AUSTRALIAN AGENCY for INTERNATIONAL DEVELOPMENT

AGRICULTURAL SYSTEMS OF PAPUA NEW GUINEA

Working Paper No. 4

WESTERN PROVINCE

TEXT SUMMARIES, MAPS, CODE LISTS AND VILLAGE IDENTIFICATION

B.J. Allen, R.L. Hide, R.M. Bourke, W. Akus, D. Fritsch,
R. Grau, G. Ling and E. Lowes

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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

Acknowledgments

The following organisations have contributed financial support to this project: The Research School of Pacific and Asian Studies, The Australian National University; The Australian Agency for International Development; the Papua New Guinea-Australia Colloquium through the International Development Program of Australian Universities and Colleges and the Papua New Guinea National Research Institute; the Papua New Guinea Department of Agriculture and Livestock; the University of Papua New Guinea; and the National Geographic Society, Washington DC.

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Technical advice and encouragement have been provided throughout the project by John McAlpine, Gael Keig and Sue Cuddy, Australian Commonwealth Scientific and Industrial Research Organization.

Support and advice have been received from Geoff Humphreys and Harold Brookfield of the Land Management Project, and Gerard Ward (formerly Director), Research School of Pacific and Asian Studies, The Australian National University. Brookfield's (1971) study of Melanesian agricultural systems has been particularly influential.

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: Ted Sitapai, Derek Tomlinson, Balthazar Wayi (coordination and planning); Will Akus, Gadi Ling (field mapping).

Papua New Guinea National Research Institute: Wari Iamo (coordination and funding).

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); Claudia Camarotto, Vivienne Laynne, Elanna Lowes (research assistance); Yvonne Byron (editorial assistance); Merv Commons (technical assistance).

Field Survey

Some preliminary surveys were done during visits for other purposes in the Wipim station-Sanguanso village area in 1967 and in the Kiunga-Ningerum area in 1979. The main surveys were conducted by three parties over a 2-3 week period in May 1982. Two parties operated in the northern part of the province and as far south as the junction of the Fly and Strickland Rivers. Another party operated in the southern part of the province. Extensive traverses were conducted by aircraft, road, foot and boat throughout the province. Details of the surveys are given in the section Survey Description for each agricultural system.

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 and Amber Pares were responsible for the production of the revised paper.

CONTENTS

Contents (Continued)

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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Smith, T., G. Keig, J. Marks and R. Grau 1992 Summary Results by Environmental Zone from the 1982-3 National Nutrition Survey of Papua New Guinea: Implications for Future Survey Design. Papua New Guinea Institute of Medical Research, Goroka.

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 **[SUBSYSIDNO]:** 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^{o})
2	Gentle	(2-10^{o})
3	Steep	(10-25^{o})
4	Very steep	(>25^{o})
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 (*eg. kunai < 1.5 m tall*)
2	Tall grass (*eg. Miscanthus or Saccharum > 1.5 m tall*)
3	Grass and woody regrowth *(dense short or tall grass and short woody regrowth*)
4	Short woody regrowth (*shrubs/trees < 10 m tall*)
5	Tall woody regrowth (*trees > 10 m tall*)
6	Forest (*no indication of previous use*)
7	No long fallow
8	Savanna *(Scattered woody growth with grass ground cover)*

***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 *(Musa* cvs*)*	13	Taro *(Colocasia esculenta*)
03	Breadfruit *(Artocarpus altilis)*	14	Yam *(Dioscorea alata*)
04	Cassava *(Manihot esculenta)*	15	Yam *(Dioscorea esculenta*)
05	Chinese taro *(Xanthosoma sagittifolium)*	16	Yam *(Dioscorea pentaphylla*)
06	Coconut *(Cocos nucifera)*	17	Other
07	Corn *(Zea mays)*	18	Queensland arrowroot (*Canna edulis)*
08	Potato *(Solanum tuberosum)*		
09	Sago *(Metroxylon sagu)*	19	Taro (Amorphophallus) *(Amorphophallus paeoniifolius)*
10	Swamp taro *(Cyrtosperma chamissonis)*	20	Yam *(Dioscorea bulbifera)*
11	Sweet potato *(Ipomoea batatas)*	21	Yam *(Dioscorea nummularia)*
12	Taro *(Alocasia macrorrhiza*)		

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

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

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

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

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

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

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

1	Betel nut, highland *(Areca macrocalyx)*
2	Betel nut, lowland *(Areca catechu)*
3	Betel pepper, highland (*Piper gibbilimbum*)
4	Betel pepper, lowland *(Piper betle)*
5	Tobacco *(Nicotiana tabacum)*
6	Kava *(Piper methysticum)*

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 **[VSMMOUND]:** 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 (*Campnosperma* 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:

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

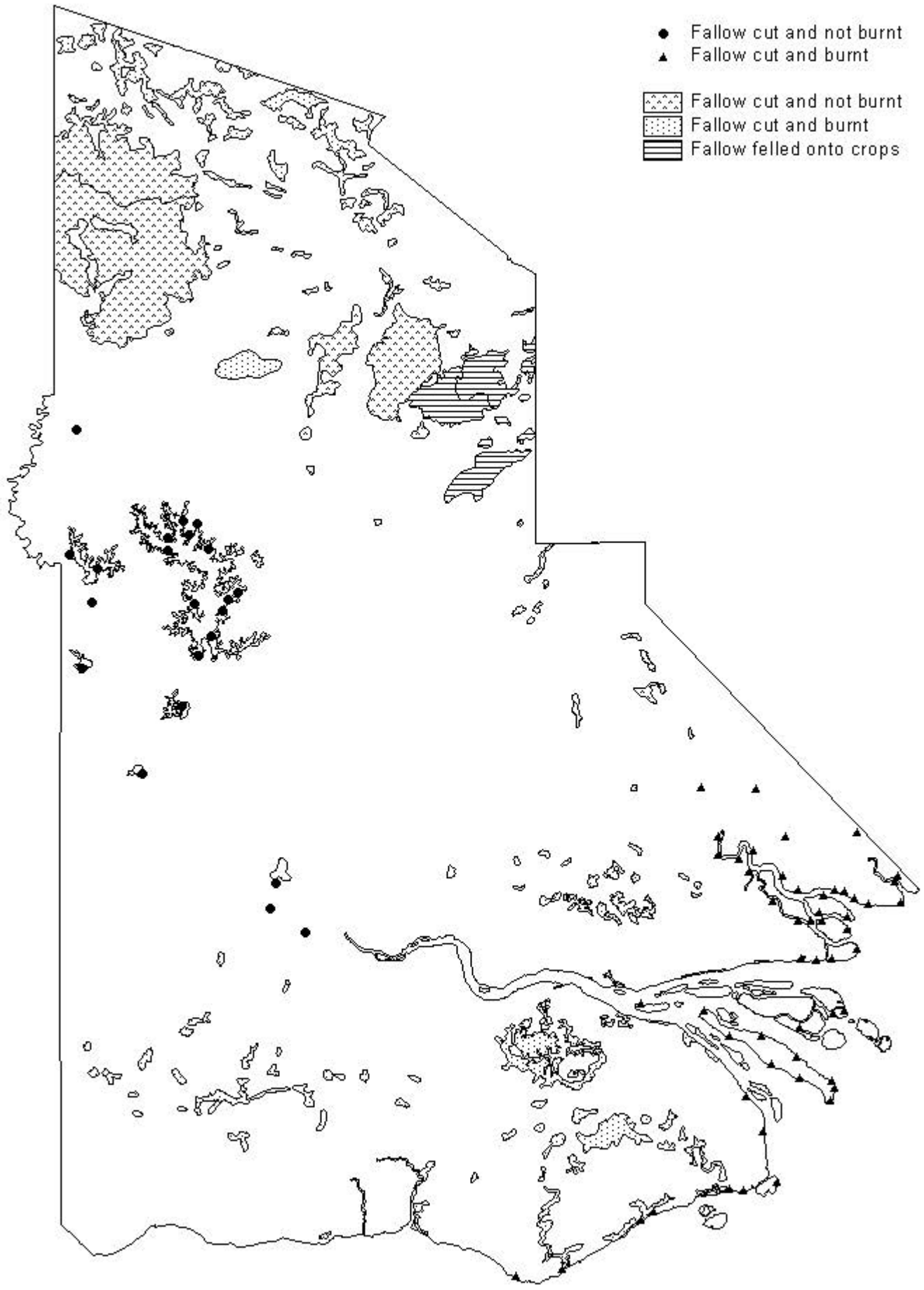
PROVINCE 15 West Sepik	**AGRICULTURAL SYSTEM No**. 3	**Subsystem No** 2 **of** 2
Districts 4 Telefomin	**Subsystem Extent** 25 %	

They contain information on Districts and subsystem extent only.

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

PROVINCE 15 West Sepik	**AGRICULTURAL SYSTEM No**. 1	**Subsystem No** 1 **of** 1

WESTERN PROVINCE



Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 1 **Subsystem No.** 1 **of** 1

Districts 6 Tabubil **Subsystem Extent** 100 % **Area (sq km)** 205
Population 1,064 **Population density** 5 **persons/sq km** **Population absent** 16 **%**

System Summary

Located in the mountainous areas north of Tabubil and Olsobip station and extending into the Telefomin and Feramin areas of West Sepik Province. The undergrowth is cleared from beneath tall woody regrowth, generally 15-25 years old. Taro is the most important crop; sweet potato and Chinese taro are important crops; other crop are banana, cassava and yam (D. alata). Taro is planted beneath the trees. As the crop matures, trees are thinned and eventually all trees may be either cut down or killed and left standing, so that direct sunlight is allowed to reach the crop. Chinese taro is planted in separate gardens below 1300 m altitude. Sweet potato is planted as a segregated crop in taro gardens. Some cleared undergrowth is burnt, and much is heaped within the gardens or along the garden edge, but a thick layer of mulch is left on the soil surface at planting. Only one planting is made before fallowing. Gardens are extended progressively beneath standing trees across a site, until all suitable land has been cultivated and a new site is sought.

Extends across provincial border to System(s) 1501

Altitude range (m) 900-2000 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	Taro (Colocasia)
STAPLES SUBDOMINANT	Chinese taro, Sweet potato
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro (Colocasia), Yam (D. alata)
OTHER VEGETABLES	Aibika, Amaranthus spp., Choko tips, Corn, Cucumber, Ferns, Highland pitpit, Kumu musong, Pumpkin tips, Tulip
FRUITS	Marita pandanus, Sugarcane
NUTS	Breadfruit, Castanopsis, Karuka (planted), Karuka (wild)
NARCOTICS	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	Significant
CROP SEQUENCES	None
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 Animal skins	Minor
2 Fresh food	Minor

Water Management:	
DRAINAGE	None
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Minor
TILLAGE	None
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	Significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	None

OTHER AGRONOMIC PRACTICES

OTHER DOCUMENTATION

Survey description

In January 1987, a four week study of shifting cultivation at the Mianmin hamlets of Defambambip, Yemimbip and Beitafip (West Sepik) in which all gardens were surveyed and mapped. In June 1991, a foot traverse from Telefomin to Eliptamin station, and through the Elip Valley (West Sepik) (3 days). In May 1992, a visit to Golgobip village and traverse on foot from Golgobip to Olsobip station (2 days).

