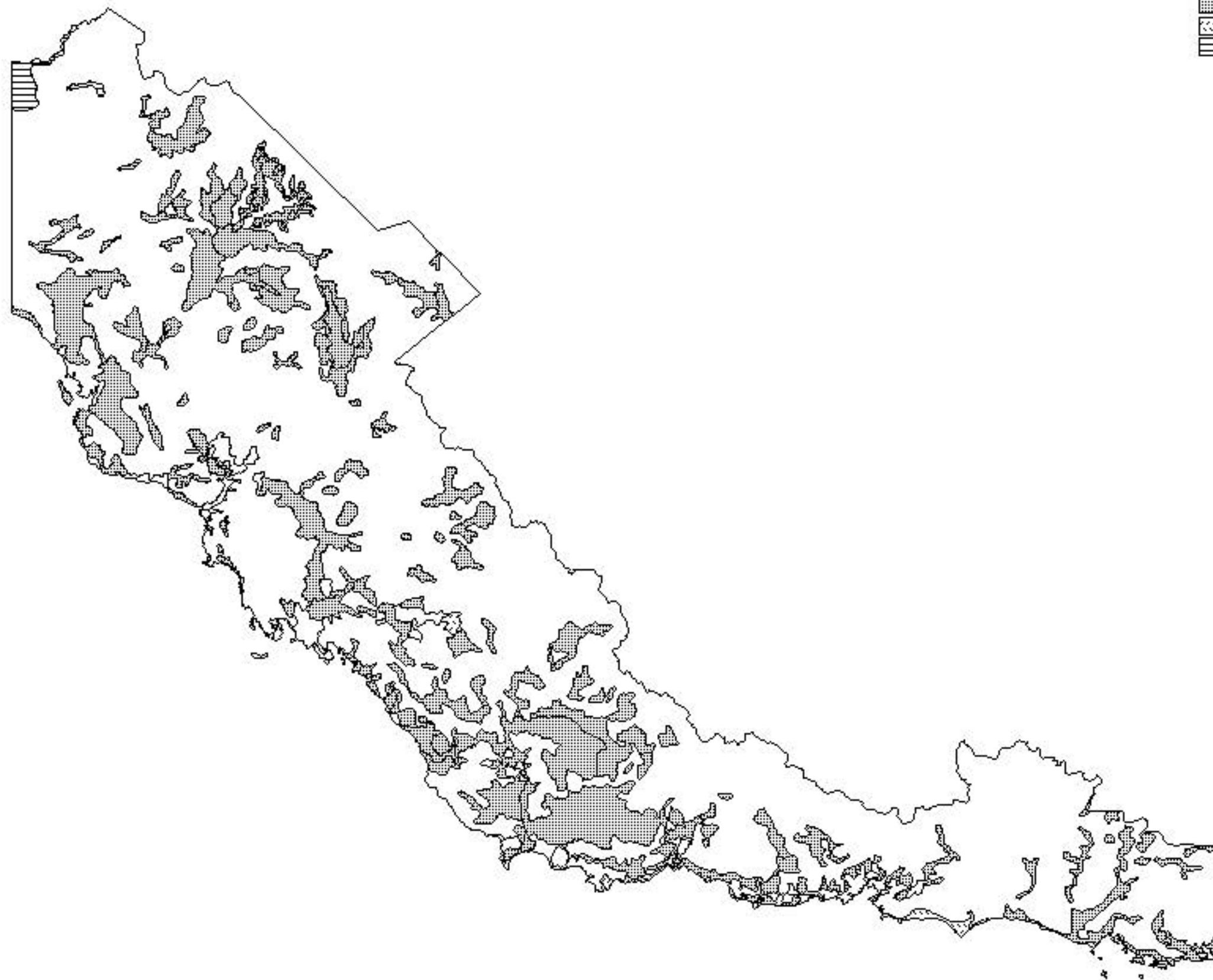
## Soil tillage



# CENTRAL PROVINCE

## Fallow clearing practices





- Fallow cut and burnt
- Fallow cut and not burnt
- Fallow felled onto crops



30 0 30 Kilometers

# CENTRAL PROVINCE

## Soil mounds and beds

-  Mounds absent and beds absent
-  Small mounds present and beds absent
-  Small mounds and beds present
-  Large mounds present and beds absent



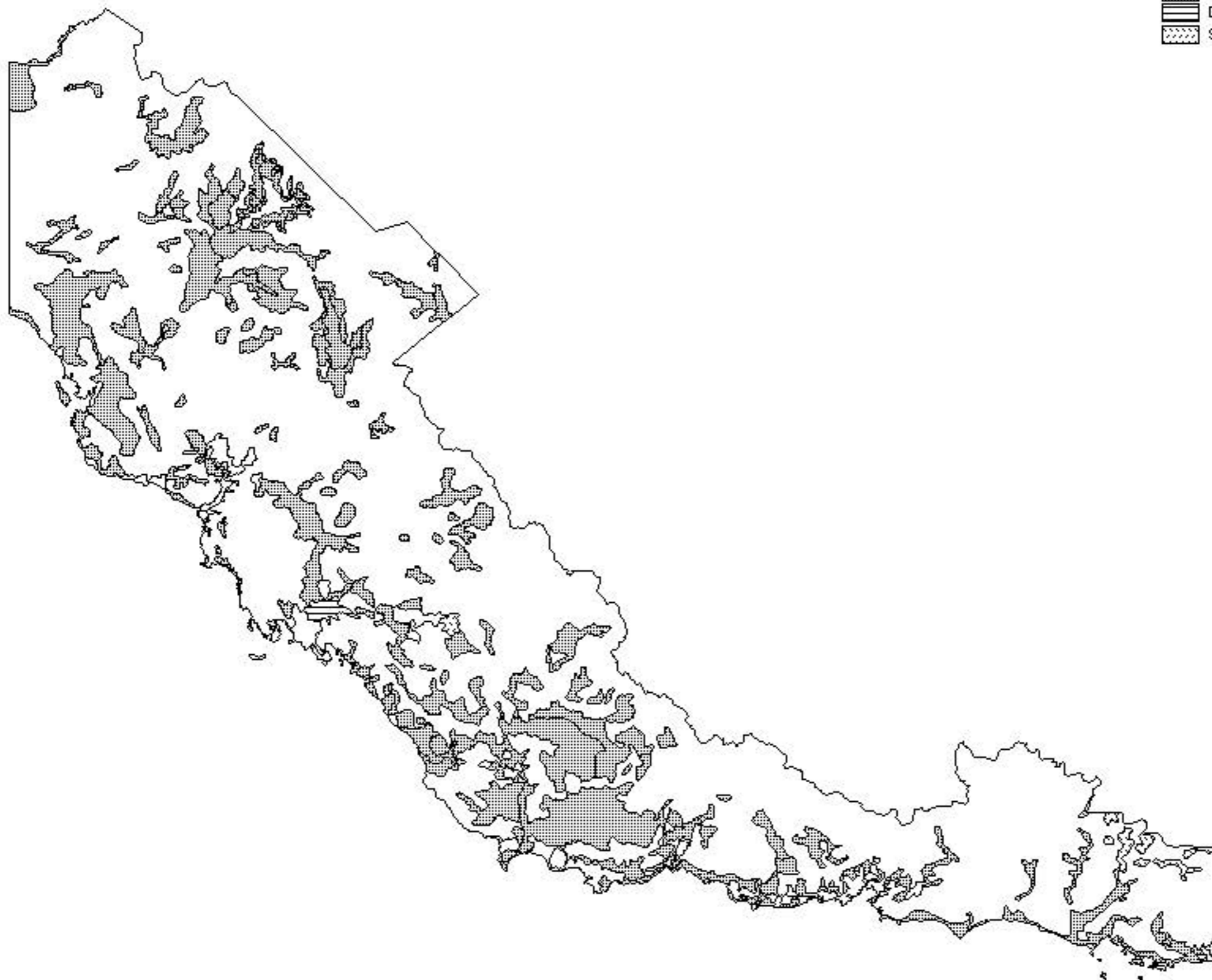
30 0 30 Kilometers



# CENTRAL PROVINCE

## Water management techniques

- No water control
- Drainage
- Soil retention barriers











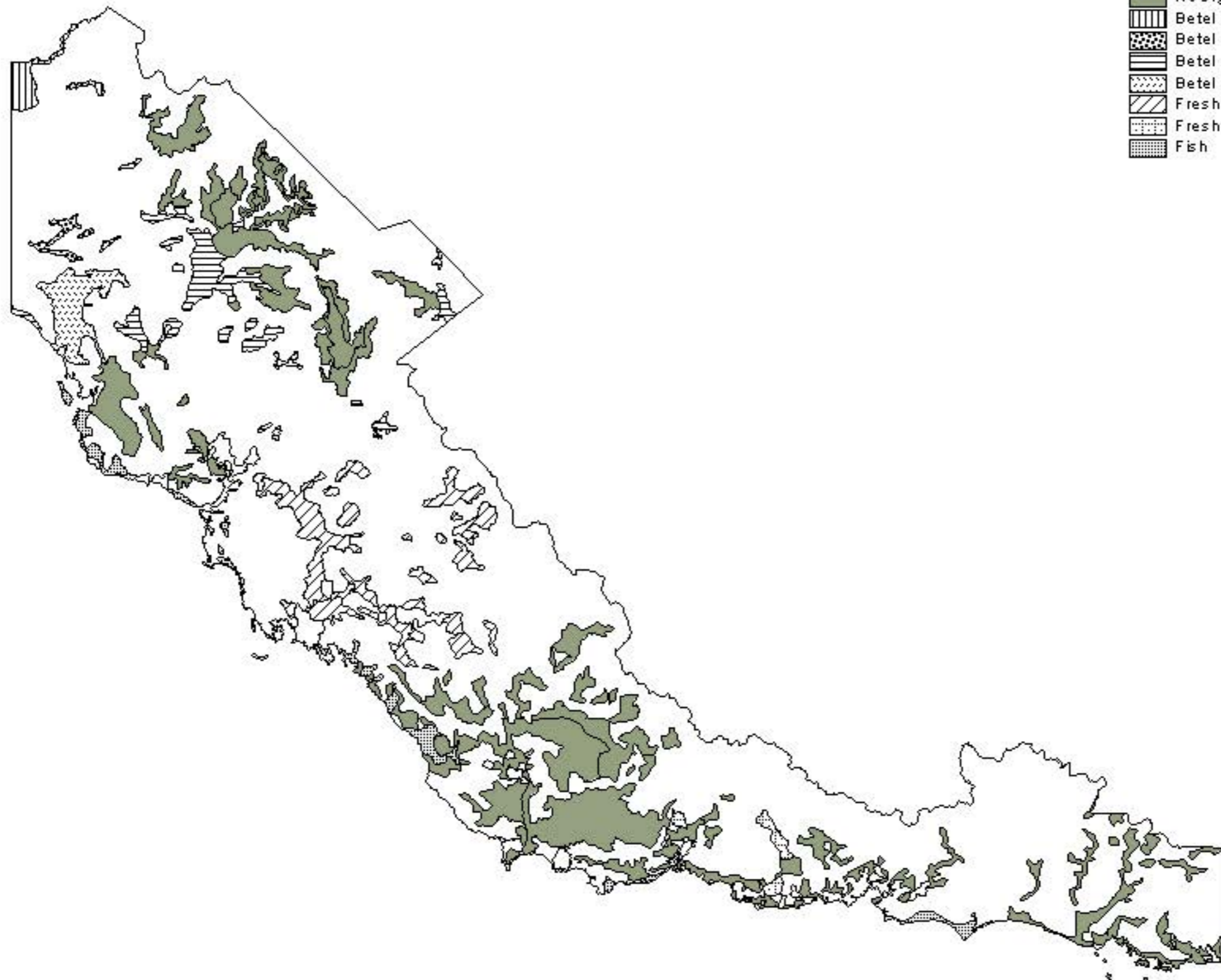
30 0 30 Kilometers



# CENTRAL PROVINCE

## Cash income activities

-  No significant cash income
-  Betel nut
-  Betel nut, betel pepper
-  Betel nut, fresh food
-  Betel nut, betel pepper, fresh food
-  Fresh food
-  Fresh food, rubber
-  Fish



30 0 30 Kilometers



# CENTRAL PROVINCE

## Seasonality of main food crops

- No seasonal planting
- Planted seasonally

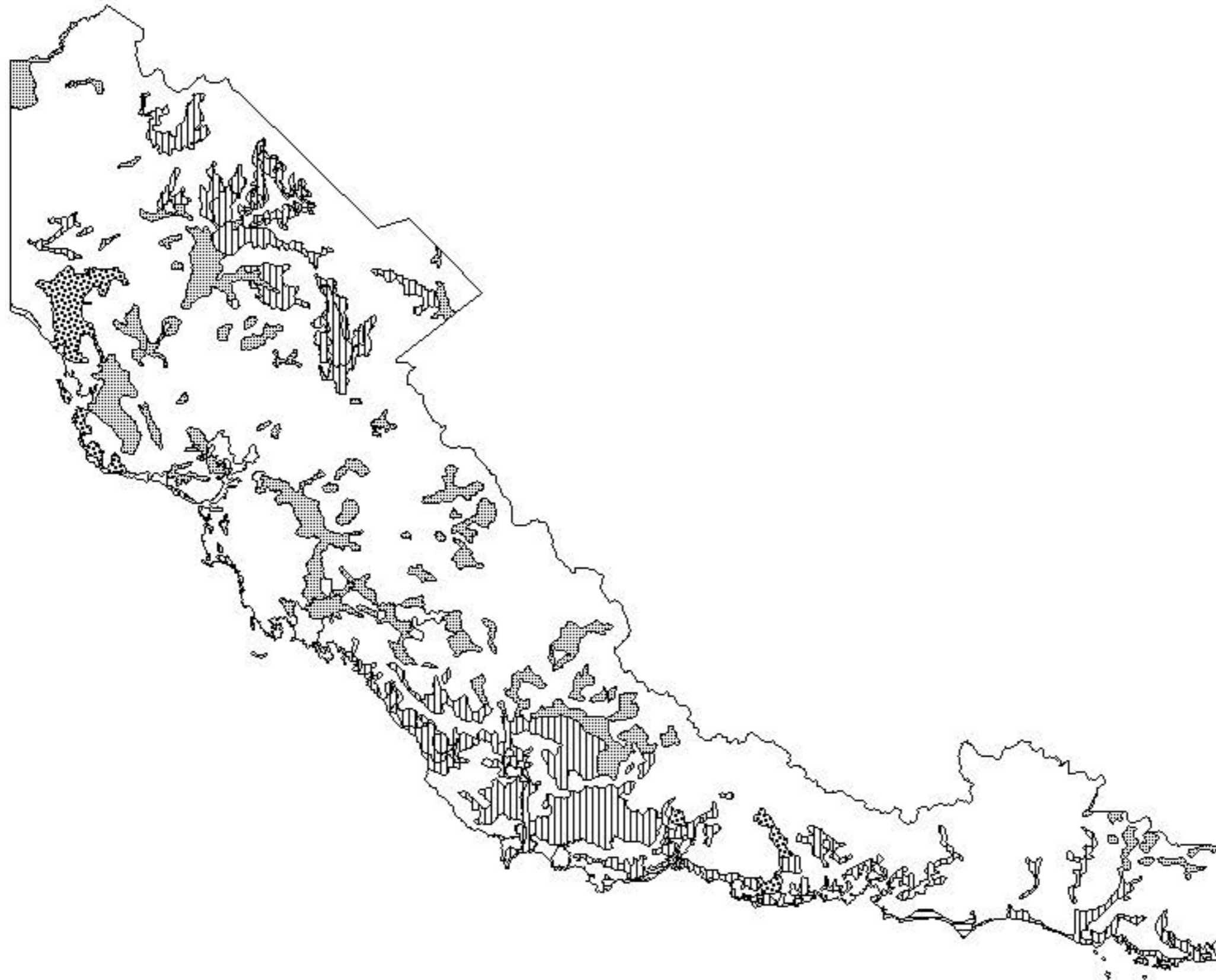
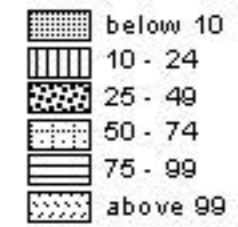


30 0 30 Kilometers

# CENTRAL PROVINCE

## Population density

Persons per square kilometre



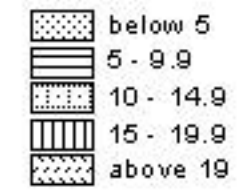
30 0 30 Kilometers



# CENTRAL PROVINCE

## Population absent

Percentage





## **5. AGRICULTURAL SYSTEMS: DATA LISTING BY CODES**

The following tables list all of the information contained within the database in coded form. The codes are contained in Section 2, Database Structure, Definitions and Codes.



**AGRICULTURAL SYSTEM DATA LISTING - CODES**      **Province: 03 Central**

System	Sub sys	No. of subsys	Subsys extent	Same sys oth prov	Districts	Census Divisions
301	1	1	4	0213-1238	4-5	
302	1	1	4	0214	4	18-19
303	1	2	3	0204	4	17
303	2	2	1	0204	4	17
304	1	1	4		4	16-18-19
305	1	1	4	0602	3-4-5	09-20-25-28-30
306	1	1	4		5	21-22-23-24-29
307	1	1	4		4-5	20-23-24-25-26-27-29-30
308	1	1	4		1	02
309	1	1	4		4	14-15-16-20
310	1	1	4		3-4	13-14-15-16
311	1	1	4		3	10-11
312	1	1	4		3	10
313	1	2	3		3	10
313	2	2	1		3	10
314	1	1	4		3	09-10-11
315	1	1	4		3	10
316	1	1	4		2-3	07-12-13
317	1	1	4		1-2-3	02-04-05-07-08-10-12-13
318	1	1	4		2	04-05-06-07-08
319	1	1	4		1-2	01-02-03-04-05-07
320	1	1	4		1-2	01-02-07
321	1	1	4	0529	1	01
322	1	1	4	0506	1	01

**KEY**

Subsys                      Subsystem  
 Same sys                Same system in  
 oth prov                other province



AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 03 Central

System	Sub sys	Area km <sup>2</sup>	Population			Altitude range m		Slope	Fallows		
			Total	Abs	Den	Low	High		Veg	Sht	Per
301	1	138	0	0	0	40	1000	2	5	0	3
302	1	68	1144	14	17	10	20	1	5	0	3
303	1	17	2548	37	150	0	100	2	1	0	2
303	2	0	0	0	0	0	100	2	5	0	2
304	1	323	8282	100	26	10	40	1	4	0	2
305	1	533	2922	18	5	100	1400	4	5	0	3
306	1	494	7677	27	16	1400	2000	4	3	2	2
307	1	724	13777	22	19	1900	2200	4	4	2	2
308	1	88	3600	100	41	20	100	2	4	0	2
309	1	367	2826	100	8	20	100	3	5	0	3
310	1	108	2799	41	26	0	40	2	8	0	3
311	1	297	1003	16	3	10	30	1	4	0	2
312	1	269	1131	14	4	400	800	3	5	0	3
313	1	27	123	11	5	600	800	3	4	0	1
313	2	0	0	0	0	600	800	3	5	0	3
314	1	212	1811	23	9	400	1800	3	5	0	3
315	1	68	0	100	0	20	80	2	1	3	1
316	1	132	3183	16	24	5	20	1	2	0	1
317	1	965	17381	19	18	0	300	3	1	0	2
318	1	521	4437	100	9	400	800	3	5	0	3
319	1	994	12838	23	13	20	200	3	5	0	3
320	1	90	7240	39	80	5	20	1	1	0	1
321	1	341	4178	29	12	10	300	5	5	0	3
322	1	124	583	17	5	600	1400	3	5	0	3

KEY

Subsys Subsystem

Area km<sup>2</sup> Area of System

**Population**

Total Resident population 1980

Abs Absent population (%)

Den Population density (persons/km<sup>2</sup>)

**Fallows**

Veg Type of Fallow vegetation

Sht Short fallows

Per Long fallow period

**AGRICULTURAL SYSTEM DATA LISTING - CODES**

**Province: 03 Central**

System	Sub sys	Staple crops			Narcotic crops
		Most import	Important	Present	
301	1	02-11	00	02-04-05-09-11-13	2-4-5
302	1	02	11-13	02-04-05-09-11-12-13-14-15-17	2-4-5
303	1	02	06	02-04-06-09-11-15-18-19	2-4
303	2	02	06	02-04-06-09-11-15-18-19	2-4
304	1	02	06-11-13	02-04-05-06-11-12-13-14-17-18	2-4-5
305	1	11	02-05-13	02-04-05-11-13-14-15	2-4-5
306	1	11	00	02-05-08-11-13-14	1-5
307	1	11	00	02-05-08-11-13-14	1-5
308	1	02-11	13-14-15	02-04-05-11-13-14-15-18-19	2-4-5
309	1	02	04-15	02-04-05-09-11-13-14-15	2-4-5
310	1	02-04	06-15	02-04-06-11-12-14-15-19	2-4-5
311	1	02	11	02-04-05-09-11-12-13-14-15	2-4-5
312	1	02	15	02-04-05-11-13-14-15-19	2-4-5
313	1	11	00	02-05-11	2-4-5
313	2	02	15	02-04-05-11-13-14-15-19	2-4-5
314	1	11	13-14	02-04-05-11-13-14-15	1-2-4-5
315	1	11	04	02-04-05-11-13-14-15	5
316	1	02	04-06-14	02-04-05-11-13-14-15-18-19-20	2-4-5
317	1	02-11	04-06-15	02-04-05-09-11-13-14-15-18-19	2-4-5
318	1	02-11	15	02-04-05-09-11-13-14-15	2-4-5
319	1	02	04-06-11	02-04-05-09-11-13-14-15-18-19	2-4-5
320	1	11	02-04-06-15	02-04-05-06-11-13-14-15-18-19	2-4-5
321	1	00	02-04-06-11-13	02-04-05-06-09-11-13-14-15-19	2-4-5
322	1	11	13	02-04-05-08-11-13-14-15-20	1-2-3-4-5

**KEY**

Subsys      Subsystem

**AGRICULTURAL SYSTEM DATA LISTING - CODES**

**Province: 03 Central**

System	Sub sys	Vegetable crops	Fruit crops	Nut crops
301	1	01-09-10-11-15-16-21-20-23	08-12-13-15-17	01-04-10
302	1	01-09-10-15-21-23-27	07-08-09-12-13-15-17	01-04-10
303	1	01-09-16-23-27	07-09-13-12-17-23	01
303	2	01-09-10-16-23-27	07-09-13-12-17-23	01
304	1	01-02-09-15-16-17-21-23-27-28	05-07-09-12-13-15-17	01-10
305	1	01-02-05-08-09-15-16-21-23-27	06-07-08-12-13-15-17-30	01-04-10-13
306	1	01-03-04-06-09-10-13-18-21	11-13-15-31-37	08-09
307	1	01-03-04-06-09-10-13-18-21	11-13-15-31-37	08-09
308	1	01-02-07-09-10-16-19-21-23-27	07-08-12-13-15-17-22-23	01-04
309	1	01-09-10-16-19-21-27-44	05-07-09-12-13-15-17	01-04-10
310	1	01-09-10-16-19-21-27-44	04-05-07-09-12-13-15-17	01-10
311	1	01-07-09-10-16-21-23-27-44	05-07-12-13-15-17	01-04-10
312	1	01-03-08-09-10-14-16-19-21-37	07-08-09-12-13-15-17-27	01-04-10
313	1	06-07-08-09-13-19	07-08-12-13-15-17	01
313	2	01-03-08-09-10-14-16-19-21-37	07-08-09-12-13-15-17-27	01-04-10
314	1	01-08-09-10-16-21-22-23-27-28	01-06-07-09-12-13-15-17	01-04-09-10-11
315	1	01-07-09-10-19-21-27-28-44	06-07-09-11-12-13-15-17	01-04
316	1	01-09-10-19-21-27-44	01-05-06-07-12-13-15-17	01-10
317	1	01-09-10-19-21-27	01-05-06-07-12-13-15-17	01-10
318	1	01-02-03-09-10-13-16-19-21	07-08-09-12-13-15-23	01-04-09-10
319	1	01-02-09-10-13-15-16-21-23-27	05-07-08-12-13-15-17	01-10
320	1	01-09-10-19-21-27	01-05-06-07-12-13-15-17	01-10-15
321	1	01-09-10-15-16-20-21-23-27-28	05-07-08-12-13-15-17-36	01-07-13-15-18
322	1	01-04-09-10-13-15-16-20-23-27	05-07-08-12-13-15-17	01-03-09-10-13

**KEY**

Subsys      Subsystem

**AGRICULTURAL SYSTEM DATA LISTING - CODES**

**Province: 03 Central**

System	Sub sys	Segregation		Crop Seq	Gard types		Soil fertility maintenance techniques							
		Gar	Crp		Mix	H'ld	Leg	Tre	Com	Man	Isl	Sil	Fer	
301	1	0	1	0	0	0	0	0	0	0	0	0	1	0
302	1	0	1	3	0	1	0	0	0	0	0	0	1	0
303	1	1	1	1	0	0	0	0	0	0	0	0	0	0
303	2	1	1	1	0	0	0	0	0	0	0	0	0	0
304	1	0	1	3	0	0	0	0	0	0	0	0	1	0
305	1	1	2	0	0	0	0	0	0	0	0	0	0	0
306	1	1	1	0	0	3	0	0	0	0	0	0	0	0
307	1	1	1	0	0	3	0	0	0	0	0	0	0	0
308	1	0	1	0	0	2	1	0	0	0	0	0	0	1
309	1	2	1	1	0	0	0	0	0	0	0	0	0	0
310	1	3	1	1	0	0	0	0	0	0	0	0	0	0
311	1	0	1	1	0	0	0	0	0	0	0	1	0	0
312	1	0	2	2	0	1	0	0	0	0	0	0	0	0
313	1	0	0	0	0	2	0	0	0	0	0	0	0	0
313	2	0	3	2	0	2	0	0	0	0	0	0	0	0
314	1	2	1	0	0	3	0	0	0	0	0	0	0	0
315	1	0	1	3	0	3	3	0	0	1	0	0	0	1
316	1	3	1	0	0	0	0	0	0	0	0	0	0	0
317	1	3	1	2	0	1	0	0	0	0	0	0	0	0
318	1	2	1	2	0	1	1	0	0	0	0	0	0	0
319	1	0	3	2	0	1	0	0	0	0	0	0	0	0
320	1	3	1	1	0	1	0	0	0	0	0	0	0	0
321	1	0	2	3	0	1	0	0	0	0	0	0	0	0
322	1	0	2	2	0	2	0	0	0	0	0	0	0	0

**KEY**

Subsys      Subsystem

**Segregation**

Gar          Garden

Crp          Crop

Crop seq    Crop sequences

**Gard types    Garden types**

Mix          Mixed vegetable gardens

H'ld          Household gardens

**Soil fertility maintenance techniques**

Leg          Legume rotation

Tre          Planted tree fallow

Com          Compost

Man          Animal manure

Isl          Island bed

Sil          Silt from floods

Fer          Inorganic fertilizer

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 03 Central

System	Sub sys	Management techniques											
		Water		Soil						Fallow		Other	
		Irr	Drn	Pig	Till	Hol	Bar	Mul	Mec	Brn	Cut	Fen	Stk
301	1	0	0	0	0	0	0	0	0	1	2	1	0
302	1	0	0	0	0	0	0	0	0	3	0	3	1
303	1	0	0	0	3	0	0	0	0	3	0	0	1
303	2	0	0	0	0	0	0	0	0	2	0	0	1
304	1	0	0	0	0	0	0	0	1	3	0	3	1
305	1	0	0	0	0	0	0	0	0	3	0	3	1
306	1	0	1	3	1	0	1	0	0	3	0	3	1
307	1	0	1	3	0	0	1	0	0	3	0	3	1
308	1	0	0	0	0	0	0	0	0	2	0	2	1
309	1	0	0	0	0	0	0	0	0	3	0	3	2
310	1	0	0	0	3	0	0	0	0	3	0	3	2
311	1	0	0	0	0	0	0	0	0	3	0	0	1
312	1	0	0	0	0	0	1	0	0	3	0	3	2
313	1	0	0	0	3	0	3	0	0	0	0	0	0
313	2	0	0	0	0	0	0	0	0	3	0	0	2
314	1	0	0	0	0	0	0	0	0	3	0	3	2
315	1	0	3	0	3	0	1	0	0	2	0	1	1
316	1	0	0	0	3	0	0	0	3	2	0	1	2
317	1	0	0	0	3	0	0	0	2	2	0	3	2
318	1	0	0	0	0	0	0	0	0	3	0	0	2
319	1	0	0	0	0	0	0	0	0	3	0	2	1
320	1	0	1	0	3	0	0	0	2	1	0	1	1
321	1	0	0	0	0	0	1	0	0	3	0	1	1
322	1	0	0	0	0	0	3	0	0	3	0	2	1