Boundary definition

The boundary with System 1507 north of Yapsei was based on fieldwork and interviews in the Yapsei area. Elsewhere the northern boundary with System 1507 was based on fieldwork in a number of Mianmin hamlets; extrapolation from the boundary at Yapsei; and Morren and Hyndman (1987). The boundary with Systems 1503, 0102/1505, 1509 and 1510 was based on walking traverses between Oksapmin, the Bak Valley and Bimin and aerial observations. The boundary with System 1502 was determined by road and walking traverses south and west of Telefomin station. The southern boundary with Western Province System 0102/1505 was determined on a walking traverse from Golgobip village to Olsobip station; and interviews at Selbang, Biangabip and Bultem villages.

Notes

This system is distinguished from Systems 1502, 1503, 0102/1505, 1507, 1509 and 1510 by different combinations of the most important and important crops. As well, fallow periods are shorter in Systems 1502 and 1510. In System 1507, sago is the most important food.

Although taro is the most important crop everywhere, the importance of sweet potato and Chinese taro varies locally. Chinese taro is an important crop in the Elip and Upper Sepik Valleys, but not in the Feramin or Mianmin areas. Sweet potato is more important in the Atbalmin area than in the Eliptamin area. In the Tifalmin area in 1970, sweet potato was estimated to contribute between 30 and 40 per cent by weight of food eaten (Wheatcroft 1975, 64). Chinese taro is planted up to 1300 m altitude. The system was previously more extensive and extended to the southern limit of the area occupied by the Ok language speakers. At lower altitudes, taro has been displaced by other crops (sweet potato, Chinese taro and cassava) since the early 1980s.

In all areas Chinese taro is planted in separate gardens. Sweet potato is usually planted separately from taro on better drained sites. Taro and sweet potato are said to be planted in the same gardens at Misinmin village near Telefomin (Brumbaugh 1980, 55), and in separate gardens in the Tifalmin area (Wheatcroft 1975, 64). Where they are planted in the same garden, they are always planted in separate sections. Chinese taro, and to a lesser extent taro, is often planted in areas disturbed by landslides. Taro blight is present up to 1600 m altitude, and is said to have arrived in the Elip Valley in the 1960s from the Mianmin area. Another disease (probably the Alomae virus) is also said to be a problem. Taro beetle (Papuana spp) is present. Household gardens contain minor plantings of taro, Chinese taro and bananas.

A number of soil fertility maintenance techniques are used. In the Elip Valley and the Telefomin area, casuarina trees are sometimes planted in taro gardens or fallows. Decomposed heaps of cleared fallow vegetation (known as 'kompos' in pidgin) are used as sites for planting taro. Trees are sometimes deliberately felled on a site a number of years prior to the cultivation of the site. Women clear and heap the cut undergrowth. Some heaps are burnt, sometimes around the base of trees to kill them, but many trees are left standing and much litter is not burnt. The sites of small fires are used to plant spring onions, winged bean and aibika. In response to severe taro blight in the Golgobip area, trees are being cut and removed from gardens. In sweet potato gardens, more trees are felled and removed than in taro gardens, but many are left standing.

In the Elip Valley and Golgobip area, a number of gardens are enclosed by one fence. In the Tifalmin area, individual gardens are fenced. Gardens in the area between Mianmin and Yapsei stations are not often fenced, except for sweet potato gardens at lower altitudes. Yams, common beans and winged beans are staked. Generally there is only one planting before fallow, but occasionally sweet potato is replanted a second time. Sweet potato is dibbled on the first planting, but where a second crop is cultivated, small mounds 20 cm high and 50 cm in diameter are commonly used.

The main source of cash is from employment (wages, remittances and gifts) at Tabubil town or the Ok Tedi mine. Vegetables, including potatoes, are purchased weekly at Eliptamin, Feramin, Telefomin and Golgobip by Min Vegetable Marketing Pty Ltd and sold to Ok Tedi mine caterers at Tabubil. Telefomin High School also purchases fresh food. Arabica coffee and cardamom are present but are not being harvested because of low prices.

National Nutrition Survey 1982/83

19 families from 1 village were asked in March or May 1983 what they had eaten the previous day. 89 per cent reported eating taro, 5 per cent sago, 5 per cent Chinese taro and none sweet potato, cassava, banana, yam or coconut. 32 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern, except for the lack of sweet potato consumption.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 2 **Subsystem No.** 1 **of** 1

Districts 6 Tabubil **Subsystem Extent** 100 % **Area (sq km)** 718
Population 2,547 **Population density** 4 **persons/sq km** **Population absent** 11 **%**

System Summary

Located on the southern side of the main ranges to just south of Tabubil in Western Province; and in the Ok Om Valley upstream from Sisamin village in West Sepik Province. Tall woody regrowth, more than 20 years old, is felled and heaped. Where sweet potato is planted, the heaps are burnt. Where taro is planted, there is little burning. Taro, sweet potato, Chinese taro and cassava are important crops; other crops are banana and sago. Before the early 1980s, taro was the most important crop, with some sweet potato grown. Since then, sweet potato, Chinese taro and cassava have become important crops. Meanwhile taro has declined in importance, though it is still grown, generally at higher altitudes. While the relative significance of the four important crops varies, sweet potato is generally the most common. There is no tillage, and only one planting is made before fallowing. Sweet potato, taro and Chinese taro (and sometimes cassava) are usually grown in separate gardens.

Extends across provincial border to System(s) 1505

Altitude range (m) 400-1800 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Cassava, Chinese taro, Sweet potato, Taro (Colocasia)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Choko tips, Corn, Cucumber, Ferns, Highland pitpit, Lowland pitpit, Pumpkin tips, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
NUTS	Breadfruit
NARCOTICS	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	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 Animal skins	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	None
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
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	Significant
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, traverse on foot from Golgobip village to Olsobip station; interviews in Olsobip area and garden visits; visits to Selbang and Biangabip villages; road traverse from Tabubil to Finalbin village (3 days). Information obtained from Atenkit (near Irian Jaya border) and Bultem villagers. In January-March 1996, an eight week walking traverse from Kiunga to Telefomin via the Upper Fly River, Biangabip and Bolovip. The West Sepik Province part of the system was not visited and the description is based on Hatanaka and Bragge (1973).

Boundary definition

The southern boundary with System 0103 coincides with the language boundary between Ok and other language groups, and is agriculturally distinct. It was determined by a road traverse between Kiunga and Tabubil; a walking traverse from Kiunga to Telefomin; and from Morren and Hyndman (1987). The boundary with System 0101/1501 was determined by a walking traverse between Golgobip village and Olsobip station; and interviews at Biangabip, Selbang and Finalbin villages. The boundary with System 1503 was determined from aerial observations. The boundary with System 0701 is defined as the provincial boundary.

Notes

This system is distinguished from System 0103 where sago and banana are the most important foods. It is distinguished from other nearby systems (0101/1501, 1503, 0729) by the combination of the most important and important crops.

This system is evolving from one in which taro was the most important crop (System 0101/1501) to one in which sweet potato, cassava and Chinese taro are displacing taro. The decreasing significance of taro is said to be due to problems with taro blight and taro beetle. A study of food intake at two villages in the Murray River area in 1986 showed that sweet potato was the dominant food in the September-December period (Kuchikura 1990). At Bultem village in the 1970s, Hyndman (1979, 194-5) reported that fallow vegetation was not burnt and gardens were not fenced. Both practices are now common, and are associated with the change from taro to other root crops. Extensive karuka pandanus stands (both cultivated and wild) exist at higher altitudes (above 1600 m). Sweet potato is generally planted without mounding, but some is planted in mounds around 30 cm high.

At Biangabib village, sweet potato is sometimes planted in mounds 1-1.5 m in diameter and about 80 cm high. Compost is not used in them. This practice was introduced by highland pastors in the early 1970s. The pastors are no longer living there, but the practice was still spreading in 1996.

People living north of Tabubil receive very large cash payments as royalties from the Ok Tedi mine. They now consume significant quantities of imported food. Elsewhere in the system the main source of cash is gifts from people working at Ok Tedi. Some fresh food is sold to the Tabubil wholesale vegetable market and in roadside and town markets.

National Nutrition Survey 1982/83

33 families from 2 villages were asked in March 1983 what they had eaten the previous day. 94 per cent reported eating sweet potato, 88 per cent taro, 6 per cent banana and none cassava, Chinese taro, sago, yam or coconut. None reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the predominance of sweet potato and taro, and the absence of both cassava and Chinese taro consumption.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 3 **Subsystem No.** 1 **of** 1

Districts 4 Nomad, 5 Kiunga **Subsystem Extent** 100 % **Area (sq km)** 2068
Population 5,004 **Population density** 2 **persons/sq km** **Population absent** 5 **%**

System Summary

Located in both the western (north of Ningerum) and eastern (northwest of Nomad and east of the Strickland River) parts of the northern half of the province. Approximately half of all food comes from sago, and half from agriculture. Sago is made from planted and wild managed stands. Gardens are made in tall woody regrowth, generally more than 30 years old. Usually fallow vegetation is felled and crops are planted through the debris without burning. Sometimes undergrowth is cleared, bananas planted and the trees are then felled onto the crop. Banana is the most important crop; other crops are taro, sweet potato and cassava. Only one planting is made before fallowing. Breadfruit, okari and marita pandanus are common in fallows.

Extends across provincial border to System(s) None

Altitude range (m) 150-400 **Slope** Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	Banana, Sago
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Cassava, Sago, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Corn, Cucumber, Highland pitpit, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
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	5 (very low)

GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	None
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 Animal skins	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION

Survey description

In May 1992, a road traverse from Kiunga to Tabubil. In May 1992, a foot traverse from Nomad station to Sakobi village (north of Nomad towards Honinabi); and aerial survey Kiunga-Nomad-Mogulu-Honinabi-Kiunga. In January-March 1996, an eight week walking traverse from Kiunga to Telefomin, via the Upper Fly River, Biangabip and Bolovip.

Boundary definition

The northern and southern boundaries of the western part of the system were identified by road traverse from Kiunga to Tabubil; from visits to the Kungim and Tarakbits areas; and from Morren and Hyndman (1987) and Ulijaszek (1992). The northern boundary separates root crop systems in the north from banana/sago systems and is agriculturally distinct. The southern boundary with System 0104 is less distinct and occurs at about the 150 m contour. This contour, and the Kiunga to Telefomin walk, were used to define the boundary. Boundaries with Systems 0105/0709 and 0106 in the eastern part of the system were identified from walking and road traverses from Nomad to Sakobi village and to Mogulu station; and Knauft (1985) and Shaw (1990).

Notes

This system is distinguished from Systems 0104, 0105/0709 and 0106 by the relative importance of banana and sago in those systems. In the two systems to the east (0105/0709 and 0706), fallow vegetation is cut onto planted crops.

In most cases the undergrowth is cleared, trees are felled and crops are planted into the litter, but occasionally trees are felled onto a newly planted crop. The practice of cutting the trees onto the crop appears to be more common than in System 0104 to the south. It is also more common in the eastern part of the system (Dwyer and Minnegal 1993, 7-10). One outside observer stated that felling the fallow vegetation first and planting after has become more common since the mid-1980s. In the eastern part of the system (north and northeast of Nomad), small gardens are sometimes made by felling the trees and burning the vegetation. A range of root crops are planted in these gardens, which are fenced.

Kava is consumed in the Samo language area north of Nomad station (Shaw 1990). Gardens are not planted seasonally, although Shaw (1990, 41-2) reported banana planting in the June-July period, and lowland pitpit planting in October-November.

In both the eastern and western parts of this system, people have moved spontaneously over the last 20 years from scattered and relatively small longhouse communities to more concentrated, more permanent, larger village and longhouse groups. The new settlements are located close to modern transport nodes - the airstrips of Tiamobi, Honinabi and Nomad in the east, and the Kiunga to Tabubil road in the west. It is possible that these new larger concentrations of people will have a severe impact on sago resources and soil fertility, which will in turn adversely affect food production in the short to medium term future. Soils are poor and rainfall is around 5000 mm per year. During 1992, people blamed a perceived general degradation of the environment on 'pollution' from the Ok Tedi mine and the underground copper concentrate pipeline. Land used for gardening along the Ok Tedi River north of Ningerum has suffered damage from siltation caused by the dumping of mine waste in the headwaters. People living along the Kiunga to Tabubil road have better access to both local roadside markets, and the Tabubil and Kiunga town markets for animal products, food and firewood. They may also be the recipients of compensation payments from the mining company. They had higher cash incomes and used store purchased food more than people in the east.

National Nutrition Survey 1982/83

49 families from 7 villages were asked in February or May 1983 what they had eaten the previous day. 67 per cent reported eating sago, 65 per cent banana, 14 per cent cassava, 10 per cent sweet potato, 6 per cent yam, 2 per cent coconut, 2 per cent taro and none Chinese taro. 12 per cent reported eating rice. 2 per cent reported eating fresh fish. This is similar to the crop pattern.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 4 **Subsystem No.** 1 **of** 1

Districts 3 Balimo, 4 Nomad, 5 Kiunga **Subsystem Extent** 100 % **Area (sq km)** 2670
Population 10,933 **Population density** 4 **persons/sq km** **Population absent** 12 **%**

System Summary

Located in the area west of the Fly River and north of the Fly-Ok Tedi junction to the Indonesian border; in very small patches from Kiunga, east to Debepari station on the west bank of the Strickland River; and south of Mt Bosavi near Wawoi Falls airstrip. Sago is the most important food and agriculture is less important. Fallow vegetation is tall woody regrowth, generally more than 30 years old. It is cleared without burning. Banana is an important crop; other crops are taro, sweet potato and cassava. All crops are planted into the fallen litter. Only one planting is made before fallowing. Hunting and fishing provide important sources of food. Breadfruit, okari and marita pandanus are common in fallows.

Extends across provincial border to System(s) None

Altitude range (m) 60-150 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Banana
STAPLES PRESENT	Banana, Cassava, Sago, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Corn, Cucumber, Highland pitpit, Lowland pitpit, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
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	5 (very low)

GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	None
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	Minor
2 Crocodile	Minor
3 Fresh food	Minor
4 Rubber	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION

Survey description

In June 1979, garden visits along the Kiunga-Rumginae road, near Kungim and Tarakbits villages and Ningerum station. In May 1992, road traverses and garden visits from Kiunga to Ningerum and Tabubil. Information on the Debepari area was collected at Nomad, but the area was not visited; the area was inspected from the air. The Wawoi Falls area was not visited; information was collected from informants at Bosavi, and taken from Wood (1982).

Boundary definition

The northern boundaries of the western part of the system were identified by road traverses from Kiunga to Tabubil; from visits to the Kungim and Tarakbits areas; and from Ulijaszek (1992). This boundary with System 0103 occurs at about the 150 m contour. This contour, and the Kiunga to Telefomin walk, were used to define the boundary. The southern boundary with System 0107 follows Saunders (1993). Boundaries with Systems 0105/0709 and 0106 in the eastern part of the system were identified from aerial survey (Kiunga-Nomad-Honinabi) and interviews in the Nomad area. The Wawoi Falls area (south of Mt Bosavi) was not visited and is included on the basis of interviews at Bosavi station and Wood (1982).

Notes

This system is distinguished from Systems 0103, 0105/0709 and 0106 by the relative importance of banana and sago in these systems. In the two systems to the east (0105/0709 and 0106), fallow vegetation is cut onto planted crops. The banana garden/root crop garden distinction of the systems to the east (0105, 0106) is not found in this system.

Wood (1982, 49) described separate sweet potato gardens, with mounds, in the eastern part of the system. In most cases undergrowth is cleared, trees are felled and crops are planted into the litter. Occasionally trees are felled after planting, in particular during drier than usual weather so that the trees provide initial shade. Fallow vegetation is usually not burnt.

Sweet potato is usually planted without mounds, but occasionally mounds between 30 and 40 cm high are used. Taro appears to be more important in the Wawoi Falls area than in the Kiunga area. The altitude in the Wawoi Falls area (300-650 m) is higher than that in the Kiunga area (60-150 m). Frodin and Hyndman (1982, 333) report that nuts from self-sown Canarium spp. are eaten in the Awin language area.

Hunted game includes pigs, cassowary, birds, lizards, kapul (tree kangaroos, possums and bandicoots) and snakes. In the area between Kiunga and Ningerum to the Indonesian border, the settlement pattern has changed significantly since about 1950. Previously settlements were sited on rivers and access was by canoe. Most settlements have moved from the rivers to the Kiunga to Tabubil road and feeder roads. People have better access to urban markets here than in the east and they sell small amounts of food at Kiunga, Tabubil, Ningerum, Rumginae and on the roadside. Rubber was introduced during the 1960s and 1970s. Production fell sharply from 1989 because of a fall in price. Small quantities of plumes and crocodiles are sold.

National Nutrition Survey 1982/83

188 families from 17 villages were asked in February or May 1983 what they had eaten the previous day. 87 per cent reported eating sago, 69 per cent banana, 15 per cent sweet potato, 5 per cent coconut, 3 per cent taro, 1 per cent cassava, 1 per cent Chinese taro and 1 per cent yam. 26 per cent reported eating rice. 19 per cent reported eating fresh fish. This is similar to the crop pattern.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 5 **Subsystem No.** 1 **of** 1

Districts 4 Nomad **Subsystem Extent** 100 % **Area (sq km)** 658
Population 2,077 **Population density** 3 **persons/sq km** **Population absent** 1 **%**

System Summary
Located near the Tomu River, west of Mt Bosavi; and east of Nomad station, between the Nomad River and the Rentoul River. Most of the system is in Western Province with a small extension into Southern Highlands Province. Tall woody regrowth, more than 25 years old, is cultivated using two methods. The first involves clearing beneath the trees and planting bananas with some taro. The trees are then felled on top of the crops. There is no burning and little fencing. In the second method, trees are felled and burnt and the gardens are strongly fenced. Root crops are planted in these gardens. The fallows used for these two types of gardens are similar in age and type. Banana is the most important crop; sago is an important food; other crops are taro, yam (D. alata), Chinese taro and sweet potato. Only one planting is made before fallowing. Breadfruit trees and marita pandanus are very common in fallows.

Extends across provincial border to System(s) 0709

Altitude range (m) 100-200 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Sago
STAPLES PRESENT	Banana, Chinese taro, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta), Taro (Amorphophallus)
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (winged), Ginger, Highland pitpit, Kumu musong, Lowland pitpit, Rungia, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
NUTS	Breadfruit, Okari
NARCOTICS	Tobacco, Kava

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	None
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 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION

Survey description

In May 1992, a transect by vehicle from Nomad to Tiambi and Honabi villages in Western Province; and a transect on foot from Nomad to Sakobi village (north of Nomad towards Honabi station) (2 days). The small part of this system which extends into Southern Highlands Province was not visited.

Boundary definition

The eastern boundary with System 0708 is based on interviews near Nomad and proximity to the Tomu River. The boundaries with Western Province Systems 0103 and 0106 were identified on a road traverse from Nomad to Mogulu station and Adumari village; foot traverses from Nomad to Sakobi village and Mogulu to Gogoyebi village; a satellite image (Landsat 5 TM Band 4 WRS D099-064 Quad 3, 30 December, 1990); Knauft (1985); and van Beek (1987). The southern part of this system (Tomu River area) was not visited, and is included on the basis of interviews at Nomad. The boundary with System 0104 south of the Tomu River area is based on interviews at Bosavi station and Wood (1982).

Notes

There are two types of gardens in this system. These are firstly, the smaller and fenced root crop gardens; and secondly, the larger, unfenced banana gardens. Fallow vegetation and fallow period are similar in both garden types. This contrasts with System 0106 where the root crop gardens follow fallows of shorter duration. The people using both systems acknowledge the difference and explain that pressure on land in System 0106 is greater and thus less forest is available. The change in fallow type is clearly discernible from the air and on satellite images. Fallow periods for both types of gardens are long (greater than 25 years). Prior to colonial contact, the Bedamini (Biami) people, who occupy System 0106, were actively expanding and encroaching upon this system. This system is distinguished from Systems 0708 and 0104 where sago is the most important food; and from System 0103 to the west where banana and sago are the most important crops.

Sago is processed from both planted and managed wild stands. Gardens and settlements (longhouses) are located near sago stands, and are moved relatively frequently. Information on planting seasonality is limited. However, van Beek (1987) and Knauft (1985) suggest that clearing and planting of banana gardens begins in September and is usually completed by December. Root crop gardens are made all year round, but yams are normally planted around September.

Most people using this system have access to the market at Nomad airstrip and sell animal products, food and firewood there.

National Nutrition Survey 1982/83

62 families from 7 villages were asked in February or March 1983 what they had eaten the previous day. 100 per cent reported eating sago, 3 per cent banana, and none yam, taro, Chinese taro, coconut, sweet potato or cassava. None reported eating rice. None reported eating fresh fish. This differs from the crop pattern with unexpectedly high sago consumption, and low banana consumption.