**KEY**

Subsys Subsystem

**Management techniques**

**Water management**

Irr Irrigation

Drn Drainage

**Soil management**

Pit Pigs placed in gardens

Till Tillage

Hol Deep holing (for yams)

Bar Soil retention

Mul Mulching

Mec Mechanized soil tillage

**Fallow management**

Brn Burning of cut vegetation

Cut Fallow cut onto crops

**Other**

Fen Fencing

Stk Staking of crops

**AGRICULTURAL SYSTEM DATA LISTING - CODES**

**Province: 03 Central**

System	Sub sys	Management techniques						Crop planting seasonality		Cropping intensity	R value
		Soil mounds				Garden beds		Maj	Min		
		Vsm	Sm	Md	Lge	Sq	Lg				
301	1	0	0	0	0	0	0	0	1	1	9
302	1	0	2	0	0	0	0	2	2	2	20
303	1	0	1	0	0	0	0	0	0	1	29
303	2	0	1	0	0	0	0	2	2	1	28
304	1	0	2	0	0	0	0	2	2	2	38
305	1	0	3	0	0	0	0	0	1	1	5
306	1	0	3	0	0	0	0	1	1	2	17
307	1	0	3	0	0	0	0	1	1	2	17
308	1	0	2	0	0	0	0	2	2	1	9
309	1	0	2	0	0	0	0	2	3	2	20
310	1	0	2	0	0	0	0	2	3	2	20
311	1	0	2	0	0	0	0	3	3	2	33
312	1	0	0	0	0	0	0	2	2	2	17
313	1	0	0	3	0	0	0	0	0	1	25
313	2	0	0	0	0	0	0	2	2	2	17
314	1	0	3	0	0	0	0	2	2	1	5
315	1	0	3	0	0	0	3	3	3	4	77
316	1	0	2	0	0	0	0	3	3	2	57
317	1	0	2	0	0	0	0	3	3	2	45
318	1	0	1	0	0	0	0	2	3	2	8
319	1	0	2	0	0	0	0	3	3	2	23
320	1	0	3	0	0	0	0	3	3	1	25
321	1	0	2	0	0	0	0	3	3	2	9
322	1	0	2	0	0	0	0	2	1	2	9

**KEY**

Subsys      Subsystem  
**Management techniques**

**Soil mounds**

Vsm      Very small  
 Sm      Small  
 Md      Medium  
 Lge      Large

**Garden beds**

Sq      Square  
 Lg      Long

**Crop planting seasonality**

Maj      Dominant  
 Min      Other crops

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 03 Central

System	Sub sys	Cash income sources											
		An	Bet	Crd	Cat	Chi	Coc	Cnt	CfA	CfR	Crc	Fwd	Fsh
301	1	0	2	0	0	0	0	0	0	0	0	0	0
302	1	0	3	0	0	0	0	0	0	0	0	0	1
303	1	0	3	0	0	0	0	0	0	0	0	0	0
303	2	0	3	0	0	0	0	0	0	0	0	0	0
304	1	0	3	0	0	0	0	0	0	0	0	0	0
305	1	0	2	0	0	0	0	0	1	0	0	0	0
306	1	0	0	0	1	0	0	0	0	0	0	0	0
307	1	0	0	0	1	0	0	0	0	0	0	0	0
308	1	0	0	0	0	0	0	0	0	0	0	0	0
309	1	0	1	0	0	0	0	0	0	0	0	1	0
310	1	0	1	0	0	0	0	1	0	0	0	0	2
311	1	0	0	0	0	0	0	0	0	0	0	0	1
312	1	0	0	0	0	0	0	0	0	1	0	0	1
313	1	0	0	0	0	0	0	0	0	0	0	0	0
313	2	0	0	0	0	0	0	0	0	0	0	0	0
314	1	1	0	0	0	0	0	0	1	0	0	0	0
315	1	0	0	0	0	0	0	0	0	0	0	0	0
316	1	0	1	0	0	0	0	0	0	0	0	0	2
317	1	0	1	0	1	0	0	0	0	0	0	0	0
318	1	1	0	0	0	0	0	0	0	0	0	1	0
319	1	0	1	0	0	0	0	1	0	0	0	0	1
320	1	0	1	0	0	0	0	0	0	0	0	0	2
321	1	0	1	0	0	0	0	1	0	0	0	0	1
322	1	0	0	0	0	0	0	0	1	1	0	0	0

KEY

Subsys Subsystem

Cash Income Sources

An Animal skins  
 Bet Betel nut  
 Crd Cardamom  
 Cat Cattle

Chi Chillie  
 Coc Cocoa  
 Cnt Coconut  
 CfA Coffee Arabica

CfR Coffee Robusta  
 Crc Crocodile  
 Fwd Firewood  
 Fsh Fish

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 03 Central

System	Sub sys	Cash income sources										
		Fod	Op	Pot	Pyr	Ric	Rub	Shp	Tea	Tob	Ot1	Ot2
301	1	1	0	0	0	0	0	0	0	0	0	0
302	1	1	0	0	0	0	0	0	0	0	3	0
303	1	2	0	0	0	0	0	0	0	0	0	0
303	2	2	0	0	0	0	0	0	0	0	0	0
304	1	2	0	0	0	0	0	0	0	0	3	0
305	1	2	0	0	0	0	1	0	0	0	0	0
306	1	1	0	1	0	0	0	0	0	1	0	0
307	1	1	0	1	0	0	0	0	0	1	0	0
308	1	3	0	0	0	0	3	0	0	0	0	0
309	1	1	0	0	0	0	0	0	0	0	0	0
310	1	1	0	0	0	0	0	0	0	0	0	0
311	1	2	0	0	0	0	0	0	0	0	1	0
312	1	2	0	0	0	0	1	0	0	0	0	0
313	1	3	0	0	0	0	1	0	0	0	0	0
313	2	3	0	0	0	0	1	0	0	0	0	0
314	1	2	0	0	0	0	0	0	0	0	0	0
315	1	3	0	0	0	0	0	0	0	0	0	0
316	1	1	0	0	0	0	0	0	0	0	0	0
317	1	1	0	0	0	0	0	0	0	0	0	0
318	1	1	0	0	0	0	0	0	0	0	1	0
319	1	1	0	0	0	0	0	0	0	0	0	0
320	1	1	0	0	0	0	0	0	0	0	0	0
321	1	1	0	0	0	0	0	0	0	0	0	0
322	1	1	0	1	0	0	0	0	0	0	0	0

KEY

Subsys Subsystem

Cash Income Sources

Fod Fresh food

Op Oil Palm

Pot Potato

Pyr Pyrethrum

Ric Rice

Rub Rubber

Shp Sheep

Tea Tea

Tob Tobacco

Ot1 Other 1

Ot2 Other 2



AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 03 Central

System	Sub sys	Survey 1				Survey 2				Survey 3				
		Date mth yr	Period yrs	Sv tp	Sv in	Date mth yr	Period yrs	Sv tp	Sv in	Date mth yr	Period yrs	Sv tp	Sv in	
301	1	05 92	-	3	RMB	-	-	-	-	-	-	-	-	
302	1	08 95	-	3	BJA	-	-	-	-	-	-	-	-	
303	1	05 92	-	3	RMB	08 95	-	2	TN	-	-	-	-	
303	2	05 92	-	3	RMB	08 95	-	2	TN	-	-	-	-	
304	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	
305	1	08 95	-	3	TN	-	-	-	-	-	-	-	-	
306	1	08 95	-	4	A/N	-	-	-	-	-	-	-	-	
307	1	08 95	-	4	A/N	-	-	-	-	-	-	-	-	
308	1	-	-	1985-86	5	TN	11 88	-	4	RMB	08 95	-	3	A/N
309	1	08 95	-	2	BJA	-	-	-	-	-	-	-	-	-
310	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	-
311	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	-
312	1	08 95	-	1	BJA	-	-	-	-	-	-	-	-	-
313	1	08 95	-	1	BJA	-	-	-	-	-	-	-	-	-
313	2	08 95	-	1	BJA	-	-	-	-	-	-	-	-	-
314	1	03 82	-	3	B/A	08 95	-	3	A/N	-	-	-	-	-
315	1	03 93	-	4	F/G	-	-	-	-	-	-	-	-	-
316	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	-
317	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	-
318	1	08 95	-	3	A/N	-	-	-	-	-	-	-	-	-
319	1	-	-	1985-0	-	TN	08 95	-	3	A/N	-	-	-	-
320	1	08 95	-	-	A/N	-	-	-	-	-	-	-	-	-
321	1	-	-	-	-	-	-	-	-	-	-	-	-	-
322	1	01 94	-	4	A/S	-	-	-	-	-	-	-	-	-

KEY

Subsys	Subsystem	A/N	B.J. Allen/T. Nen
Sv tp	Survey type	A/S	B.J. Allen/G. Sem
Sv in	Surveyor initials	BJA	B.J. Allen
		B/A	R.M. Bourke/B.J. Allen
		F/G	N. Fereday/J. Gibson
		RMB	R.M. Bourke
		TN	T. Nen

## **6. LISTINGS OF RURAL VILLAGES (CENSUS UNITS) INDEXED TO AGRICULTURAL SYSTEMS**

All rural village Census Units in the 1980 National Population Census which are locatable on either the 1980 or 1990 Census Maps are assigned to an Agricultural System. The village name, National Population Census identification codes (Province, District, Census Division, Census Unit), population and Agricultural System number for each village is held as a single record in a population database (AGPOP). District and Census Division codes for this Province are listed in Appendix A.2.

This section provides three different listings from that database of rural villages indexed by Agricultural Systems:

- 6.1 Rural villages listed in census order (District, Census Division).
- 6.2 Rural villages listed in alphabetical order.
- 6.3 Rural villages listed by Agricultural System number (alphabetically within agricultural systems) with PNGRIS Resource Mapping Unit (RMU) numbers.

Abbreviations used are:

Dist	District name and number (see Appendix A.2)
Div	Census Division number (see Appendix A.2)
Population	1980 National Population Census count of population in a Unit
RMU	Provincial Resource Mapping Unit number (PNGRIS)
System	Agricultural System number
Village	Census Unit name
Unit	Census Unit number



## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

**Province: 3 Central**

Village		Population	System	Village		Population	System
<b>DISTRICT</b>	1 Abau			10	DOMARA	528	0319
<b>Division</b>	1 Amazon Bay			11	DURAMU	166	0319
1	ARAU	94	0321	12	EGALAUNA	286	0320
2	AROANA	73	0321	13	GADOGUINA	48	0319
3	BAM	87	0319	14	GAIVAKALA	357	0320
4	BONUA	165	0321	15	GAVUONE	1289	0319
5	BOREBO	204	0321	16	GEBEA	32	0319
6	BORU	313	0320	17	IABA	114	0319
7	DAGOBO	81	0321	18	IANU	193	0308
8	DARAVA	277	0321	19	ILIMORUPU	381	0320
9	DARAVA NO 2	83	0319	20	IRUONE	187	0320
10	DEBA	30	0321	21	KALAPA	53	0319
11	DEIGAM	59	0322	22	KAPARI	592	0319
12	DEREBAI	119	0321	23	KEAGOLO	171	0317
13	DERIA	82	0321	24	KELEKAPANA	254	0320
14	DOMA	189	0319	25	KELERAKWA	598	0317
15	DOVETA	62	0322	26	KINIKALANA	47	0320
16	EUNUORO	101	0321	27	KWAPEUPA	197	0320
17	GABURU-MARA	114	0321	28	LALaura	240	0319
18	GAMILA	39	0321	29	MAIAGOLO	79	0319
19	GEAGEA	88	0321	30	GANAI	183	0319
21	IBIAM IGUP	137	0322	31	MAOPA NO 1	730	0320
22	ILAI	70	0321	32	MAOPA NO 2	434	0320
23	KEAKARO	45	0321	33	MERANI	141	0319
24	KEBEI	36	0321	34	MORI	83	0319
25	KERIA	134	0322	35	OBAHA	87	0319
26	KORAUTO	23	0321	36	PARAMANA	181	0320
27	KURERE ASIARO	376	0321	37	PELAGAI	388	0320
28	LABU	50	0321	38	SEGILI	180	0319
29	LALUORO	249	0321	39	SI'INI	125	0319
30	LAUA	49	0321	40	TUTUBU	140	0319
31	LOUPOM	231	0321	41	UDIRI	57	0319
32	MAGAUBO	228	0320	42	VIRIOLO	355	0319
33	MAGORE	112	0321	43	WAIORI	1033	0319
34	MAEVA	34	0321	44	WAIHAVANUA	306	0320
35	MAILU	444	0321	45	WANIGELA	1895	0319
36	MODAURO	37	0321	46	WAPAGAI	104	0320
37	NABAI	60	0321	47	WARO	101	0320
38	NORA	88	0322	48	BOIBODAE	34	0319
39	NUNUMAI	151	0321	49	UNU	29	0308
40	OIBADA	49	0321	505	MANABO BLOCKS	313	0308
41	OIO	87	0319	516	IANU BLOCKS	353	0308
42	ONIONI	51	0321				
44	PEDILI	82	0321	<b>DISTRICT</b>	2 Rigo		
45	SABIRIBO	106	0321	<b>Division</b>	3 Ormond		
46	SELAI	122	0321	1	ALEPA	260	0319
47	TANOBADA	59	0321	2	BAGIBOGI	58	0319
48	UBUNA	47	0321	3	BAGUGORO	84	0319
49	UNEVI	72	0321	4	DUBANATEBOA	151	0319
50	VEROI	103	0322	5	GARAMOKOGENA	52	0319
52	WOWORO	156	0321	6	GEREGAGEA	136	0319
<b>Division</b>	2 Marshall Lagoon			7	GORUGORUNA	89	0319
1	AMAU	136	0319	8	IMAIRU	164	0319
2	ANEVE	52	0319	9	KONAKO	58	0319
3	APAEVA	232	0319	10	KORE	120	0319
4	BARAMATA NO 4	79	0319	11	KWAIBO	190	0319
5	BAIOBO	42	0319	12	MAMALO	172	0319
6	BOMGUINA	76	0319	13	MOLEGORO	60	0319
7	BUKUKU	144	0319	14	POLIGOLO	27	0319
8	BURU	122	0320	15	POTUNA	127	0319
9	DOM	198	0319	16	URIGO	113	0319

## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 3 Central

	Village	Population	System	Village	Population	System	
<b>Division</b>	17 VANUA VAMONA	129	0319	22 SANOUM	169	0318	
	4 Maria			23 SENEMAKA	15	0318	
	1 AREMAKA	72	0318	24 TABURAIKA	54	0318	
	2 BAGUBARA	99	0317	25 UBUREGORO	7	0318	
	3 BIGEIA	15	0319	26 UNUNOMU	163	0318	
	4 BINIGORO	46	0319	27 WABURAIKA	24	0318	
	5 BOGARAMAKA	64	0317	28 WEBIGOLO	22	0318	
	6 BOKUKOMANA	72	0318	29 WIGA	14	0317	
	7 DIRIGOLO	153	0317	30 HIMAI	55	0317	
	8 GARETANO	40	0319	<b>Division</b>	6 Mount Obree		
	9 GOADA	77	0319	1 ABARO	39	0318	
	10 GOUWO	46	0319	2 ABOWANA	120	0318	
	11 IAURA	90	0318	3 ADARAIKA	30	0318	
	12 KAITEBA	23	0318	4 BADAICA	46	0318	
	13 KAKIAKOMANA	27	0318	5 BARATAKA	30	0318	
	14 KOBAROKA	51	0317	6 BORO	21	0318	
	15 KOMIOKOMANA	14	0317	7 DODI	25	0318	
	16 KORUAKOMANA	68	0318	8 DOROBISORO	146	0318	
	17 KORU'ORU	73	0318	9 ERENAIKA	28	0318	
	18 LAUGAITA	22	0317	10 GURANOMU	39	0318	
	19 LEBAGOLO	78	0317	11 HUAVOLO	46	0318	
	20 LEPAMAGANA	71	0317	12 IBARADOKU	11	0318	
	21 LI'IBA	63	0318	13 IDAGIGOLO	16	0318	
	22 MAIPIKO	64	0319	14 IGONONAMO	200	0318	
	23 MAMATAGORO	30	0318	15 IMIDIRU	70	0318	
	24 MARIA	128	0318	16 IPOIDUBURU	50	0318	
	25 MEIROBU	53	0317	17 KAIKANOMU	33	0318	
	26 MEMEKAKOMANA	47	0317	18 LAROMI	70	0318	
	27 MUMUIRU	56	0318	19 LOFAIKA	50	0318	
	28 NAGOATEBAKA	16	0317	20 MIMAI	36	0318	
	29 NENEMAKOMANA	43	0318	21 MUIANOMU	41	0318	
	30 OMANAGORO	31	0318	22 SOMORI	61	0318	
	31 ORAITA	98	0318	23 SORI	12	0318	
	32 TABUAKOMANA	29	0317	24 TABU	100	0318	
	33 TAIKOGENA	58	0317	25 TOMOROVANUA	39	0318	
	34 TOBAROKA	26	0317	26 WAIFANOUMU	34	0318	
	35 TUMUO	39	0319	<b>Division</b>	7 Rigo		
	36 UNUAGORO	50	0318	1 ALEBAGIU	32	0317	
37 VORAKOGENA	100	0319	2 ALEWAI	134	0320		
38 IOIKOMANA	21	0317	3 ALOMARUPU	264	0317		
<b>Division</b>	5 Mount Brown		4 ALUKUNI	217	0320		
1 AMURAIKA	37	0318	5 BABAGA(SAROA)	45	0317		
2 AMURAM	21	0318	6 BABAGA (HULA)	329	0317		
3 AIRIAUKU	76	0318	7 BABAGARUPU	166	0317		
4 AREMAIKA	19	0318	8 BIGAIRUKA	83	0319		
5 ARUDIDU	20	0318	9 BOKUKOMANA	66	0318		
6 BOBOGORO	75	0317	10 BONANAMO	195	0317		
7 BUMEGORO	42	0317	11 BORE	119	0319		
8 BUREDOBURU	38	0318	12 BOREGAINA	546	0317		
9 DAKEVAKOMANA	115	0317	13 BULIDOBU	15	0318		
10 DIDIGA	45	0317	14 DAROAKOMANA	93	0317		
11 DIRIKOMANA	115	0317	15 DEBADEGORO	127	0318		
13 GOBAKIGORO	112	0317	16 DIRINOMU	87	0318		
14 GUROGORO	136	0317	17 EFAIKA	104	0318		
15 HOMENOMU	66	0318	18 EHO	15	0317		
16 IOROMAKOMANA	34	0318	19 GABAGABA	543	0317		
17 KEMAKOMANA	14	0318	20 GABONE	302	0317		
18 MARANOM	113	0318	21 GAMOGA	93	0317		
19 MARUNOMU	75	0319	22 GAUNOMU	152	0317		
20 MUIAMAGORO	63	0317	23 GAVAGORO	28	0317		
21 ONEMAGORO	26	0318	24 GEO	32	0317		

## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 3 Central

Village	Population	System	Village	Population	System		
25	GEGOFI	101	0318	86	WASIRA	91	0317
26	GEMO	214	0317	87	WAURAIKA	44	0318
27	GERESI	122	0317	89	KWIKILA VILLAGE	18	0317
28	GEVERAGORO	35	0318	<b>Division</b>	8 Koiari		
29	GIDOBADA	157	0317	1	AGITANA	148	0317
30	GINIGOLO	193	0317	2	ANAHADABU	83	0317
31	GIRABU	109	0317	3	BUSALAMAGA	41	0318
32	GOBUA	44	0317	4	IAODOBU	43	0317
33	GOBUKOMANA	84	0317	5	IOVEI	72	0317
34	GOBUNAIKA	51	0318	6	LAGUME	47	0317
35	GOMORE	102	0317	7	LOINDAIRI	77	0317
36	GOULUPU	196	0319	8	MEDENE	50	0317
37	GOGOREKOMANA	134	0317				
38	GUNUGAU	246	0317	<b>DISTRICT</b>	3 Hiri		
39	HULA	1083	0320	<b>Division</b>	9 Mount Koiari		
40	IARUMENOMU	14	0318	2	BODINUMU	159	0314
41	IMUAGORO	305	0317	3	BORIDI	95	0314
42	IRUPARA	207	0320	4	DUBI	47	0314
43	KALO	761	0319	5	EFOGI	241	0314
44	KAMALI	407	0317	6	ENIVILOGO	70	0314
45	KAPAROKO	293	0320	7	GOSISI	106	0305
46	KARAIKOMANA	155	0317	8	HAILOGO	75	0314
47	KARAWA	203	0320	9	KAGI	161	0314
48	KAREKODOBU	250	0317	10	MADILOGO	86	0314
49	KEAPARA	487	0320	11	MANARI	222	0314
50	KEMABOLO	320	0317	12	MANUMU	121	0314
51	KEMAEA	56	0317	13	NADINUMU	114	0314
52	KODOGERE	72	0317	14	NAORO	243	0314
53	KOKOROGORO	186	0318	15	SURIA	91	0314
54	KORAKOMANA	72	0317	<b>Division</b>	10 Sogeri Valley		
55	KOWOROKOMANA	63	0317	1	AGEFA	23	0311
56	KWALE	175	0317	2	BOREDABU	49	0312
57	KWALIMURUPU	168	0317	3	BEREBEI	44	0312
58	LAUTAKOMANA	25	0317	4	BEREADABU	30	0312
59	LIBUNAKOMANA	269	0317	5	DOE	129	0312
60	LOGAMAKA	19	0317	6	FAKONAMA	54	0312
61	MAKERUPU	263	0317	7	FULIMUTI	52	0315
62	MANUGORO	210	0318	8	FUTINUMU	32	0312
63	MATAIRUKA	184	0319	9	GURINUMU	69	0312
64	NAFENANOMU	14	0316	10	IANABEWAI	58	0312
65	NEMONOMU	47	0318	11	KAILAKINUMU	123	0313
66	NIUIRUKA	144	0319	12	KALAKADABU	81	0312
67	NOGOMAKA	92	0317	13	MANURINUMU	36	0312
68	ODUIKA	28	0318	14	MESIME	49	0315
69	PAITAGORO	22	0317	15	OGOTANA	101	0312
70	RIWALIRUPU	328	0317	16	OSABEWAI	89	0312
71	SABUIA	68	0317	17	RUBURU	69	0312
72	SARO	173	0317	18	TORINUMU	56	0317
73	SAROAKEINA	209	0317	19	UBERI	71	0312
74	SEBA	126	0317	20	VESILOGO	108	0312
75	SENUNU	62	0317	21	WAHONAOADA	62	0312
76	SISIGOLO	25	0318	22	WAIWA	48	0314
77	SIVITATANA	268	0317	23	WARUTANUMU	69	0315
78	TABUNOMU	21	0318	24	NAINUMU	49	0312
79	TAGANA	119	0316	<b>Division</b>	11 Vanapa River		
80	TAITUKOMANA	52	0317	1	AKUKU	158	0311
81	TAUKOMANA	58	0317	2	BADILOHO	84	0311
82	TAURUBA	439	0317	3	BERERE	20	0311
83	WAINOMU	20	0317	4	BOTEKA	108	0311
84	WAIRADOBU	21	0317	5	DOURAMOKU	78	0311
85	WALAI	85	0317	6	EDEBU	85	0311

## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 3 Central

Village	Population	System	Village	Population	System
7 ENAGE	38	0314	2 AVIARA-WAIMA	383	0303
8 FODU	38	0311	3 ERE'ERE	421	0303
9 HAIMA	34	0311	4 HAURAMIRI	231	0303
10 IOMARE	31	0311	5 HEREPARU	84	0303
11 KANOBABA	25	0311	6 KIVORI KUI	367	0303
12 KEAKUAKU	96	0311	7 KIVORI POE	450	0303
13 KEREA	117	0311	8 ROROAIARA	471	0303
14 MOTUMOTU	18	0311	<b>Division</b> 18 North Mekeo		
15 VASAGABIRA	51	0311	1 AMEIAKA	163	0302
16 VEIKABU	37	0311	3 BABANONGO	287	0304
<b>Division</b> 12 East Coast Hiri			4 ENGEFA	232	0302
1 BARAKAU	496	0317	5 INAUKINA	188	0302
2 DABUNARI	61	0316	6 IOI	101	0302
3 DAGODA	83	0316	7 MAIPA	139	0302
4 GAIRE	1125	0316	8 PIUNGA	183	0302
5 KEREKADI	53	0316	<b>Division</b> 19 Mekeo		
6 RABUKA	150	0316	1 AIPEANA	796	0304
7 SEME	92	0316	2 AMOAMO	220	0304
8 TUBUSEREIA	1656	0317	3 BEBEO	169	0304
9 VAIVAI	87	0317	4 BEIPA	977	0304
<b>Division</b> 13 West Coast Hiri			5 EBOA	611	0304
1 BOERA	540	0317	6 IMOUNGA	138	0302
2 GOROHU	285	0310	7 INAWABUI	650	0304
3 KIDO	275	0316	8 INAWAE	198	0304
4 KOUDERIKA	177	0317	9 INAWAIA	784	0304
5 LEA LEA	920	0316	10 INAWAUNI	200	0304
6 MANUMANU	260	0310	11 INAWI	938	0304
7 PAPA	291	0316	12 JESUBAIBUA	440	0304
8 PORABADA	2111	0317	13 ORIROPETANA	298	0304
9 ROKU	404	0317	14 RARAI	494	0304
<b>DISTRICT</b> 4 Kairuku			<b>Division</b> 20 Kuni		
<b>Division</b> 14 Kabadi			1 ADIO	36	0309
1 HISIU	576	0310	2 BUBUNI	22	0305
2 INEINA	59	0309	3 DEVADEVA	186	0307
3 KEVEONA	191	0309	4 DILAVA MADIU	147	0305
4 KOUPUANA	239	0309	5 FOFU	106	0305
5 MAGABAIRA	217	0309	6 FOIO	43	0309
6 PINU	397	0309	7 IDOIDO	100	0309
7 UKAUKANA	329	0309	8 INAUMAKA	52	0305
<b>Division</b> 15 Nara			9 INIKA	134	0309
1 ALA'ALA	124	0310	10 IUMU	115	0305
2 DIUMANA	103	0309	11 KEAKAMANA	102	0305
3 KAI AU	69	0309	12 KAUAKA	35	0305
4 OROI	163	0310	13 MAIMAI	149	0305
5 TUBU	79	0309	14 TAMALA	102	0309
6 VANUAMAI	126	0309	15 VALE	417	0305
<b>Division</b> 16 Roro			16 YOJAKA	40	0305
1 BABIKO	374	0304	17 LAFALAPA	22	0305
2 BEREINA	127	0304	<b>DISTRICT</b> 5 Goilala		
3 BIOTO	403	0309	<b>Division</b> 21 Zarima		
4 DELENA	215	0310	1 GUARIMAIPA	185	0306
5 KEABADA	205	0310	2 IGUAI	54	0306
6 MOU	386	0304	3 KARUAMA	182	0306
7 NIKURA	199	0309	4 OLIVI	99	0306
8 PINUPAKA	210	0310	5 TAVEVE	212	0306
9 POUKAMA	174	0310	6 DAK'LAWAURO	81	0306
10 RAPA	333	0304	<b>Division</b> 22 Kunimaipa		
11 TSIRIA	587	0310	1 AMENA	71	0306
<b>Division</b> 17 Waima/Kivori			2 BIZOA	82	0306
1 AVIARA-OREKE	141	0303	3 ELI	136	0306

## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 3 Central

Village	Population	System	Village	Population	System		
4	ENAugAGAVE	145	0306	9	MATSIAlAVAVA	101	0306
5	GAGAVE	108	0306	10	NAIRELAVAVA	38	0307
6	GANIAWAI	103	0306	11	NELIVE	67	0307
7	GHIVENA	121	0306	12	PERUMELAVAVA	31	0306
8	GOILAPU	139	0306	13	POMUTU	25	0307
9	GUARI NO 1	89	0306	14	TATUPITI	264	0307
10	GUARI NO 2	95	0306	15	TORORO	77	0307
11	GUBURU	32	0306	16	ULAMUTU	34	0307
12	ILOPO	35	0306	<b>Division</b>	25 Pilitu		
13	KELEVI	89	0306	1	BOLUBOLU	104	0307
14	KOEFA NO 1	146	0306	2	LAMANAIPA	22	0307
15	KOEFA NO 2	67	0306	3	LAMINA	149	0307
16	KOMO	100	0306	4	LAMORO	157	0307
17	LAPAUlA	126	0306	5	LARAMAITA	108	0307
18	LOBUDON	149	0306	6	LOTUAVA	193	0305
19	NELEME	57	0306	7	MOROA	22	0307
20	OMU	130	0306	8	OPORE	75	0305
21	OMUITU	31	0306	9	PORUELAVAVA	31	0307
22	RUPILA	100	0306	10	WAPOTE	124	0305
23	TONAMENA	158	0306	11	ZANIALAVAVA	160	0307
24	TORURA	230	0306	12	ZAMORO	139	0305
25	UNE	174	0306	<b>Division</b>	26 Ivane		
26	ZAILAPU	15	0306	1	DIORO	133	0307
27	ZHAKe	88	0306	2	ILAYAPE	184	0307
28	ZHEVENAI	107	0306	3	KORUAVA	94	0307
29	ZHEVIYAMAI	65	0306	4	LOTUAVA	84	0307
<b>Division</b>	23 Aiwara			5	MAITU	77	0307
1	AMUGANIAVA	70	0307	6	MINARU	61	0307
2	EIYAPU	136	0306	7	NIONOPA	32	0307
3	ELAVA	152	0306	8	ORO	136	0307
4	GANE	112	0306	<b>Division</b>	27 Auga		
5	GARIPA	132	0307	1	ARIONE	62	0307
6	ITA	116	0306	2	BAIDANA	124	0307
7	IVEIYAVA	151	0307	3	BELAVISTA	242	0307
8	KATAIPA	142	0307	4	DIGURENDA	74	0307
9	KERAU	202	0307	5	FANE	343	0307
10	KILEIPI	133	0307	6	GAIVA	248	0307
11	KIORIVI	211	0306	7	GARIMA NO 1	119	0307
12	KOPURILAVAVA	93	0307	8	GARIMA NO 2	56	0307
13	LAITATA	239	0306	9	GURORO	30	0307
14	LAMANAIPA	140	0307	10	IDAVE	41	0307
15	LAVAVAI	157	0306	11	IDULA	116	0307
16	LOLEAVA	232	0306	12	IGUAI	93	0307
17	LUMIOTO	140	0307	13	KAILAPE	98	0307
18	MAINE	161	0306	14	KARAME	109	0307
19	MALAVA	137	0307	15	KIRI	64	0307
20	MOINGILI	157	0307	16	KONE	53	0307
21	OROROGAIVALA	93	0306	17	KOPUKORO	32	0307
22	PONEYALAVAVA	118	0307	18	LAVAVAI	111	0307
23	SOPU	372	0307	19	LEDANA	147	0307
24	TAWUNI	124	0307	20	MAFULU	108	0307
25	WATAGOIPA	58	0306	21	MOINGILI	91	0307
<b>Division</b>	24 Loloipa			22	MONDO	197	0307
1	ARIOME	99	0306	23	TANIPAI	64	0307
2	BURUAI	21	0307	24	TOKIO	101	0307
3	ERUMELAVAVA	161	0307	25	TURALA	62	0307
4	GIGUAVA	100	0307	26	YULAI	218	0307
5	GUPOU	77	0307	27	YUMU	107	0307
6	ILIMAVA	54	0307	<b>Division</b>	28 Dilava		
7	KARIARITSI	40	0306	1	AVELE	178	0305
8	KOILoALAVAVA	71	0307	2	AVORA	36	0305



## 6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

### Province: 3 Central

Village	Population	System	Village	Population	System
3 BAIDANA	42	0305	16 SISIARENDA	140	0306
4 BAURA	92	0305	17 SUMBI	354	0307
5 ILIDE	159	0305	18 SIGUFE	181	0307
6 KARAME	259	0305	19 TA	111	0307
7 KODIGE	162	0305	20 TAFADE	110	0307
8 YALOGÉ	123	0305	22 URUN	378	0307
<b>Division</b> 29 Vetapu			23 VISI	466	0306
1 ADUAI	230	0307	24 WOITAPE	283	0307
2 ENENDE	227	0307	<b>Division</b> 30 Chirima		
3 EVESE	344	0307	1 BERAVESA	118	0307
4 GINALA	153	0307	2 EVESA	241	0307
5 HOIANURENDA	139	0306	3 GINALA	170	0307
6 IEME	179	0307	4 GOROWAKU	139	0307
7 IRITUMU	68	0307	5 KAGO	170	0307
8 KAMBISI	491	0306	6 KOAMA	111	0307
9 KASE	244	0306	7 SEI	139	0307
10 KOKODA	207	0306	8 SINGGO	188	0307
11 KOSIPI	257	0307	9 SONGGAKU	208	0307
12 KURAMA	291	0307	10 TURA	158	0307
13 OMBOLI	215	0307	11 YONGAI	339	0307
14 ONONGE	251	0306	12 YORIBAI	135	0307
15 ORO	330	0307	951 KOROGO	27	0305

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
ABARO	2	6	1	0318	BEREBEI	3	10	3	0312
ABOWANA	2	6	2	0318	BEREINA	4	16	2	0304
ADARAIIKA	2	6	3	0318	BERERE	3	11	3	0311
ADIO	4	20	1	0309	BIGAIRUKA	2	7	8	0319
ADUAI	5	29	1	0307	BIGEIA	2	4	3	0319
AGEFA	3	10	1	0311	BINIGORO	2	4	4	0319
AGITANA	2	8	1	0317	BIOTO	4	16	3	0309
AIPEANA	4	19	1	0304	BIZOA	5	22	2	0306
AIRIAUKU	2	5	3	0318	BOBOGORO	2	5	6	0317
AKUKU	3	11	1	0311	BODINUMU	3	9	2	0314
ALA'ALA	4	15	1	0310	BOERA	3	13	1	0317
ALEBAGIU	2	7	1	0317	BOGARAMAKA	2	4	5	0317
ALEPA	2	3	1	0319	BOIBODAE	1	2	48	0319
ALEWAI	2	7	2	0320	BOKUKOMANA	2	4	6	0318
ALOMARUPU	2	7	3	0317	BOKUKOMANA	2	7	9	0318
ALUKUNI	2	7	4	0320	BOLUBOLU	5	25	1	0307
AMAU	1	2	1	0319	BOMGUINA	1	2	6	0319
AMEIIKA	4	18	1	0302	BONANAMO	2	7	10	0317
AMENA	5	22	1	0306	BONUA	1	1	4	0321
AMOAMO	4	19	2	0304	BORE	2	7	11	0319
AMUGANIAVA	5	23	1	0307	BOREBO	1	1	5	0321
AMURAIKA	2	5	1	0318	BOREDABU	3	10	2	0312
AMURAM	2	5	2	0318	BOREGAINA	2	7	12	0317
ANAHADABU	2	8	2	0317	BORIDI	3	9	3	0314
ANEVE	1	2	2	0319	BORO	2	6	6	0318
APAEVA	1	2	3	0319	BORU	1	1	6	0320
ARAU	1	1	1	0321	BOTEKA	3	11	4	0311
AREMAIIKA	2	5	4	0318	BUBUNI	4	20	2	0305
AREMAKA	2	4	1	0318	BUKUKU	1	2	7	0319
ARIOME	5	24	1	0306	BULIDOBU	2	7	13	0318
ARIONE	5	27	1	0307	BUMEGORO	2	5	7	0317
AROANA	1	1	2	0321	BUREDORURU	2	5	8	0318
ARUDIDU	2	5	5	0318	BURU	1	2	8	0320
AVELE	5	28	1	0305	BURUAI	5	24	2	0307
AVIARA-OREKE	4	17	1	0303	BUSALAMAGA	2	8	3	0318
AVIARA-WAIMA	4	17	2	0303					
AVORA	5	28	2	0305	DABUNARI	3	12	2	0316
					DAGOBO	1	1	7	0321
BABAGA (HULA)	2	7	6	0317	DAGODA	3	12	3	0316
BABAGA(SAROA)	2	7	5	0317	DAK'LAWAURO	5	21	6	0306
BABAGARUPU	2	7	7	0317	DAKEVAKOMANA	2	5	9	0317
BABANONGO	4	18	3	0304	DARAVA	1	1	8	0321
BABIKO	4	16	1	0304	DARAVA NO 2	1	1	9	0319
BADAIIKA	2	6	4	0318	DAROAKOMANA	2	7	14	0317
BADILOHO	3	11	2	0311	DEBA	1	1	10	0321
BAGIBOGI	2	3	2	0319	DEBADEGORO	2	7	15	0318
BAGUBARA	2	4	2	0317	DEIGAM	1	1	11	0322
BAGUGORO	2	3	3	0319	DELENA	4	16	4	0310
BAIDANA	5	27	2	0307	DEREBAI	1	1	12	0321
BAIDANA	5	28	3	0305	DERIA	1	1	13	0321
BAIOBO	1	2	5	0319	DEVADEVA	4	20	3	0307
BAM	1	1	3	0319	DIDIGA	2	5	10	0317
BARAKAU	3	12	1	0317	DIGURENDA	5	27	4	0307
BARAMATA NO 4	1	2	4	0319	DILAVA MADIU	4	20	4	0305
BARATAKA	2	6	5	0318	DIORO	5	26	1	0307
BAURA	5	28	4	0305	DIRIGOLO	2	4	7	0317
BEBO	4	19	3	0304	DIRIKOMANA	2	5	11	0317
BEIPA	4	19	4	0304	DIRINOMU	2	7	16	0318
BELAVISTA	5	27	3	0307	DIUMANA	4	15	2	0309
BERAVESA	5	30	1	0307	DODI	2	6	7	0318
BEREADABU	3	10	4	0312	DOE	3	10	5	0312

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
DOM	1	2	9	0319	GEBEA	1	2	16	0319
DOMA	1	1	14	0319	GEGOFI	2	7	25	0318
DOMARA	1	2	10	0319	GEMO	2	7	26	0317
DOROBISORO	2	6	8	0318	GEO	2	7	24	0317
DOURAMOKU	3	11	5	0311	GEREGAGEA	2	3	6	0319
DOVETA	1	1	15	0322	GERESI	2	7	27	0317
DUBANATEBOA	2	3	4	0319	GEVERAGORO	2	7	28	0318
DUBI	3	9	4	0314	GHIVENA	5	22	7	0306
DURAMU	1	2	11	0319	GIDOBADA	2	7	29	0317
EBOA	4	19	5	0304	GIGUAVA	5	24	4	0307
EDEBU	3	11	6	0311	GINALA	5	29	4	0307
EFAIKA	2	7	17	0318	GINALA	5	30	3	0307
EFOGI	3	9	5	0314	GINIGOLO	2	7	30	0317
EGALAUNA	1	2	12	0320	GIRABU	2	7	31	0317
EHO	2	7	18	0317	GOADA	2	4	9	0319
EIYAPU	5	23	2	0306	GOBAKIGORO	2	5	13	0317
ELAVA	5	23	3	0306	GOBUA	2	7	32	0317
ELI	5	22	3	0306	GOBUKOMANA	2	7	33	0317
ENAGE	3	11	7	0314	GOBUNAIKA	2	7	34	0318
ENAugAGAVE	5	22	4	0306	GOGOREKOMANA	2	7	37	0317
ENENDE	5	29	2	0307	GOILAPU	5	22	8	0306
ENGEFA	4	18	4	0302	GOMORE	2	7	35	0317
ENIVILOGO	3	9	6	0314	GOROHU	3	13	2	0310
ERE'ERE	4	17	3	0303	GOROWAKU	5	30	4	0307
ERENAIKA	2	6	9	0318	GORUGORUNA	2	3	7	0319
ERUMELAVAVA	5	24	3	0307	GOSISI	3	9	7	0305
EUNUORO	1	1	16	0321	GOULUPU	2	7	36	0319
EVESA	5	30	2	0307	GOUWO	2	4	10	0319
EVESE	5	29	3	0307	GUARI NO 1	5	22	9	0306
FAKONAMA	3	10	6	0312	GUARI NO 2	5	22	10	0306
FANE	5	27	5	0307	GUARIMAIPA	5	21	1	0306
FODU	3	11	8	0311	GUBURU	5	22	11	0306
FOFOU	4	20	5	0305	GUNUGAU	2	7	38	0317
FOIO	4	20	6	0309	GUPOU	5	24	5	0307
FULIMUTI	3	10	7	0315	GURANOMU	2	6	10	0318
FUTINUMU	3	10	8	0312	GURINUMU	3	10	9	0312
GABAGABA	2	7	19	0317	GUROGORO	2	5	14	0317
GABONE	2	7	20	0317	GURORO	5	27	9	0307
GABURU-MARA	1	1	17	0321	HAILOGO	3	9	8	0314
GADOGUINA	1	2	13	0319	HAIMA	3	11	9	0311
GAGAVE	5	22	5	0306	HAURAMIRI	4	17	4	0303
GAIRE	3	12	4	0316	HEREPARU	4	17	5	0303
GAIVA	5	27	6	0307	HIMAI	2	5	30	0317
GAIVAKALA	1	2	14	0320	HISIU	4	14	1	0310
GAMILA	1	1	18	0321	HOIANURENDA	5	29	5	0306
GAMOGA	2	7	21	0317	HOMENOMU	2	5	15	0318
GANAI	1	2	30	0319	HUAVOLO	2	6	11	0318
GANE	5	23	4	0306	HULA	2	7	39	0320
GANIAWAI	5	22	6	0306	IABA	1	2	17	0319
GARAMOKOGENA	2	3	5	0319	IANABEWAI	3	10	10	0312
GARETANO	2	4	8	0319	IANU	1	2	18	0308
GARIMA NO 1	5	27	7	0307	IANU BLOCKS	1	2	516	0308
GARIMA NO 2	5	27	8	0307	IAODOBU	2	8	4	0317
GARIPA	5	23	5	0307	IARUMENOMU	2	7	40	0318
GAUNOMU	2	7	22	0317	IAURA	2	4	11	0318
GAVAGORO	2	7	23	0317	IBARADOKU	2	6	12	0318
GAVUONE	1	2	15	0319	IBIAM IGUP	1	1	21	0322
GEAGEA	1	1	19	0321	IDAGIGOLO	2	6	13	0318
					IDAVE	5	27	10	0307
					IDOIDO	4	20	7	0309