Main References

Knauft, B.M. 1985 Good Company and Violence: Sorcery and Social Action in a Lowland New Guinea Society. Berkeley, University of California at Los Angeles Press.

Other References

Knauft, B.M. 1987 Managing sex and anger: tobacco and kava use among the Gebusi of Papua New Guinea. In Lindstrom, L. (ed), Drugs in Western Pacific Societies: Relations of Substance. ASAO Monograph No. 11. Lanham, University Press of America, 73-98.
van Beek, A.G. 1987 The way of all flesh: hunting and ideology of the Bedamuni of the Great Papuan Plateau (Papua New Guinea). PhD thesis, University of Leiden, Leiden.
Wood, M. 1982 Kamula social structure. PhD thesis, Macquarie University, Sydney.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 6 **Subsystem No.** 1 **of** 2

Districts 4 Nomad **Subsystem Extent** 75 % **Area (sq km)** 288
Population 2,185 **Population density** 8 **persons/sq km** **Population absent** 1 **%**

System Summary
Located around the Mogulu airstrip, between the Hamaua River to the north and the Alagumia River to the south. Two subsystems occur, one which involves the cultivation of tall, older forest with bananas; and the other the cultivation of root crops in lower, younger woody regrowth. For the entire system, banana is the most important crop; sago, taro and yam (D. esculenta) are important crops. In this subsystem, the undergrowth beneath tall woody regrowth, generally more than 30 years old, is cleared and planted with banana and other crops. Shortly after planting, the trees are felled onto the crop. There is no burning. Only one planting is made before fallowing. Banana is the most important crop; taro and sago are important crops. Breadfruit, okari and marita pandanus are very common in fallows.

Extends across provincial border to System(s) None

Altitude range (m) 200-600 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Sago, Taro (Colocasia)
STAPLES PRESENT	Banana, Sago, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (winged), Ginger, Highland pitpit, Kumu musong, Lowland pitpit, Rungia, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
NUTS	Breadfruit, Okari
NARCOTICS	Tobacco, Kava

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	None
CROP SEGREGATION	None
CROP SEQUENCES	None
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	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION

Survey description

In May 1992, traverse by road from Nomad station to Mogulu station and from Mogulu to Adumari village (2 days). Traverse on foot from Mogulu to Gogoyebi village.

Boundary definition

The boundary with System 0105/0709 was identified on a road traverse from Nomad to Mogulu station and Adumari village; a foot traverse from Mogulu to Gogoyebi village; a satellite image (Landsat 5 TM Band 4 WRS D099-064 Quad 3, 30 December, 1990); and Knauft (1985) and van Beek (1987). The boundary with System 0109/0707 is based on a walking traverse from Komo to Bosavi station, Southern Highlands; differences in altitude (500 m contour); and interviews.

Notes

This system is distinguished from System 0105/0709 where both banana and root crop gardens follow tall woody regrowth fallows, more than 25 years old. It is distinguished from System 0109/0707 where sweet potato is the most important crop.

This system is used largely by the Biami people who were expanding their territory prior to colonial contact. They remain a relatively rapidly growing population in this area. This system exhibits two fallow cycles, one within the other. The first cycle is identified as Subsystem 1. Tall forest, at least 30 years old, is cleared for banana/taro gardens. The trees are felled on the young bananas and the gardens are unfenced. Pigs can forage in these gardens and some crops are planted specifically for pigs.

The second cycle is identified as Subsystem 2. Between 5-10 years later, the same site is cleared again. All vegetation is cut down, some of it is burnt and some removed by hand into heaps. While a few bananas and taro are grown around the heaps, most of these gardens are devoted to yam, sweet potato, cassava, Chinese taro, taro and Amorphophallus taro. These gardens are heavily fenced to keep out pigs. The second cycle involving root crops is probably derived from a simpler banana garden system. This pattern of unfenced, unburnt, trees-felled-on-crop banana gardens and fenced, felled, burnt and cleared root crop gardens occurs to the west (System 0105). It is also found to the east in the Southern Highlands, between Mt Sisa and Mt Bosavi (System 0707).

Information on planting seasonality is limited. However van Beek (1987, 21) states that the larger communal banana gardens tend to be cleared from September to October. Planting is completed by December. The smaller root crop gardens are not planted seasonally. Settlements (longhouses and increasingly villages) were previously moved frequently, but are becoming more permanent. Household gardens contain very small areas of mounded sweet potato and greens. Van Beek (1987, 20, 23) reports that self-sown Canarium spp. trees, of which the nuts are eaten, are left standing when gardens are cleared; breadfruit and okari trees are similarly left standing, but are also planted near gardens and villages. Sago and bananas are sold at Mogulu station. Chillies have been sold for cash but are presently not grown.

National Nutrition Survey 1982/83

32 families from 2 villages were asked in February or March 1983 what they had eaten the previous day. 97 per cent reported eating sago, 13 per cent sweet potato, 13 per cent banana, and none cassava, coconut, taro, Chinese taro or yam. 3 per cent reported eating rice. 3 per cent reported eating fresh fish. This differs from the crop pattern with unexpectedly high sago consumption and low banana, taro and yam consumption.

Main References

van Beek, A.G. 1987 The way of all flesh: hunting and ideology of the Bedamuni of the Great Papuan Plateau (Papua New Guinea). PhD thesis, University of Leiden, Leiden.

Other References

Knauft, B.M. 1985 Good Company and Violence: Sorcery and Social Action in a Lowland New Guinea Society. Berkeley, University of California at Los Angeles Press.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 6 **Subsystem No.** 2 **of** 2

Districts 4 Nomad **Subsystem Extent** 25 %

System Summary

In this subsystem, short woody regrowth, 5-10 years old, following previous banana gardens (Subsystem 1), is cut down. Some of the cut vegetation is burnt and some is heaped. A number of root crops are planted. Yam (D. esculenta) is the most important. Other crops are taro, Chinese taro, yam (D. alata), sweet potato, cassava and Amorphophallus taro. Only one planting is made before fallowing.

Extends across provincial border to System(s) None

Altitude range (m) 200-600 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Sago, Yam (D. esculenta)
STAPLES PRESENT	Cassava, Chinese taro, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta), Taro (Amorphophallus)
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (winged), Ginger, Highland pitpit, Kumu musong, Lowland pitpit, Rungia, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
NUTS	Breadfruit, Okari
NARCOTICS	Tobacco, Kava

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	None
CROP SEQUENCES	None
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	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	None
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
MOUNDS	Minor
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	None

OTHER DOCUMENTATION
None

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 7 **Subsystem No.** 1 **of** 1

Districts 2 Morehead, 4 Nomad, 5 Kiunga **Subsystem Extent** 100 % **Area (sq km)** 11461
Population 7,414 **Population density** 1 **persons/sq km** **Population absent** 17 **%**

System Summary
Located along the middle reaches of the Fly River from north of Lake Murray to Suki Lagoon in the south. Sago is the most important food, with agriculture of little significance. Hunting (pig, wallaby, cassowary, deer) and fishing are major sources of food. Gardens do not appear to be made by all people every year. At the northern end of Lake Murray, gardens are made in tall forest after fallows of over 15 years. Only one planting is made before fallowing. Small gardens are also made along the levee banks of the Fly River for several kilometres above the Strickland junction. Triploid banana is common in these gardens.

Extends across provincial border to System(s) None

Altitude range (m) 20-50 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Cassava, Sago, Sweet potato, Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Corn, Kangkong, Pumpkin fruit, Pumpkin tips, Tulip
FRUITS	Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Potus nuts
NARCOTICS	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	None
CROP SEGREGATION	None
CROP SEQUENCES	None
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 Crocodile	Significant
2 Fish	Minor
3 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 7 **Subsystem No.** 1 **of** 1

OTHER DOCUMENTATION

Survey description

In May 1992, for the Lake Murray area, an aerial traverse Obo-Bosset-Lake Murray. Two hours were spent at Obo village, interviewing and visiting banana gardens along the bank of the Fly River. Household gardens were inspected and interviews done at Bosset village. Small forest gardens at Lake Murray were inspected from the air (1 day).

Boundary definition

Based on an aerial survey Kiunga-Lake Murray-Bosset-Obo; and visits to Obo and Bosset villages. No significant land use is identifiable in this system from air photo interpretation (Saunders 1993). The system boundaries were determined by population distribution.

Notes

This system is distinguished from System 0104 where agriculture is somewhat more important. It is quite distinct from System 0110 to the south where yam is the most important crop.

It is possible that the small amount of agriculture seen in this system is a recent development. At Obo village for example, it was said that no gardens were made previously (in the time of the present adult generation's grandparents). It is claimed that more gardens are made now due to pressure on sago. Some of the banana gardens along the levee banks of the Fly (for several kilometres above the Fly-Strickland Junction) were made before 1976 and have become perennial. They can be flooded for up to three weeks at a time in some years (eg. in 1973, 1983 and 1986). The banana variety planted is an ABB triploid introduced from Irian Jaya, which tolerates flooding. Conversely, sago supplies can be disrupted by drought because of lack of water for processing (Busse 1987, 37-8). The banana gardens of the population at the northern end of Lake Murray (who are said to have migrated southwards from the Ningerum area) are made in tall woody regrowth. Lotus nuts are collected and eaten. Small household gardens are made after short grass fallows. Crops grown in them include sweet potato, yam, cassava, pineapple, watermelon, pawpaw and sugarcane. The sweet potato is planted in mounds 30-80 cm high and about 1 m in diameter. The yams are planted in November to January and harvested in September to October; watermelon is planted in September to October and harvested in December to January. Live crocodiles and skins are sold to traders; barramundi fish is sold to traders, and frozen for transport to Tabubil.

In the late 1920s Williams (1937, 41) considered that sago was the main food of the people (Wiram) at Suki, and described their gardening as being 'of very little account'. He recorded that they grew a poor quality betel nut, but in 1992 Morehead informants said that betel nut was not currently grown or used at Suki.

National Nutrition Survey 1982/83

82 families from 4 villages were asked in March or July 1983 what they had eaten the previous day. 85 per cent reported eating sago, 28 per cent banana, 2 per cent taro, 2 per cent coconut, 1 per cent cassava, and none sweet potato, Chinese taro or yam. 9 per cent reported eating rice. 61 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

Busse, M.W. 1987 Sister exchange among the Wamek of the Middle Fly. PhD thesis, University of California, San Diego.
Williams, F.E. 1937 Papuans of the Transfly. Oxford, Clarendon.

Other References

Paijmans, K., D.H. Blake, P. Bleeker and J.R. McAlpine 1971 Land resources of the Morehead-Kiunga area, Territory of Papua and New Guinea. Land Research Series No. 29, Commonwealth Scientific and Industrial Research Organization, Melbourne.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 8 **Subsystem No.** 1 **of** 1

Districts 5 Kiunga **Subsystem Extent** 100 % **Area (sq km)** 176
Population 3,521 **Population density** 20 **persons/sq km** **Population absent** 0 **%**

System Summary

Located in the East Awin Refugee Relocation Area. This system was only 4 years old in 1992. When the camp was established, forest was felled and burnt where possible. It had probably not been used for at least 50 years. Short woody regrowth fallows are now generally used. In some gardens, a short fallow of about one year separates plantings. Sweet potato and banana are important crops; other crops are cassava, Chinese taro and taro. Some peanuts are grown in a rotation with sweet potato. Two, or sometimes more, plantings are made before fallowing. The soil is tilled before second and subsequent plantings. Sweet potato is planted in small mounds. There was no sago or coconut in the area when it was occupied, and these are being planted. The most important food is imported rice, provided by the United Nations High Commissioner for Refugees.

Extends across provincial border to System(s) None

Altitude range (m) 100-150 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Sweet potato
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Chinese cabbage, Corn, Cucumber, Kangkong, Lowland pitpit, Peanuts, Pumpkin tips, Bean (snake)
FRUITS	Sugarcane
NUTS	None
NARCOTICS	Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	Minor
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	2 plantings
R VALUE	40 (medium)

GARDEN SEGREGATION

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

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 Fresh food	Minor
2 Artifacts	Minor

OTHER AGRONOMIC PRACTICES

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

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 8 **Subsystem No.** 1 **of** 1

OTHER DOCUMENTATION

Survey description

In May 1992, a two hour visit by helicopter. Discussions were held with the agricultural advisor to the area, gardens visited, and a low level aerial inspection was made.

Boundary definition

The East Awin Refugee Relocation Area did not exist when the air photos used by Saunders (1993) were flown. The system boundaries are approximate and are based on a low-level helicopter survey.

Notes

This agricultural system is distinguished from the surrounding System 0104 because it does not include sago and is of very recent origin.

This area covers the East Awin Refugee Relocation Area for refugees from Irian Jaya. The Area is administered by the United Nations High Commissioner for Refugees (UNHCR). In 1992, there were 3000 residents. Most of the residents were not subsistence agriculturalists when they lived in Irian Jaya, but were urban dwelling teachers, public servants, tradespeople and professionals. The first settlers arrived in 1987 and forest began to be cleared in 1988. Some land has been cultivated several times since then, although in 1992 relatively large areas of land cleared of forest were not being cultivated.

An agricultural advisor is experimenting with ridging, mounding, tree planting, mulching and composting as means to maintain continuous cultivation. The Area does not have enough land available for shifting cultivation as it is practised in surrounding systems. However few of the refugees have adopted these more intensive practices because they hope they will eventually be allowed to leave the camp to take up their former occupations in towns. Some have begun using a sweet potato-peanut rotation; peanuts and sweet potato are segregated within gardens. In these gardens, the soil is tilled before second and subsequent plantings. Some garden sites have been planted with leguminous shrubs (leucaena and crotalaria). Some people dig up megapode nests and use them as compost (see also Dwyer and Minnegal 1990). Most sweet potato is grown in small mounds.

Contracts to supply fresh vegetables to the catering company supplying Ok Tedi Mining Ltd have been negotiated, and small amounts are being sold at Kiunga. Residents also sell paintings and carvings in Kiunga. However access to the Area is difficult; the road is in very poor condition and the Fly River is not bridged. The UNHCR provides the refugees with rice, tinned fish and clothing.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Kirsch, S. 1989 The Yonggom, the refugee camps along the border and the impact of the Ok Tedi mine. Research in Melanesia 13, 30-61.

Ulijaszek, S. and S.M. Welsby 1985 A rapid appraisal of the nutritional status of Irian Jaya refugees and Papua New Guineans undergoing severe food shortage in the North Fly region. Papua New Guinea Medical Journal 28, 2, 109-114.

Other References

Dwyer, P.D. and M. Minnegal 1990 Yams and megapode mounds in the lowland rain forest of Papua New Guinea. Human Ecology 18, 2, 177-185.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 9 **Subsystem No.** 1 **of** 1

Districts 4 Nomad **Subsystem Extent** 100 % **Area (sq km)** 57
Population 0 **Population density** 0 **persons/sq km** **Population absent** 0 **%**

System Summary
Located east of Nomad on the slopes of Mt Sisa (Haliago) above 500 m. Most of this system is located in Southern Highlands Province. Sweet potato is the most important crop; sago is an important food; other crops are taro, cassava, banana, Chinese taro and yam (D. alata). The undergrowth beneath tall woody regrowth, more than 15 years old, is cleared. Two types of gardens are made. In the first, which covers approximately 80 per cent of the land cultivated, the site is strongly fenced. Sweet potato is planted by dibbling and the trees are then felled on top of the crop. There is no burning. Cut vegetation is placed in large heaps within the fenced area. In the second type of garden, bananas and taro are planted and the trees felled on the crops. There is no burning or heaping of vegetation. Only one planting is made before fallowing. Household gardens are common. Marita pandanus is grown extensively in fallows.

Extends across provincial border to System(s) 0707

Altitude range (m) 600-1200 **Slope** Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	Sweet potato
STAPLES SUBDOMINANT	Sago
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata)
OTHER VEGETABLES	Aibika, Bean (winged), Cucumber, Highland pitpit, Lowland pitpit, Nasturtium spp., Peanuts, Pumpkin fruit, Rungia, Tulip
FRUITS	Marita pandanus, Pawpaw, Pineapple, Sugarcane
NUTS	Breadfruit
NARCOTICS	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	Very significant
CROP SEGREGATION	Minor
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 Animal skins	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	None
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	None
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	Very significant
SMALL MOUNDS	None
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	Very significant
SEASONAL MAIN CROPS	Minor
SEASONAL SEC'DARY CROPS	None

OTHER DOCUMENTATION

Survey description

In January 1993, a walking traverse from Komo station to Ludesa mission and Bosavi airstrip via Pobolei, Gunikamo and Waragu villages (3 days). The Western Province part of the system was not visited.

Boundary definition

The boundaries with Systems 0705 and 0708 are based on a walking traverse from Komo station to Bosavi airstrip via Pobolei, Gunigemo and Waragu villages. The western boundary with System 0106 is based on visits to the area of Mogulu mission, Western Province.

Notes

This is a low-intensity forest fallow system which contrasts with the more intensive systems in the Highland valleys to the north, such as System 0705, where sweet potato is grown in composted mounds. It is distinguished from System 0708 to the south, where sago is the most important food; and from System 0106 to the west where banana is the most important food.

This system has been studied in detail by Kelly (1977) at Gabulusado village and Dwyer (1990) at Pobolei and Nemisado villages. The system ranges in altitude from around 600 m to around 1200 m on the slopes of an extinct volcano. There is considerable variation in the relative importance of sweet potato and sago across this altitudinal range and between communities at similar altitudes. The contribution of sago to the starchy component of the diet is estimated to range between 32 and 60 per cent (Kelly 1993, 95). At higher altitudes sweet potato is a more important food than sago, and taro and bananas are minor crops. Hunting on the higher slopes of the mountain is very important. At lower altitudes sago, bananas and taro become more important and hunting less important, although still significant. Sweet potato gardens are stoutly fenced.

Kelly (1977, 47) argues that subsistence activities exhibit a marked seasonal pattern. Dwyer (1990, 157-169) finds similar patterns, but concludes they occur at different times in different communities and are not related to either the availability of game animals, nor the fruiting season of marita pandanus. They appear to occur for social reasons. Wild karuka nuts are gathered irregularly from the upper slopes of Mt Sisa (Dwyer 1990, 220). Although okari trees almost certainly grow at lower altitudes in the western part of the system, they were not observed around Pobolei or Nemisado villages by Dwyer (pers. comm., 1995).

This is an isolated area with no road connections and no airstrips. The Etoro people have historical trading relations with the Huli to the north (Systems 0704, 0705, 0706) and the Onabasulu and Kaluli to the south (System 0708).

No population is assigned to this system because all census points are located in the Southern Highlands.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 10 **Subsystem No.** 1 **of** 1

Districts 2 Morehead **Subsystem Extent** 100 % **Area (sq km)** 425
Population 3,582 **Population density** 8 **persons/sq km** **Population absent** 11 **%**

System Summary

Located throughout the Morehead district. Parts of this system are inundated annually. Gardens are cut in tall woody fallows, more than 15 years old. Large trees may be ringbarked and left standing to provide shade. Cut material is burnt. Yam (D. esculenta) is the most important crop; cassava and coconut are important crops; other crops are yam (D. alata), sweet potato, sago, taro, banana and Chinese taro. Typically only one planting is made before fallowing. Along the Bensbach River wetlands, gardens are frequently made on the site of prehistoric ditch and mound systems. In these gardens, yams are planted on the mounded beds, taro and banana in the ditches between them. Cassava is usually planted apart from yam in separate garden sections. In the Bensbach area, some small taro gardens are made in grassland. As the annual high water recedes in July and August, dry season gardens planted with sweet potato and watermelon are made by some villages on the flood banks of the Bensbach River. Uprooted weeds are placed as mulch on and between yam mounds. In the grassland taro gardens, cleared grass is laid over the soil surface. Yam and sweet potato are usually planted in small mounds; yam (D. esculenta and D. alata) is staked. Yam gardens are planted seasonally between November and January. Household gardens are common. Hunting (wallaby and deer particularly) and fishing are very important food sources.

Extends across provincial border to System(s) None

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

CROPS

STAPLES DOMINANT	Yam (D. esculenta)
STAPLES SUBDOMINANT	Cassava, Coconut
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (common), Corn, Cucumber, Peanuts, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Guava
NUTS	Breadfruit, Candle nut, Java almond, Okari
NARCOTICS	Tobacco, Kava

FALLOW & CROPPING PERIOD

FALLOW TYPE	Savanna
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	Minor
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	Minor
INORGANIC FERTILISER	None

CASH EARNING ACTIVITIES

1 Chillies	Minor
2 Crocodile	Minor
3 Fresh food	Minor
4 Rubber	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Significant
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	Minor
MULCHING	Significant
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	Minor
Other Features:	
FENCES	Very significant
STAKING OF CROPS	Very significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION

Survey description

In May 1992, flew Daru-Morehead-Bensbach; boat from Bensbach to Balamuk on the Bensbach River; interviews and garden visits at Balamuk and Wando villages; by boat and foot from Balamuk to Bensbach; flew Bensbach to Morehead; drove Morehead to Mata village through Garaita village gardens. Viewed gardens along road; garden inspections at Mata; drove Mata to Rouku village and inspected gardens (4 days). Inspected area east of Mata by air en route from Morehead to Wipim airstrip in adjoining System 0112.