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
IDULA	5	27	11	0307	KARUAMA	5	21	3	0306
IEME	5	29	6	0307	KASE	5	29	9	0306
IGONONAMO	2	6	14	0318	KATAIPA	5	23	8	0307
IGUAI	5	21	2	0306	KAUAKA	4	20	12	0305
IGUAI	5	27	12	0307	KEABADA	4	16	5	0310
ILAI	1	1	22	0321	KEAGOLO	1	2	23	0317
ILAYAPE	5	26	2	0307	KEAKAMANA	4	20	11	0305
ILIDE	5	28	5	0305	KEAKARO	1	1	23	0321
ILIMAVA	5	24	6	0307	KEAKUAKU	3	11	12	0311
ILIMORUPU	1	2	19	0320	KEAPARA	2	7	49	0320
ILOPO	5	22	12	0306	KEBEI	1	1	24	0321
IMAIRU	2	3	8	0319	KELEKAPANA	1	2	24	0320
IMIDIRU	2	6	15	0318	KELERAKWA	1	2	25	0317
IMOUNGA	4	19	6	0302	KELEVI	5	22	13	0306
IMUAGORO	2	7	41	0317	KEMABOLO	2	7	50	0317
INAUKINA	4	18	5	0302	KEMAEA	2	7	51	0317
INAUMAKA	4	20	8	0305	KEMAKOMANA	2	5	17	0318
INAWABUI	4	19	7	0304	KERAU	5	23	9	0307
INAWAE	4	19	8	0304	KEREA	3	11	13	0311
INAWAIA	4	19	9	0304	KEREKADI	3	12	5	0316
INAWAUNI	4	19	10	0304	KERIA	1	1	25	0322
INAWI	4	19	11	0304	KEVEONA	4	14	3	0309
INEINA	4	14	2	0309	KIDO	3	13	3	0316
INIKAI	4	20	9	0309	KILEIPI	5	23	10	0307
IOI	4	18	6	0302	KINIKALANA	1	2	26	0320
IOIKOMANA	2	4	38	0317	KIORIVI	5	23	11	0306
IOMARE	3	11	10	0311	KIRI	5	27	15	0307
IOROMAKOMANA	2	5	16	0318	KIVORI KUI	4	17	6	0303
IOVEI	2	8	5	0317	KIVORI POE	4	17	7	0303
IPOIDUBURU	2	6	16	0318	KOAMA	5	30	6	0307
IRITUMU	5	29	7	0307	KOBAROKA	2	4	14	0317
IRUONE	1	2	20	0320	KODIGE	5	28	7	0305
IRUPARA	2	7	42	0320	KODOGERE	2	7	52	0317
ITA	5	23	6	0306	KOEFA NO 1	5	22	14	0306
IUMU	4	20	10	0305	KOEFA NO 2	5	22	15	0306
IVEIYAVA	5	23	7	0307	KOILOALAVAVA	5	24	8	0307
JESUBAIBUA	4	19	12	0304	KOKODA	5	29	10	0306
KAGI	3	9	9	0314	KOKOROGORO	2	7	53	0318
KAGO	5	30	5	0307	KOMIOKOMANA	2	4	15	0317
KAIAMU	4	15	3	0309	KOMO	5	22	16	0306
KAIKANOMU	2	6	17	0318	KONAKO	2	3	9	0319
KAILAKINUMU	3	10	11	0313	KONE	5	27	16	0307
KAILAPE	5	27	13	0307	KOPUKORO	5	27	17	0307
KAITEBA	2	4	12	0318	KOPURILAVAVA	5	23	12	0307
KAKIAKOMANA	2	4	13	0318	KORAKOMANA	2	7	54	0317
KALAKADABU	3	10	12	0312	KORAUTO	1	1	26	0321
KALAPA	1	2	21	0319	KORE	2	3	10	0319
KALO	2	7	43	0319	KOROGO	5	30	951	0305
KAMALI	2	7	44	0317	KORU'ORU	2	4	17	0318
KAMBISI	5	29	8	0306	KORUAKOMANA	2	4	16	0318
KANOBABA	3	11	11	0311	KORUAVA	5	26	3	0307
KAPARI	1	2	22	0319	KOSIPI	5	29	11	0307
KAPAROKO	2	7	45	0320	KOUDERIKA	3	13	4	0317
KARAIKOMANA	2	7	46	0317	KOUPUANA	4	14	4	0309
KARAME	5	27	14	0307	KOWOROKOMANA	2	7	55	0317
KARAME	5	28	6	0305	KURAMA	5	29	12	0307
KARAWA	2	7	47	0320	KURERE ASIARO	1	1	27	0321
KAREKODOBU	2	7	48	0317	KWAIBO	2	3	11	0319
KARIARITSI	5	24	7	0306	KWALE	2	7	56	0317
					KWALIMURUPU	2	7	57	0317
					KWAPEUPA	1	2	27	0320

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
KWIKILA VILLAGE	2	7	89	0317	MARANOM	2	5	18	0318
LABU	1	1	28	0321	MARIA	2	4	24	0318
LAFALABA	4	20	17	0305	MARUNOMU	2	5	19	0319
LAGUME	2	8	6	0317	MATAIRUKA	2	7	63	0319
LAITATA	5	23	13	0306	MATSIALAVAVA	5	24	9	0306
LALAUVA	1	2	28	0319	MEDENE	2	8	8	0317
LALUORO	1	1	29	0321	MEIROBU	2	4	25	0317
LAMANAIPA	5	23	14	0307	MEMEKAKOMANA	2	4	26	0317
LAMANAIPA	5	25	2	0307	MERANI	1	2	33	0319
LAMINA	5	25	3	0307	MESIME	3	10	14	0315
LAMORO	5	25	4	0307	MIMAI	2	6	20	0318
LAPAULA	5	22	17	0306	MINARU	5	26	6	0307
LARAMAITA	5	25	5	0307	MODAURO	1	1	36	0321
LAROMI	2	6	18	0318	MOINGILI	5	23	20	0307
LAUA	1	1	30	0321	MOINGILI	5	27	21	0307
LAUGAITA	2	4	18	0317	MOLEGORO	2	3	13	0319
LAUTAKOMANA	2	7	58	0317	MONDO	5	27	22	0307
LAVAVAI	5	23	15	0306	MORI	1	2	34	0319
LAVAVAI	5	27	18	0307	MOROA	5	25	7	0307
LEA LEA	3	13	5	0316	MOTUMOTU	3	11	14	0311
LEBAGOLO	2	4	19	0317	MOU	4	16	6	0304
LEDANA	5	27	19	0307	MUIAMAGORO	2	5	20	0317
LEPAMAGANA	2	4	20	0317	MUIANOMU	2	6	21	0318
LI'IBA	2	4	21	0318	MUMUIRU	2	4	27	0318
LIBUNAKOMANA	2	7	59	0317	NABAI	1	1	37	0321
LOBUDON	5	22	18	0306	NADINUMU	3	9	13	0314
LOFAIKA	2	6	19	0318	NAFENANOMU	2	7	64	0316
LOGAMAKA	2	7	60	0317	NAGOATEBAKA	2	4	28	0317
LOINDAIRI	2	8	7	0317	NAINUMU	3	10	24	0312
LOLEAVA	5	23	16	0306	NAIRELAVAVA	5	24	10	0307
LOTUAVA	5	25	6	0305	NAORO	3	9	14	0314
LOTUAVA	5	26	4	0307	NELEME	5	22	19	0306
LOUPOM	1	1	31	0321	NELIVE	5	24	11	0307
LUMIOTO	5	23	17	0307	NEMONOMU	2	7	65	0318
MADILOGO	3	9	10	0314	NENEMAKOMANA	2	4	29	0318
MAEVA	1	1	34	0321	NIKURA	4	16	7	0309
MAFULU	5	27	20	0307	NIONOPA	5	26	7	0307
MAGABAIRA	4	14	5	0309	NIUIRUKA	2	7	66	0319
MAGAUBO	1	1	32	0320	NOGOMAKA	2	7	67	0317
MAGORE	1	1	33	0321	NORA	1	1	38	0322
MAIAGOLO	1	2	29	0319	NUNUMAI	1	1	39	0321
MAILU	1	1	35	0321	OBAHA	1	2	35	0319
MAIMAI	4	20	13	0305	ODUIKA	2	7	68	0318
MAINE	5	23	18	0306	OGOTANA	3	10	15	0312
MAIPA	4	18	7	0302	OIBADA	1	1	40	0321
MAIPIKO	2	4	22	0319	OIO	1	1	41	0319
MAITU	5	26	5	0307	OLIVI	5	21	4	0306
MAKERUPU	2	7	61	0317	OMANAGORO	2	4	30	0318
MALAVA	5	23	19	0307	OMBOLI	5	29	13	0307
MAMALO	2	3	12	0319	OMU	5	22	20	0306
MAMATAGORO	2	4	23	0318	OMUITU	5	22	21	0306
MANABO BLOCKS	1	2	505	0308	ONEMAGORO	2	5	21	0318
MANARI	3	9	11	0314	ONIONI	1	1	42	0321
MANUGORO	2	7	62	0318	ONONGE	5	29	14	0306
MANUMANU	3	13	6	0310	OPORE	5	25	8	0305
MANUMU	3	9	12	0314	ORAITA	2	4	31	0318
MANURINUMU	3	10	13	0312	ORIROPETANA	4	19	13	0304
MAOPA NO 1	1	2	31	0320	ORO	5	26	8	0307
MAOPA NO 2	1	2	32	0320	ORO	5	29	15	0307

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
OROI	4	15	4	0310	TAGANA	2	7	79	0316
OROROGAIVALA	5	23	21	0306	TAIKOGENA	2	4	33	0317
OSABEWAI	3	10	16	0312	TAITUKOMANA	2	7	80	0317
PAITAGORO	2	7	69	0317	TAMALA	4	20	14	0309
PAPA	3	13	7	0316	TANIPAI	5	27	23	0307
PARAMANA	1	2	36	0320	TANOBADA	1	1	47	0321
PEDILI	1	1	44	0321	TATUPITI	5	24	14	0307
PELAGAI	1	2	37	0320	TAUKOMANA	2	7	81	0317
PERUMELAVAVA	5	24	12	0306	TAURUBA	2	7	82	0317
PINU	4	14	6	0309	TAVEVE	5	21	5	0306
PINUPAKA	4	16	8	0310	TAWUNI	5	23	24	0307
PIUNGA	4	18	8	0302	TOBAROKA	2	4	34	0317
POLIGOLO	2	3	14	0319	TOKIO	5	27	24	0307
POMUTU	5	24	13	0307	TOMOROVANUA	2	6	25	0318
PONEYALAVAVA	5	23	22	0307	TONAMENA	5	22	23	0306
PORABADA	3	13	8	0317	TORINUMU	3	10	18	0317
PORUELAVAVA	5	25	9	0307	TORORO	5	24	15	0307
POTUNA	2	3	15	0319	TORURA	5	22	24	0306
POUKAMA	4	16	9	0310	TSIRIA	4	16	11	0310
RABUKA	3	12	6	0316	TUBU	4	15	5	0309
RAPA	4	16	10	0304	TUBUSEREIA	3	12	8	0317
RARAI	4	19	14	0304	TUMUO	2	4	35	0319
RIWALIRUPU	2	7	70	0317	TURA	5	30	10	0307
ROKU	3	13	9	0317	TURALA	5	27	25	0307
ROROAIARA	4	17	8	0303	TUTUBU	1	2	40	0319
RUBURU	3	10	17	0312	UBERI	3	10	19	0312
RUPILA	5	22	22	0306	UBUNA	1	1	48	0321
SABIRIBO	1	1	45	0321	UBUREGORO	2	5	25	0318
SABUIA	2	7	71	0317	UDIRI	1	2	41	0319
SANOUM	2	5	22	0318	UKAUKANA	4	14	7	0309
SAROA	2	7	72	0317	ULAMUTU	5	24	16	0307
SAROAKEINA	2	7	73	0317	UNE	5	22	25	0306
SEBA	2	7	74	0317	UNEVI	1	1	49	0321
SEGILI	1	2	38	0319	UNU	1	2	49	0308
SEI	5	30	7	0307	UNUAGORO	2	4	36	0318
SELAI	1	1	46	0321	UNUNOMU	2	5	26	0318
SEME	3	12	7	0316	URIGO	2	3	16	0319
SENEMAKA	2	5	23	0318	URUN	5	29	22	0307
SENUNU	2	7	75	0317	VAIVAI	3	12	9	0317
SI'INI	1	2	39	0319	VALE	4	20	15	0305
SIGUFE	5	29	18	0307	VANUA VAMONA	2	3	17	0319
SINGGO	5	30	8	0307	VANUAMAI	4	15	6	0309
SISIARENDA	5	29	16	0306	VASAGABIRA	3	11	15	0311
SISIGOLO	2	7	76	0318	VEIKABU	3	11	16	0311
SIVITATANA	2	7	77	0317	VEROI	1	1	50	0322
SOMORI	2	6	22	0318	VESILOGO	3	10	20	0312
SONGGAKU	5	30	9	0307	VIRIOLO	1	2	42	0319
SOPU	5	23	23	0307	VISI	5	29	23	0306
SORI	2	6	23	0318	VORAKOGENA	2	4	37	0319
SUMBI	5	29	17	0307	WABURAIKA	2	5	27	0318
SURIA	3	9	15	0314	WAHONAOADA	3	10	21	0312
TA	5	29	19	0307	WAIFANOUMU	2	6	26	0318
TABU	2	6	24	0318	WAINOMU	2	7	83	0317
TABUAKOMANA	2	4	32	0317	WAIORI	1	2	43	0319
TABUNOMU	2	7	78	0318	WAIRADOBU	2	7	84	0317
TABURAIKA	2	5	24	0318	WAIRAVANUA	1	2	44	0320
TAFADE	5	29	20	0307	WAIWA	3	10	22	0314
					WALAI	2	7	85	0317