Boundary definition

The northern boundary with System 0107 is based on interviews in the Bensbach and Morehead areas; locations of agricultural land use mapped by Saunders (1993); and Williams (1937). The eastern boundary with Systems 0112, 0111 and 0113 is based on interviews in the Oriomo and Pahoturi River areas; locations of agricultural land use mapped by Saunders (1993); aerial inspection between Morehead and Wipim station; Archbold and Rand (1940) for the boundary with System 0111; and Beaver (1920) for the boundary with System 0113.

Notes

This system is distinguished from System 0107 to the north where sago is the most important food and gardening is of minimal importance; from System 0111 where both savanna and tall grass fallows are used; from System 0112 where sago is the most important food; and from System 0113 where subsistence is based on marine exploitation.

The use of old mound and ditch systems in the Bensbach area is described by Williams (1937, 218, fn 1), and mapped by Harris and Laba (1982) and Swadling (1983, 26-8). In 1992 it was observed at Wando and Balamuk, and reported for other villages further north on the Bensbach River. Williams' account appears to differ from observations in 1992 in two respects. His implication that people were currently making, rather than using, such improvements was not confirmed. Secondly, in 1992 taro was normally planted with banana in the ditches, not on the mounds, as indicated by Williams. During the survey in May 1992, the water level on the Bensbach River was still too high for the dry season, flood bank gardens to have been made, and only the top of the previous year's light fencing was visible above the water. Villages making such gardens include Balamuk, Wando, Bundabar and Weam.

The significance of yam as the most important crop of the Morehead area (in contrast to taro inland of the Kiwai coast, and sago to the east) was noted by Beaver (1920, 88). It was also reported for the Mai Kussa River area in the south-east by Archbold and Rand (1940, 178-9). Williams (1937, 7, 220) noted that sago was only plentiful towards the Fly River in the north (Suki): elsewhere it was rare and valued. All sago in the Morehead area is said to be planted. Occasionally, cassava is replanted either after a yam crop or following an initial cassava crop. This occurs especially in gardens near villages, for instance in the Morehead-Garaita area. It is not a new practice: a yam-cassava succession was reported in the 1930s (Williams 1937, 218). A triploid banana ('Derwaki'), originating from Irian Jaya, is increasingly important: it is said to be very vigorous, and tolerant of climatic extremes. French (1986, 15, 197, 299, 315, 326) reported the minor use of Operculina sp., a tuber-bearing vine, in yam gardens near Arufi village; as well as Semecarpus sp., a cultivated nut tree at Arufi, and a number of wild foods.

In 1992, kava cultivation was said to be restricted to villages west of Morehead: Wereave, Weam, Kandarisa, Mengete, Indorodoro and Tokwa. Around Morehead, some separate yam (D. alata) gardens are made; and banana is sometimes planted in separate sections within yam (D. esculenta) gardens. Household gardens are very common, ranging from plots of tobacco to mixed plantings of several crops. It is said that the grass is laid as mulch in the small taro gardens in the Bensbach area to keep the ground "cold"; presumably to retain soil moisture. Both the practice, and the rationale, are similar in Systems 0111 and 0112.

Income sources are generally minor and vary both by location and over time. In the Bensbach area, tourism at the Bensbach Lodge (when operating) has provided most income in the form of fish royalties and employment. Fresh food sales, including significant meat from hunted animals, are a minor source both at Bensbach and Morehead. Small quantities of rubber and chillies have been sold in recent years, and some people sell crocodile skins.

National Nutrition Survey 1982/83

37 families from 5 villages were asked in February or March 1983 what they had eaten the previous day. 73 per cent reported eating yam, 41 per cent sago, 14 per cent cassava, 5 per cent coconut, 5 per cent sweet potato, 3 per cent banana, and none taro or Chinese taro. 38 per cent reported eating rice. 24 per cent reported eating fresh fish. This is similar to the crop pattern except for the higher than expected sago consumption.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 11 **Subsystem No.** 1 **of** 2

Districts 1 Daru **Subsystem Extent** 50 % **Area (sq km)** 167
Population 2,798 **Population density** 17 **persons/sq km** **Population absent** 45 **%**

System Summary

Located in a narrow lowland strip on the south coast of the Oriomo region and in the lower reaches of the Pahoturi and Binaturi Rivers. There are two subsystems, each covering an estimated half of the system. For the entire system, yam (D. esculenta) and taro are the most important crops; banana and coconut are important crops. Sago is either not available, as in Togo and Waidoro villages, or is said to be of little importance. In subsystem 1, fallows of savanna and tall woody regrowth, more than 15 years old, are cleared. Larger trees are ringbarked and cut material is burnt. Yam (D. esculenta) is usually the most important crop, though possibly less so towards the east. Banana and coconut are important crops; other crops are yam (D. alata), cassava, taro, Chinese taro, Amorphophallus taro, sweet potato and sago. Only one planting is made before fallowing. Yam (D. esculenta and D. alata) is planted in small mounds and grown on stakes. Gardens are cleared between August and September, and planted from September to December. Household gardens are common.

Extends across provincial border to System(s) None

Altitude range (m) 0-30 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Yam (D. esculenta)
STAPLES SUBDOMINANT	Banana, Coconut
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta), Taro (Amorphophallus)
OTHER VEGETABLES	Aibika, Bean (common), Bean (winged), Corn, Lowland pitpit, Peanuts, Pumpkin tips, Bean (snake)
FRUITS	Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Guava, Soursop
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco, Kava

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

GARDEN SEGREGATION	Minor
CROP SEGREGATION	Minor
CROP SEQUENCES	Minor
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	Minor
INORGANIC FERTILISER	None

CASH EARNING ACTIVITIES

1 Fresh food	Significant
2 Betel nut	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	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Significant

OTHER DOCUMENTATION

Survey description

In May 1992, a boat traverse from Daru to Warmorun station on the Pahoturi River; boat from Warmorun to Kunini village via Kulilai (Togo) village; meetings and garden inspections at Warmorun, Togo and Kunini (3 days).

Boundary definition

The western boundary with System 0110 was based on interviews in the Pahoturi River area; and Archbold and Rand (1940, 178-9). The southern boundary with System 0113 was based on a boat traverse from Daru to the Pahoturi River; interviews in the Pahoturi and Oriomo Rivers area; and Eley (1988). The northern boundary with System 0112 was based on a boat traverse on the Oriomo River; interviews in the Pahoturi River and Oriomo Plateau areas.

Notes

This system is distinguished from System 0110 where grass fallows are not used; from System 0112 where sago is the most important food; and from System 0113 where subsistence is based on marine exploitation.

The estimate of 50 per cent coverage by each of the subsystems is based on observation and on Laba (1974, especially Fig. 6). Laba (1974, 3, 14) implied that Waidoro villagers preferred to use woody regrowth fallows, but that their location in relation to suitable grassland resulted in greater use of grassland. Eden (1988, 154) reported that the use of grassland was more common at Kunini village. The significance of taro has probably varied between locations and over time. It appears that taro is more important in the east of the system (Waidoro to Kunini villages), with yam more significant in the west along the Pahoturi River. Taro may have declined in significance due to disease in the 1960s and 1970s, with sweet potato gaining importance, at least at Waidoro up to the mid 1970s. However a survey of crop composition patterns in 7 gardens at Kunini village showed that taro predominated and was almost a monocrop in some new gardens (Eden 1988, 132-3). After the yam harvest, banana and cassava predominate in gardens. It is said that more cassava is planted following the yam harvest. Yams are typically planted in small mounds about 20 cm high and 70 cm diameter. Kava used to be cultivated in some villages (Laba 1974, 6). Although it was not seen in 1992, it was photographed at Ume village a few years earlier growing on specially shaded beds in savanna woodland (Lebot et al. 1992, 30-31, 88-89; and pers. comm. 1993).

Sales of fresh food, including coconut, taro, watermelon and oranges, at Daru market are significant. Betel nut sales provide a minor source of income. Small amounts of fish are sold. Rubber is grown, but was not being tapped for sale in 1992.

National Nutrition Survey 1982/83

50 families from 2 villages were asked in March or June 1983 what they had eaten the previous day. 62 per cent reported eating coconut, 60 per cent banana, 60 per cent sago, 14 per cent yam, 6 per cent taro, 4 per cent sweet potato, 2 per cent cassava and none Chinese taro. 48 per cent reported eating rice. 34 per cent reported eating fresh fish. This differs from the crop pattern with yam consumption unexpectedly low and both sago and banana consumption higher than expected.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 11 **Subsystem No.** 2 **of** 2

Districts 1 Daru **Subsystem Extent** 50 %

System Summary

In this subsystem, after a long fallow of more than 20 years, grass is cut with knives and heaped, the ground is tilled with hoes, and the cut grass is laid over the ground as mulch. Taro is the most important crop; coconut is an important crop; other crops are banana, cassava, yam (D. esculenta) and sweet potato. Sweet potato may be planted in separate gardens. Taro is planted in holes made with a digging stick. Other crops are either planted on garden edges where the soil is drier (yam and cassava) or, in the case of aibika and sugarcane, amongst the taro. Only one planting of taro is made before fallowing, but sugarcane plants may be maintained in old taro gardens as a monoculture. Cultivation is seasonal with gardens cleared between August and September, and planted between September and December. Where land is wetter, there is no tillage: grass is cut and burnt, and taro setts are planted directly with a digging stick. At Waidoro village, areas of relict, prehistoric raised beds and ditches are used in low lying wetter areas for these gardens.

Extends across provincial border to System(s) None

Altitude range (m) 0-30 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Taro (Colocasia)
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (Colocasia), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Bean (common), Bean (winged), Corn, Lowland pitpit, Peanuts, Pumpkin tips, Bean (snake)
FRUITS	Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Guava, Soursop
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco, Kava

FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall grass
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	Significant

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fresh food	Significant
2 Betel nut	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Significant
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Minor
TILLAGE	Significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	Very significant
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	Significant
Other Features:	
FENCES	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Significant

OTHER DOCUMENTATION

Notes

This subsystem is used in low-lying grasslands which are flooded each year. The floods deposit silt which presumably fertilises the soil.

For subsystem 2, Barham and Harris (1985, 267) described the raised mound beds at Waidoro village as rectilinear, ranging from 16-20 m in length to 9-11 m in width, with surfaces averaging 40 cm above the bottom of the ditches. Between January-August, the ditches are normally full of water. They emphasised that no mound construction had taken place in living memory, although ditches were occasionally cleaned out and the infill spread on the mound surfaces. Relict systems examined by them showed deeper ditches (1-1.6 m). The extent of the relict systems 'demonstrate that mound-and-ditch cultivation was much more widely practised' in the past (ibid., 272). In the Kunini village area, observations in 1986 (Eden 1988) and in 1992 showed that shallow ditches (about 30 cm deep) and slightly raised mounds were still regularly made. Laba (1974, 14, 16, Fig. 6) described separate sweet potato and taro gardens at Waidoro. In 1992 at Kunini, separate banana gardens were planted. In Waidoro taro gardens, yam and banana were planted along the garden edges (Laba 1974, 15). At Kunini, Amorphophallus taro was planted in separate sections. Cultivation is less seasonal than in subsystem 1. Plantings are made so as to exploit seasonal variation in soil moisture content as flood waters recede. Laba (1974, 15) distinguished between higher grassland gardens which were not planted seasonally, and lower ones which were. Drainage ditches are commonly made in irregular networks; they are shallow and are about 30 cm in depth and 50-100 cm wide. The soil from these ditches slightly raises the intervening soil beds of irregular size.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 12 **Subsystem No.** 1 **of** 1

Districts 1 Daru, 2 Morehead **Subsystem Extent** 100 % **Area (sq km)** 826
Population 3,153 **Population density** 4 **persons/sq km** **Population absent** 14 **%**

System Summary

Located in the inland area of the Oriomo Plateau. Sago, mainly planted, is the most important food. Gardens are made in both forested and grassland areas, but tall woody savanna regrowth, more than 15 years old, is favoured. Larger trees are ringbarked and left standing and other material is burnt. There is normally no tillage, and only one planting is made before fallowing. Of the garden crops, banana, coconut, taro and yam (D. esculenta) are important; other crops include yam (D. alata), sweet potato, Amorphophallus taro, Chinese taro, coconut and cassava. Yams (D. esculenta and D. alata), sweet potato and cassava are planted in small mounds. Yam (D. esculenta and D. alata) is grown on stakes. A minority of gardens are made in grassland. They tend to be smaller, and the soil is tilled and may be heaped into small raised beds similar to, but considerably smaller than, the relict ones in System 0111. Cleared grass is commonly laid on the soil as a mulch for taro cultivation in both woody savanna and grassland gardens. Cultivation is seasonal with gardens cleared between August and October, and planted mainly between November and February. Household gardens are common. Hunting and fishing are both important sources of food, with the significance of fishing varying with river access.

Extends across provincial border to System(s) None

Altitude range (m) 0-80 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Banana, Coconut, Taro (Colocasia), Yam (D. esculenta)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta), Taro (Amorphophallus)
OTHER VEGETABLES	Aibika, Amaranthus spp., Corn, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bamboo shoots, Bean (snake), Kalava
FRUITS	Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Watermelon, Guava, Soursop
NUTS	Breadfruit, Galip, 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	1 planting
R VALUE	5 (very low)

GARDEN SEGREGATION

GARDEN SEGREGATION	Significant
CROP SEGREGATION	Significant
CROP SEQUENCES	Minor
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 Crocodile	Minor
2 Fish	Minor
3 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Significant
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	Minor
MECHANIZATION	None
DEEP HOLING	Minor
MULCHING	Significant
SOIL RETENTION BARRIERS	Minor
Mounding Techniques:	
VERY SMALL MOUNDS	None
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	Minor
BEDS LONG	None
Other Features:	
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 July 1967, a one week rapid survey on foot and canoe from Wipim station to Kapal and Sanguanso villages. In May 1992, by air from Morehead to Wipim station; foot traverse from Wipim to Iamega village with garden inspections (half day); vehicle traverse Wipim-Kapal-Wonie with interviews and garden inspections (1 day); garden visits and interviews at Wipim (1 day); foot traverse from Wipim to Oriomo River; and by boat down river to Daru (1 day).

Boundary definition

The north-eastern boundary with System 0115 was based on interviews in the Oriomo Plateau and Wasua station areas. The western boundary with System 0110 was based on interviews in the Morehead and Oriomo Plateau areas; and an aerial inspection from Morehead to Wipim. The southern boundary with System 0111 was based on a boat traverse on the Oriomo River; interviews in the Pahoturi River and Oriomo Plateau areas; and on Beaver (1920).

Notes

This subsystem is distinguished from System 0115 where sago is the most important food and banana is grown in drained gardens; from System 0110 where yam is the most important crop; and from System 0111 where yam and taro are the most important crops.

The relative importance of sago and other crops varies widely. Some of the variation is apparently due to the availability of sago, some to location in terms of access to cash income (and hence purchased foods), and some to recent historical factors. For instance, between 1971 and 1981 sweet potato increased in importance at Wonie village (Ohtsuka et al. 1985, 346-7). During the 1992 survey, yam and taro seemed more common in gardens than indicated by Ohtsuka et al. (1985) and the 1982/83 National Nutrition Survey. Ohtsuka's survey showed that sago supplied 44-55 per cent of energy at a number of villages between 1971-81; and banana and taro provided 18 and 7 per cent respectively at Wonie village in 1971 (Ohtsuka et al. 1985, 346; Ohtsuka 1983, 118-9).

One garden area examined at Wipim village in 1992 showed an apparent sequence from forest to grassland, with two fallow 'cycles'. An area of forest had been cleared in about 1986, with large trees ringbarked, and planted with one crop of yam, taro and banana. It was then fallowed briefly for about 4 years, during which a grass/scrub regrowth fallow grew, before being cleared again. After the cut vegetation was burnt, the ground was tilled for a grassland-type taro garden with slightly raised beds, and shallow ditches. A similar sequence was seen near Iamega village, but it is not clear how common this is, or whether it is restricted to locations near villages.

In 1992 yams (D. esculenta and D. alata) and taro were frequently planted in separate gardens. In yam gardens, taro, sweet potato and Chinese taro were usually planted in separate sections. Yam (D. alata) is said to be planted in holes 30-60 cm deep which are refilled with loose soil.

Sales of fresh food, especially hunted game and sago, at Daru market are significant. Sales of crocodile skins and fish are also minor sources of income. Rubber is grown but was not being tapped for sale in 1992. Some sporadic income is derived from the sale of tree seed to CSIRO.

National Nutrition Survey 1982/83

51 families from 4 villages were asked in February or June 1983 what they had eaten the previous day. 94 per cent reported eating sago, 47 per cent coconut, 14 per cent sweet potato, 8 per cent taro, 6 per cent cassava, and none yam, banana or Chinese taro. 25 per cent reported eating rice. 22 per cent repoted eating fresh fish. This is similar to the crop pattern except for the lack of yam or banana consumption, and the higher than expected sweet potato consumption.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 13 **Subsystem No.** 1 **of** 1

Districts 1 Daru **Subsystem Extent** 100 % **Area (sq km)** 0
Population 1,157 **Population density** 0 **persons/sq km** **Population absent** 46 **%**

System Summary

The system extends along the south coastal fringe opposite Daru and Saibai islands, from Mabaduan village in the west to Parama village in the east. Subsistence is based on marine exploitation (dugong and turtles from reefs and ocean; fishing and shellfish collecting on the coast). Marine products are traded or sold to provide sago and rice which are the major starch foods. Agricultural land is limited. Sago used to be the major food source, imported from the area of Sui village and from Kiwai Island in the Fly Estuary. While sago is still important, purchased rice is probably now more important. Gardens probably provide less than one quarter of food consumed. Coconut is an important food. The crops grown in limited gardens are sweet potato, banana, cassava and taro. Gardens are mostly cleared in short woody regrowth, 5-15 years old. Fallow vegetation is cut, dried and burnt. There is minor use of fallows of short grass; the grass is pulled and used as mulch for taro in grassland gardens. The soil is tilled for taro and sweet potato cultivation. There is usually only one planting before fallowing.

Extends across provincial border to System(s) None

Altitude range (m) 0-50 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Taro (Colocasia)
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Bean (common), Cucumber, Highland pitpit, Lowland pitpit, Pumpkin tips
FRUITS	Coastal pandanus, Malay apple, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Guava
NUTS	Breadfruit
NARCOTICS	Tobacco, Kava

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	Significant
CROP SEGREGATION	Minor
CROP SEQUENCES	None
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	Very significant
2 Fresh food	Minor
3 Sea cucumber	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Minor
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	Significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	Minor
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	Minor
Other Features:	
FENCES	Very significant
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, boat surveys along system borders: three day trip from Daru to Mabaduan village, the Pahoturi River and east to Kunini village (System 0111); and a one day traverse from Daru via Kadawa village to Paewa village on the Oriomo River (System 0113). Discussions were held in Kadawa, the only village within the system visited; no gardens were inspected.

Boundary definition

No significant land use is identifiable from air photo interpretation (Saunders 1993). The boundaries with System 0111 were determined by the location of identified villages (Eley, 1988; 1990 census maps); boat traverses from Daru to the Pahoturi River and the Oriomo River; and interviews in the Pahoturi and Oriomo area. The boundary with System 0114 was based on interviews at Kadawa village; and evidence in Beaver (1920, 74-75) and Archbold and Rand (1940, 191).

Notes

This system is distinguished form System 0111 where yam and taro are the most important crops; and from System 0114 where sago is the most important food.

There are conflicting reports on the importance of agriculture. The major early account by Landtman (1927) refers to the period 1910-12, and it mixed information from both the Fly Estuary and the south coast. Harris (1977, 451) emphasised 'limited horticulture', while Eley's recent study (1988) focussed on marine activity. Landtman's study implied that agriculture, with sago production, was a major activity at the time and this has been repeated by Knauft (1993, 65). While agriculture may have declined in importance since Landtman's study, it is more likely that agriculture was previously less important than he implied. The recent relative unimportance of agriculture is underscored by the reported consumption data in the 1982/83 National Nutrition Survey. Taro is reported to be planted separately from other crops.

The importance of fishing for food and trade has frequently been stated. Beaver (1920, 69, 74-5) described the villages of Mawatta and Tureture as mainly dependent on fishing, the surplus of which they traded to inland villages such as Masingara. They also purchased their sago (especially Mawatta) from Kiwai Island. In 1936, Mabaduan village was described as having no sago, and people traded turtles for sago with Kiwai Islanders (Archbold and Rand 1940, 191). Tenakanai (1986, 42) recently described Kiwai people as spending more time fishing than gardening. Very high economic returns for turtle hunting in 1984-5 (over K60/day) were given by Prescott (1986, 110). In 1992 the major source of cash income was the sale of crayfish, turtles and baramundi, mainly in Daru. There were minor sales of fresh food; some sea cucumber is also collected and sold.

National Nutrition Survey 1982/83

35 families from 2 villages were asked in February 1983 what they had eaten the previous day. 60 per cent reported eating coconut, 26 per cent sago, 17 per cent banana, 6 per cent yam, 3 per cent sweet potato, 3 per cent taro, and none cassava or Chinese taro. 94 per cent reported eating rice. 20 per cent reported eating fresh fish. This is similar to the crop pattern except for the low consumption of sweet potato, taro and cassava.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 14 **Subsystem No.** 1 **of** 1

Districts 1 Daru, 3 Balimo **Subsystem Extent** 100 % **Area (sq km)** 4389
Population 7,323 **Population density** 2 **persons/sq km** **Population absent** 23 **%**

System Summary
Located on the islands of the Fly estuary and the shores of the estuary mouth, and the islands and shores of the Bamu estuary. Sago (both cultivated and wild) is the most important food. Agricultural land use is too insignificant for identification by aerial photography. Small gardens are made where land is suitable in tall woody regrowth, more than 15 years old. Fallow vegetation is cleared and burnt. One planting is made before fallowing. Crops planted include banana, coconut, taro, sweet potato, yam (D. esculenta and D. alata) and Chinese taro. Marine resources (fish, crocodile and turtle) are important foods.