## 6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

### Province: 3 Central

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
WANIGELA	1	2	45	0319	YALOGÉ	5	28	8	0305
WAPAGAI	1	2	46	0320	YOJAKA	4	20	16	0305
WAPOTE	5	25	10	0305	YONGAI	5	30	11	0307
WARO	1	2	47	0320	YORIBAI	5	30	12	0307
WARUTANUMU	3	10	23	0315	YULAI	5	27	26	0307
WASIRA	2	7	86	0317	YUMU	5	27	27	0307
WATAGOIPA	5	23	25	0306					
WAURAIKA	2	7	87	0318	ZAILAPU	5	22	26	0306
WEBIGOLO	2	5	28	0318	ZAMORO	5	25	12	0305
WIGA	2	5	29	0317	ZANIALAVAVA	5	25	11	0307
WOITAPE	5	29	24	0307	ZHAKE	5	22	27	0306
WOWORO	1	1	52	0321	ZHEVENAI	5	22	28	0306
					ZHEVIYAMAI	5	22	29	0306

**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
<b>SYSTEM 0302</b>					YALOGÉ	5	28	8	88
AMEIAKA	4	18	1	29	YOJAKA	4	20	16	71
ENGEFA	4	18	4	17	ZAMORO	5	25	12	38
IMOUNGA	4	19	6	29					
INAUKINA	4	18	5	29	<b>SYSTEM 0306</b>				
IOI	4	18	6	29	AMENA	5	22	1	20
MAIPA	4	18	7	29	ARIOME	5	24	1	45
PIUNGA	4	18	8	17	BIZOA	5	22	2	20
					DAK'LAWAURO	5	21	6	297
<b>SYSTEM 0303</b>					EIYAPU	5	23	2	54
AVIARA-OREKE	4	17	1	291	ELAVA	5	23	3	54
AVIARA-WAIMA	4	17	2	290	ELI	5	22	3	22
ERE'ERE	4	17	3	290	ENAugAGAVE	5	22	4	20
HAURAMIRI	4	17	4	290	GAGAVE	5	22	5	20
HEREPARU	4	17	5	290	GANE	5	23	4	54
KIVORI KUI	4	17	6	290	GANIAWAI	5	22	6	22
KIVORI POE	4	17	7	289	GHIVENA	5	22	7	20
ROROAIARA	4	17	8	291	GOILAPU	5	22	8	19
					GUARI NO 1	5	22	9	22
<b>SYSTEM 0304</b>					GUARI NO 2	5	22	10	22
AIPEANA	4	19	1	31	GUARIMAIPA	5	21	1	297
AMOAMO	4	19	2	31	GUBURU	5	22	11	20
BABANONGO	4	18	3	289	HOIANURENDA	5	29	5	101
BABIKO	4	16	1	79	IGUAI	5	21	2	297
BEBEO	4	19	3	287	ILOPO	5	22	12	19
BEIPA	4	19	4	31	ITA	5	23	6	52
BEREINA	4	16	2	30	KAMBISI	5	29	8	101
EBOA	4	19	5	78	KARIARITSI	5	24	7	9
INAWABUI	4	19	7	79	KARUAMA	5	21	3	49
INAWAE	4	19	8	30	KASE	5	29	9	103
INAWAIA	4	19	9	79	KELEVI	5	22	13	20
INAWAUNI	4	19	10	31	KIORIVI	5	23	11	54
INAWI	4	19	11	31	KOEFA NO 1	5	22	14	19
JESUBAIBUA	4	19	12	79	KOEFA NO 2	5	22	15	24
MOU	4	16	6	79	KOKODA	5	29	10	103
ORIROPETANA	4	19	13	287	KOMO	5	22	16	23
RAPA	4	16	10	82	LAITATA	5	23	13	54
RARAI	4	19	14	31	LAPAULA	5	22	17	20
					LAVAVAI	5	23	15	294
<b>SYSTEM 0305</b>					LOBUDON	5	22	18	22
AVELE	5	28	1	72	LOLEAVA	5	23	16	52
AVORA	5	28	2	72	MAINE	5	23	18	52
BAIDANA	5	28	3	72	MATSIALAVAVA	5	24	9	9
BAURA	5	28	4	72	NELEME	5	22	19	19
BUBUNI	4	20	2	86	OLIVI	5	21	4	297
DILAVA MADIU	4	20	4	75	OMU	5	22	20	20
FOFOU	4	20	5	77	OMUITU	5	22	21	20
GOSISI	3	9	7	102	ONONGE	5	29	14	103
ILIDE	5	28	5	73	OROROGAIVALA	5	23	21	54
INAUMAKA	4	20	8	71	PERUMELAVAVA	5	24	12	45
IUMU	4	20	10	86	RUPILA	5	22	22	20
KARAME	5	28	6	73	SISIARENDA	5	29	16	52
KAUAKA	4	20	12	283	TAVEVE	5	21	5	20
KEAKAMANA	4	20	11	71	TONAMENA	5	22	23	20
KODIGE	5	28	7	72	TORURA	5	22	24	20
KOROGO	5	30	951	95	UNE	5	22	25	23
LAFALAPA	4	20	17	37	VISI	5	29	23	101
LOTUAVA	5	25	6	38	WATAGOIPA	5	23	25	52
MAIMAI	4	20	13	283	ZAILAPU	5	22	26	22
OPORE	5	25	8	38	ZHAKE	5	22	27	22
VALE	4	20	15	71	ZHEVENAI	5	22	28	22
WAPOTE	5	25	10	38	ZHEVIYAMAI	5	22	29	20



**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
<b>SYSTEM 0307</b>					MINARU	5	26	6	68
ADUAI	5	29	1	101	MOINGILI	5	23	20	52
AMUGANIAVA	5	23	1	52	MOINGILI	5	27	21	63
ARIONE	5	27	1	66	MONDO	5	27	22	66
BAIDANA	5	27	2	66	MOROA	5	25	7	9
BELAVISTA	5	27	3	69	NAIRELAVAVA	5	24	10	20
BERAVESA	5	30	1	95	NELIVE	5	24	11	45
BOLUBOLU	5	25	1	38	NIONOPA	5	26	7	65
BURUAI	5	24	2	9	OMBOLI	5	29	13	90
DEVADEVA	4	20	3	71	ORO	5	26	8	46
DIGURENDA	5	27	4	64	ORO	5	29	15	103
DIORO	5	26	1	65	POMUTU	5	24	13	9
ENENDE	5	29	2	101	PONEYALAVAVA	5	23	22	54
ERUMELAVAVA	5	24	3	9	PORUELAVAVA	5	25	9	297
EVEVA	5	30	2	96	SEI	5	30	7	96
EVESE	5	29	3	103	SIGUFE	5	29	18	103
FANE	5	27	5	69	SINGGO	5	30	8	96
GAIVA	5	27	6	74	SONGGAKU	5	30	9	96
GARIMA NO 1	5	27	7	66	SOPU	5	23	23	52
GARIMA NO 2	5	27	8	66	SUMBI	5	29	17	52
GARIPA	5	23	5	46	TA	5	29	19	317
GIGUAVA	5	24	4	20	TAFADE	5	29	20	103
GINALA	5	29	4	103	TANIPAI	5	27	23	63
GINALA	5	30	3	96	TATUPITI	5	24	14	38
GOROWAKU	5	30	4	98	TAWUNI	5	23	24	298
GUPOU	5	24	5	45	TOKIO	5	27	24	52
GURORO	5	27	9	66	TORORO	5	24	15	45
IDAVE	5	27	10	74	TURA	5	30	10	96
IDULA	5	27	11	69	TURALA	5	27	25	64
IEME	5	29	6	64	ULAMUTU	5	24	16	9
IGUAI	5	27	12	41	URUN	5	29	22	52
ILAYAPE	5	26	2	68	WOITAPE	5	29	24	90
ILIMAVA	5	24	6	9	YONGAI	5	30	11	96
IRITUMU	5	29	7	101	YORIBAI	5	30	12	95
IVEIYAVA	5	23	7	52	YULAI	5	27	26	66
KAGO	5	30	5	96	YUMU	5	27	27	66
KAILAPE	5	27	13	66	ZANIALAVAVA	5	25	11	297
KARAME	5	27	14	74					
KATAIPA	5	23	8	298	<b>SYSTEM 0308</b>				
KERAU	5	23	9	52	IANU	1	2	18	218
KILEIPI	5	23	10	52	IANU BLOCKS	1	2	516	218
KIRI	5	27	15	66	MANABO BLOCKS	1	2	505	218
KOAMA	5	30	6	95	UNU	1	2	49	218
KOILALAVAVA	5	24	8	9					
KONE	5	27	16	66	<b>SYSTEM 0309</b>				
KOPUKORO	5	27	17	52	ADIO	4	20	1	85
KOPURILAVAVA	5	23	12	52	BIOTO	4	16	3	16
KORUAVA	5	26	3	46	DIUMANA	4	15	2	83
KOSIPI	5	29	11	62	FOIO	4	20	6	77
KURAMA	5	29	12	317	IDOIDO	4	20	7	85
LAMANAIPA	5	23	14	52	INEINA	4	14	2	115
LAMANAIPA	5	25	2	297	INIKA	4	20	9	85
LAMINA	5	25	3	38	KAI AU	4	15	3	108
LAMORO	5	25	4	9	KEVEONA	4	14	3	112
LARAMAITA	5	25	5	9	KOUPUANA	4	14	4	112
LAVAVAI	5	27	18	66	MAGABAIRA	4	14	5	112
LEDANA	5	27	19	66	NIKURA	4	16	7	82
LOTUAVA	5	26	4	68	PINU	4	14	6	112
LUMIOTO	5	23	17	52	TAMALA	4	20	14	77
MAFULU	5	27	20	70	TUBU	4	15	5	108
MAITU	5	26	5	68	UKAUKANA	4	14	7	112
MALAVA	5	23	19	54	VANUAMAI	4	15	6	83

**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
<b>SYSTEM 0310</b>					MANARI	3	9	11	143
ALA'ALA	4	15	1	83	MANUMU	3	9	12	143
DELENA	4	16	4	109	NADINUMU	3	9	13	144
GOROHU	3	13	2	114	NAORO	3	9	14	143
HISIU	4	14	1	111	SURIA	3	9	15	282
KEABADA	4	16	5	50	WAIWA	3	10	22	143
MANUMANU	3	13	6	111					
OROI	4	15	4	109	<b>SYSTEM 0315</b>				
PINUPAKA	4	16	8	82	FULIMUTI	3	10	7	280
POUKAMA	4	16	9	109	MESIME	3	10	14	135
TSIRIA	4	16	11	80	WARUTANUMU	3	10	23	135
<b>SYSTEM 0311</b>					<b>SYSTEM 0316</b>				
AGEFA	3	10	1	140	DABUNARI	3	12	2	156
AKUKU	3	11	1	128	DAGODA	3	12	3	156
BADILOHO	3	11	2	127	GAIRE	3	12	4	157
BERERE	3	11	3	127	KEREKADI	3	12	5	172
BOTEKA	3	11	4	301	KIDO	3	13	3	131
DOURAMOKU	3	11	5	127	LEA LEA	3	13	5	114
EDEBU	3	11	6	127	NAFENANOMU	2	7	64	279
FODU	3	11	8	115	PAPA	3	13	7	114
HAIMA	3	11	9	301	RABUKA	3	12	6	156
IOMARE	3	11	10	305	SEME	3	12	7	157
KANOBABA	3	11	11	127	TAGANA	2	7	79	180
KEAKUAKU	3	11	12	127					
KEREA	3	11	13	127	<b>SYSTEM 0317</b>				
MOTUMOTU	3	11	14	127	AGITANA	2	8	1	279
VASAGABIRA	3	11	15	117	ALEBAGIU	2	7	1	194
VEIKABU	3	11	16	127	ALOMARUPU	2	7	3	293
<b>SYSTEM 0312</b>					ANAHADABU	2	8	2	279
BEREADABU	3	10	4	150	BABAGA (HULA)	2	7	6	191
BEREBEI	3	10	3	150	BABAGA(SAROA)	2	7	5	310
BOREDABU	3	10	2	150	BABAGARUPU	2	7	7	293
DOE	3	10	5	159	BAGUBARA	2	4	2	194
FAKONAMA	3	10	6	150	BARAKAU	3	12	1	156
FUTINUMU	3	10	8	151	BOBOGORO	2	5	6	194
GURINUMU	3	10	9	151	BOERA	3	13	1	137
IANABEWAI	3	10	10	151	BOGARAMAKA	2	4	5	177
KALAKADABU	3	10	12	150	BONANAMO	2	7	10	293
MANURINUMU	3	10	13	150	BOREGAINA	2	7	12	187
NAINUMU	3	10	24	150	BUMEGORO	2	5	7	173
OGOTANA	3	10	15	151	DAKEVAKOMANA	2	5	9	194
OSABEWAI	3	10	16	110	DAROAKOMANA	2	7	14	179
RUBURU	3	10	17	159	DIDIGA	2	5	10	194
UBERI	3	10	19	148	DIRIGOLO	2	4	7	177
VESILOGO	3	10	20	150	DIRIKOMANA	2	5	11	194
WAHONAOADA	3	10	21	151	EHO	2	7	18	279
<b>SYSTEM 0313</b>					GABAGABA	2	7	19	185
KAILAKINUMU	3	10	11	150	GABONE	2	7	20	293
<b>SYSTEM 0314</b>					GAMOGA	2	7	21	183
BODINUMU	3	9	2	143	GAUNOMU	2	7	22	279
BORIDI	3	9	3	144	GAVAGORO	2	7	23	194
DUBI	3	9	4	143	GEMO	2	7	26	293
EFOGI	3	9	5	144	GEO	2	7	24	279
ENAGE	3	11	7	102	GERESI	2	7	27	181
ENIVILOGO	3	9	6	143	GIDOBADA	2	7	29	181
HAILOGO	3	9	8	143	GINIGOLO	2	7	30	310
KAGI	3	9	9	143	GIRABU	2	7	31	310
MADILOGO	3	9	10	143	GOBAKIGORO	2	5	13	194
					GOBUA	2	7	32	279
					GOBUKOMANA	2	7	33	194
					GOGOREKOMANA	2	7	37	194

**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
GOMORE	2	7	35	310	WIGA	2	5	29	194
GUNUGAU	2	7	38	293					
GUROGORO	2	5	14	194	<b>SYSTEM 0318</b>				
HIMAI	2	5	30	308	ABARO	2	6	1	163
IAODOBU	2	8	4	279	ABOWANA	2	6	2	166
IMUAGORO	2	7	41	184	ADARAIKA	2	6	3	163
IOIKOMANA	2	4	38	194	AIRIAUKU	2	5	3	308
IOVEI	2	8	5	279	AMURAIKA	2	5	1	173
KAMALI	2	7	44	191	AMURAM	2	5	2	308
KARAIKOMANA	2	7	46	194	AREMAIKA	2	5	4	174
KAREKODOBU	2	7	48	279	AREMAKA	2	4	1	194
KEAGOLO	1	2	23	197	ARUDIDU	2	5	5	173
KELERAKWA	1	2	25	201	BADAIKA	2	6	4	175
KEMABOLO	2	7	50	293	BARATAKA	2	6	5	167
KEMAEA	2	7	51	310	BOKUKOMANA	2	4	6	173
KOBAROKA	2	4	14	177	BOKUKOMANA	2	7	9	173
KODOGERE	2	7	52	181	BORO	2	6	6	163
KOMIOKOMANA	2	4	15	194	BULIDOBU	2	7	13	171
KORAKOMANA	2	7	54	194	BUREDOBURU	2	5	8	167
KOUDERIKA	3	13	4	137	BUSALAMAGA	2	8	3	279
KOWOROKOMANA	2	7	55	194	DEBADEGORO	2	7	15	321
KWALE	2	7	56	279	DIRINOMU	2	7	16	171
KWALIMURUPU	2	7	57	310	DODI	2	6	7	144
KWIKILA VILLAGE	2	7	89	181	DOROBISORO	2	6	8	163
LAGUME	2	8	6	279	EFAIKA	2	7	17	171
LAUGAITA	2	4	18	194	ERENAIKA	2	6	9	163
LAUTAKOMANA	2	7	58	194	GEGOFI	2	7	25	279
LEBAGOLO	2	4	19	187	GEVERAGORO	2	7	28	321
LEPAMAGANA	2	4	20	178	GOBUNAIKA	2	7	34	171
LIBUNAKOMANA	2	7	59	321	GURANOMU	2	6	10	167
LOGAMAKA	2	7	60	187	HOMENOMU	2	5	15	308
LOINDAIRI	2	8	7	279	HUAVOLO	2	6	11	164
MAKERUPU	2	7	61	191	IARUMENOMU	2	7	40	171
MEDENE	2	8	8	279	IAURA	2	4	11	322
MEIROBU	2	4	25	194	IBARADOKU	2	6	12	163
MEMEKAKOMANA	2	4	26	194	IDAGIGOLO	2	6	13	144
MUIAMAGORO	2	5	20	194	IGONONAMO	2	6	14	163
NAGOATEBAKA	2	4	28	194	IMIDIRU	2	6	15	163
NOGOMAKA	2	7	67	194	IOROMAKOMANA	2	5	16	173
PAITAGORO	2	7	69	194	IPOIDUBURU	2	6	16	144
PORABADA	3	13	8	137	KAIKANOMU	2	6	17	167
RIWALIRUPU	2	7	70	310	KAITEBA	2	4	12	194
ROKU	3	13	9	137	KAKIAKOMANA	2	4	13	308
SABUIA	2	7	71	157	KEMAKOMANA	2	5	17	173
SAROA	2	7	72	181	KOKOROGORO	2	7	53	321
SAROAKEINA	2	7	73	179	KORU'ORU	2	4	17	308
SEBA	2	7	74	321	KORUAKOMANA	2	4	16	194
SENUNU	2	7	75	156	LAROMI	2	6	18	175
SIVITATANA	2	7	77	187	LI'IBA	2	4	21	308
TABUAKOMANA	2	4	32	194	LOFAIKA	2	6	19	163
TAIKOGENA	2	4	33	194	MAMATAGORO	2	4	23	173
TAITUKOMANA	2	7	80	194	MANUGORO	2	7	62	156
TAUKOMANA	2	7	81	194	MARANOM	2	5	18	308
TAURUBA	2	7	82	183	MARIA	2	4	24	322
TOBAROKA	2	4	34	194	MIMAI	2	6	20	144
TORINUMU	3	10	18	279	MUIANOMU	2	6	21	167
TUBUSEREIA	3	12	8	188	MUMUIRU	2	4	27	194
VAIVAI	3	12	9	156	NEMONOMU	2	7	65	171
WAINOMU	2	7	83	194	NENEMAKOMANA	2	4	29	173
WAIRADOBU	2	7	84	279	ODUIKA	2	7	68	171
WALAI	2	7	85	293	OMANAGORO	2	4	30	173
WASIRA	2	7	86	279	ONEMAGORO	2	5	21	173

**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
ORAITA	2	4	31	308	MAIPIKO	2	4	22	194
SANOUM	2	5	22	308	MAMALO	2	3	12	193
SENEMAKA	2	5	23	173	MARUNOMU	2	5	19	173
SISIGOLO	2	7	76	279	MATAIRUKA	2	7	63	178
SOMORI	2	6	22	163	MERANI	1	2	33	218
SORI	2	6	23	167	MOLEGORO	2	3	13	178
TABU	2	6	24	163	MORI	1	2	34	218
TABUNOMU	2	7	78	171	NIUIRUKA	2	7	66	179
TABURAIKA	2	5	24	167	OBABA	1	2	35	337
TOMOROVANUA	2	6	25	167	OIO	1	1	41	234
UBUREGORO	2	5	25	173	POLIGOLO	2	3	14	178
UNUAGORO	2	4	36	194	POTUNA	2	3	15	194
UNUNOMU	2	5	26	173	SEGILI	1	2	38	224
WABURAIKA	2	5	27	308	SI'INI	1	2	39	224
WAIFANOUMU	2	6	26	167	TUMUO	2	4	35	173
WAURAIKA	2	7	87	171	TUTUBU	1	2	40	217
WEBIGOLO	2	5	28	173	UDIRI	1	2	41	288
<b>SYSTEM 0319</b>					URIGO	2	3	16	193
ALEPA	2	3	1	178	VANUA VAMONA	2	3	17	192
AMAU	1	2	1	218	VIRIOLO	1	2	42	216
ANEVE	1	2	2	225	VORAKOGENA	2	4	37	194
APAEVA	1	2	3	224	WAIORI	1	2	43	203
BAGIBOGI	2	3	2	178	WANIGELA	1	2	45	203
BAGUGORO	2	3	3	178	<b>SYSTEM 0320</b>				
BAIOBO	1	2	5	226	ALEWAI	2	7	2	191
BAM	1	1	3	228	ALUKUNI	2	7	4	192
BARAMATA NO 4	1	2	4	222	BORU	1	1	6	236
BIGAIRUKA	2	7	8	179	BURU	1	2	8	201
BIGEIA	2	4	3	178	EGALAUNA	1	2	12	200
BINIGORO	2	4	4	178	GAIVAKALA	1	2	14	200
BOIBODAE	1	2	48	226	HULA	2	7	39	191
BOMGUINA	1	2	6	218	ILIMORUPU	1	2	19	200
BORE	2	7	11	179	IRUONE	1	2	20	200
BUKUKU	1	2	7	288	IRUPARA	2	7	42	191
DARAVA NO 2	1	1	9	237	KAPAROKO	2	7	45	293
DOM	1	2	9	218	KARAWA	2	7	47	192
DOMA	1	1	14	234	KEAPARA	2	7	49	192
DOMARA	1	2	10	223	KELEKAPANA	1	2	24	200
DUBANATEBOA	2	3	4	178	KINIKALANA	1	2	26	200
DURAMU	1	2	11	218	KWAPEUPA	1	2	27	200
GADOGUINA	1	2	13	224	MAGAUBO	1	1	32	236
GANAI	1	2	30	218	MAOPA NO 1	1	2	31	200
GARAMOKOGENA	2	3	5	194	MAOPA NO 2	1	2	32	200
GARETANO	2	4	8	288	PARAMANA	1	2	36	200
GAVUONE	1	2	15	213	PELAGAI	1	2	37	200
GEBEA	1	2	16	224	WAIHAVANUA	1	2	44	200
GEREGAGEA	2	3	6	178	WAPAGAI	1	2	46	200
GOADA	2	4	9	337	WARO	1	2	47	200
GORUGORUNA	2	3	7	178	<b>SYSTEM 0321</b>				
GOULUPU	2	7	36	310	ARAU	1	1	1	249
GOUWO	2	4	10	194	AROANA	1	1	2	276
IABA	1	2	17	218	BONUA	1	1	4	266
IMAIRU	2	3	8	178	BOREBO	1	1	5	276
KALAPA	1	2	21	288	DAGOBO	1	1	7	276
KALO	2	7	43	189	DARAVA	1	1	8	234
KAPARI	1	2	22	216	DEBA	1	1	10	249
KONAKO	2	3	9	178	DEREBAI	1	1	12	276
KORE	2	3	10	193	DERIA	1	1	13	266
KWAIBO	2	3	11	193	EUNUORO	1	1	16	333
LALAU	1	2	28	217	GABURU-MARA	1	1	17	267
MAIAGOLO	1	2	29	212					

**6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM**
**Province: 3 Central**

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
GAMILA	1	1	18	272	OIBADA	1	1	40	277
GEAGEA	1	1	19	276	ONIONI	1	1	42	276
ILAI	1	1	22	272	PEDILI	1	1	44	276
KEAKARO	1	1	23	276	SABIRIBO	1	1	45	276
KEBEI	1	1	24	272	SELAI	1	1	46	276
KORAUTO	1	1	26	277	TANOBADA	1	1	47	272
KURERE ASIARO	1	1	27	247	UBUNA	1	1	48	276
LABU	1	1	28	234	UNEVI	1	1	49	276
LALUORO	1	1	29	332	WOWORO	1	1	52	247
LAUA	1	1	30	249					
LOUPOM	1	1	31	292	<b>SYSTEM 0322</b>				
MAEVA	1	1	34	276	DEIGAM	1	1	11	286
MAGORE	1	1	33	249	DOVETA	1	1	15	286
MAILU	1	1	35	332	IBIAM IGUP	1	1	21	286
MODAURO	1	1	36	267	KERIA	1	1	25	286
NABAI	1	1	37	272	NORA	1	1	38	286
NUNUMAI	1	1	39	249	VEROI	1	1	50	286

## APPENDIX A.1

### NATIONAL POPULATION CENSUS PROVINCIAL CODES

<b>Province</b>	<b>Abbreviation</b>	<b>Code</b>
Western	WES	01
Gulf	GUL	02
Central	CEN	03
National Capital District	NCD	04
Milne Bay	MBP	05
Oro (Northern)	ORO	06
Southern Highlands	SHP	07
Enga	ENG	08
Western Highlands	WHP	09
Simbu (Chimbu)	SIM	10
Eastern Highlands	EHP	11
Morobe	MOR	12
Madang	MAD	13
East Sepik	ESP	14
West Sepik (Sandaun)	WSP	15
Manus	MAN	16
New Ireland	NIP	17
East New Britain	ENB	18
West New Britain	WNB	19
Bougainville	NSP	20

## APPENDIX A.2

### NATIONAL POPULATION CENSUS CODES FOR DISTRICTS AND CENSUS DIVISIONS, CENTRAL PROVINCE<sup>1</sup>

<b>Code</b>	<b>Division</b>	<b>Code</b>	<b>Division</b>
01	ABAU	04	KAIRUKU
01	AMAZON BAY	14	KABADI
02	MARSHALL LAGOON	15	NARA
		16	RORO
02	RIGO	17	WAIMA/KIVORI
03	ORMOND	18	NORTH MEKEO
04	MARIA	19	MEKEO
05	MOUNT BROWN	20	KUNI
06	MOUNT OBREE		
07	RIGO	05	GOILALA
08	KOIARI	21	ZARIMA
		22	KUNIMAIPA
03	HIRI	23	AIWARA
09	MOUNT KOIARI	24	LOLOIPA
10	SOGERI VALLEY	25	PILITU
11	VANAPA RIVER	26	IVANE
12	EAST COAST HIRI	27	AUGA
13	WEST COAST HIRI	28	DILAVA
		29	VETAPU
		30	CHIRIMA

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<sup>1</sup> The Census Division names and codes are from the 1980 National Population Census. However, because the district definitions in some provinces changed between the 1980 and 1990 censuses, and because districts are important for provincial administrative purposes, the district names and codes are from the 1990 National Population Census. Some provinces have further changed district definitions since 1990 but these are not shown.

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