Extends across provincial border to System(s) None

Altitude range (m) 0-30 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Chinese taro, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Cucumber, Lowland pitpit, Pumpkin tips
FRUITS	Pineapple, Sugarcane
NUTS	Breadfruit
NARCOTICS	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	Minor
CROP SEQUENCES	None
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 Fish	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Minor
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	Minor
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	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION

Survey description

No major locations in the Fly Estuary visited. In May 1992, visits to several bordering areas: the south coastal Kiwai region (opposite Daru island) by boat from Daru (System 0113); by vehicle from Balimo to Wasua on the north bank of the lower Fly in the inner estuary (System 0115); and by boat from Balimo to the Bamu estuary (Systems 0116, 0114).

Boundary definition

No significant land use is identifiable from air photo interpretation (Saunders 1993). The eastern boundary was defined arbitrarily as the Gulf Province border between the Gama and Turama Rivers. The south-western boundary with System 0113 was based on interviews at Kadawa village; and evidence in Beaver (1920, 74-75) and Archbold and Rand (1940, 191). The western boundary with System 0112 was based on interviews at Kadawa village and on the Oriomo River. The boundary in the Fly Estuary with System 0115 was based on interviews in the Oriomo Plateau area and at Wasua mission. The north-western boundary with System 0116 was based on a boat traverse on the Aramia and lower Bamu Rivers. The northern boundary on the Bamu River with System 0104 was based on Wood (1982).

Notes

This system is distinguished from System 0201 to the east where agriculture is often (but not always) more important than in this system. It is distinguished from System 0113 where there is minimal sago and agricultural production; from System 0112 where food gardens are made in tall woody savanna regrowth; from System 0115 where banana, grown in drained gardens, is an important crop; from System 0116 where gardens are made in short grass or tall woody regrowth fallows; and from System 0104 where banana is an important crop.

It is likely that only some families make gardens. As with System 0113, there are conflicting reports on the importance of agriculture. Landtman's early account (1927) gave a generalised picture for both the estuarine and southern coastal villages of Kiwai speakers which probably resulted in an overemphasis on garden cultivation. Recently, Knauft (1993, 65) relied heavily on Landtman for an account, which he extended through to the Goiribari area of Gulf Province (eastern Kiwai in his terminology). In contrast, Beaver's (1920, 69-75, 142, 154, 160-166) description of the estuarine system indicated very little cultivation. This is consistent with recent accounts (Hyndman 1982, 19, 24) and the 1992 survey.

Beaver (1920, 161) noted that sweet potato was 'always planted in bunches along rows of mounds, not on the flat as in some parts of Papua'. In 1992, yam (D. alata) were planted in mounds about 50 cm high in household gardens on the banks of the Aramia River. Yam (D. esculent and D. alata) is grown on stakes.

Sago surpluses are produced from some locations (eg. Kiwai island) for trade to other areas (eg. Mawatta and Tureture villages in System 0113) in exchange for fish and dugong, or cash. Other sources of cash income are fish and canoes.

National Nutrition Survey 1982/83

89 families from 7 villages were asked in January, February or June 1983 what they had eaten the previous day. 97 per cent reported eating sago, 30 per cent coconut, 8 per cent sweet potato, 7 per cent banana, 1 per cent cassava and none yam, taro or Chinese taro. 12 per cent reported eating rice. 46 per cent reported eating fresh fish. This is similar to the crop pattern.

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PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 15 **Subsystem No.** 1 **of** 2

Districts 1 Daru, 3 Balimo **Subsystem Extent** 75 % **Area (sq km)** 2501
Population 4,540 **Population density** 2 **persons/sq km** **Population absent** 25 **%**

System Summary

Restricted to the banks of the Fly River between approximately Lewada village (south bank, just west of Wasua station) and Domara village (north bank, east of Wasua). Sago is the most important food; banana and coconut are important crops. The agricultural component is divided into two subsystems. Subsystem 1 is based on drained gardens made on the banks of the Fly River, in which banana is the most common crop. Subsystem 2 includes two minor kinds of garden. In this subsystem, gardens are cleared from grass and woody regrowth, after fallows of 5-15 years, on the generally waterlogged banks of the Fly River and channels between 'islands' and the banks (as at Wasua). The vegetation is cut and burnt. Major drainage is necessary, consisting at Wasua of a channel about 2 m wide by 1.5 m deep, and small ditches running out of the gardens and intersecting the main channel at right angles. Banana (mostly triploid) is the main crop cultivated, and cultivation is semi-permanent, estimated as longer than 10 years. Other crops are sweet potato and taro. Silt from flooding is deposited on garden sites, but the frequency is unknown.

Extends across provincial border to System(s) None

Altitude range (m) 0-30 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Banana, Coconut
STAPLES PRESENT	Banana, Coconut, Sago, Sweet potato, Taro (Colocasia)
OTHER VEGETABLES	Aibika, Pumpkin fruit, Pumpkin tips, Tulip
FRUITS	Malay apple, Mango, Orange, Pineapple
NUTS	Breadfruit
NARCOTICS	Kava

FALLOW & CROPPING PERIOD

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	1 planting
R VALUE	50 (medium)

GARDEN SEGREGATION

GARDEN SEGREGATION	None
CROP SEGREGATION	None
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	Very significant
INORGANIC FERTILISER	None

CASH EARNING ACTIVITIES

1 Cattle	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Very significant
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
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 traverse by vehicle from Balimo to Wasua station and Dede village (1 day). At Dede visits were made to several banana gardens and sago places beside the Fly River and to a few grassland gardens away from the river; road visits to isolated Dede food gardens and rubber plantings belonging to both Adiba and Dede villagers.

Boundary definition

Locations of agricultural land use mapped by Saunders (1993) were used to define all boundaries. The northern boundary with System 0116 was based on a road traverse from Balimo to Wasua mission. The boundaries with Systems 0112 and 0114 was based on interviews at Wasua mission and in the Oriomo Plateau area.

Notes

This system is distinguished from Systems 0114 and 0116 where sago is the most important food and gardens are of minor significance; and from System 0112 where fallow vegetation is savanna.

The distinctive banana gardens have received much comment, but unfortunately have never been fully described. Beaver (1920, 142), referring to the area of Aduru village, spoke of 'the very heart of banana-growing country, and the huge areas under banana cultivation are the most striking features of the river for fully fifty miles. The gardens are laid out in squares with irrigation drains which enable them to be watered by the rise and fall of the tide, and the whole plantation resembles nothing so much as a gigantic chess-board'. He described the people as clearing new land every year, although each garden was cropped for some years. Except in exceptional circumstances, it seems unlikely that the ditches served an irrigation function (tidal irrigation on the Fly was also referred to by Mackay 1909, 177). Brandes (1929, 299) shows an aerial photograph of a Fly River garden, with six 'rows of banana plants growing on ridges separated by drainage ditches six feet deep'.

At Dede village in 1992, the diagnostic ditches drained either to the river, or to channels leading to the river. Both river and channels are still tidal here. The provincial government provides funds for channel maintenance. People reported concerns that the river has been affected by the Ok Tedi mine (water levels and quality, fish health, river banks and garden soils).

People travel to Daru market to sell banana, sago, coconut and other foods. Rubber was planted in the 1970s but has not been tapped for about 2 years due to low prices. In 1992 deer were reported to have crossed the Fly from the west in small numbers near Wasua station. There are approximately 26 cattle projects throughout this system, averaging 40 head per project. Sales provide a minor source of income. Fresh food sales at various markets also provide minor income.

National Nutrition Survey 1982/83

25 families from 2 villages were asked in February 1983 what they had eaten the previous day. 84 per cent reported eating sago, 76 per cent coconut, 52 per cent banana, 4 per cent yam, and none cassava, sweet potato, taro or Chinese taro. 12 per cent reported eating rice. 24 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

None.

Other References

Beaver, W.N. 1914 A description of the Girara District, Western Papua. Geographical Journal 43, 407-413.
Beaver, W.N. 1920 Unexplored New Guinea. London, Seeley, Service and Company.
Brandes, E.W. 1929 Into primeval Papua by seaplane. National Geographic Magazine 56, 3, 253-332.
Learoyd, D. 1985 Nutrition survey: Balimo/Wasua area: October-November 1985. Unpublished report, Balino Health Centre, Balino.
Mackay, K. 1909 Across Papua. London, Witherby.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 15 **Subsystem No.** 2 **of** 2

Districts 1 Daru, 3 Balimo **Subsystem Extent** 25 %

System Summary

In this subsystem, two kinds of gardens are made. For the first kind, tall woody regrowth (occasionally primary forest) is cleared after fallows of longer than 15 years and the vegetation is burnt. A mixture of banana, cassava, taro, yam (D. esculenta and D. alata) and sweet potato is planted in usually untilled soil. For the grassland gardens, short grass fallows, more than 15 years old, are cleared and burnt. The soil is tilled to make raised long beds, usually running down short slopes (as in the adjoining System 0116 to the north). The same mixture of crops is planted. Raised beds may also occasionally be made in the gardens cut in the woody regrowth fallow. Only one planting is made before fallowing.

Extends across provincial border to System(s) None

Altitude range (m) 0-30 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Coconut, Cassava, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Pumpkin fruit, Pumpkin tips, Tulip
FRUITS	Malay apple, Mango, Orange, Pineapple
NUTS	Breadfruit
NARCOTICS	Kava

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	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	None
INORGANIC FERTILISER	None

CASH EARNING ACTIVITIES

1 Cattle	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION
None

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 16 **Subsystem No.** 1 **of** 2

Districts 3 Balimo **Subsystem Extent** 75 % **Area (sq km)** 4720
Population 10,601 **Population density** 2 **persons/sq km** **Population absent** 26 **%**

System Summary

Located north of the lower Fly River estuary, in and around the Aramia River wetlands. Sago is the most important food. Gardens are of minor significance. Other crops include taro, yam (D. esculenta and D. alata), banana, sweet potato and cassava. Two subsystems are identified on the basis of fallow vegetation. This subsystem occupies about three quarters of garden area. Short grass, 5-15 years old, is cleared and burnt, the soil is tilled and heaped into long rectangular beds running up and down the ridges with drains on either side. Crops planted include yam (D. alata and D. esculenta), sweet potato, cassava and banana. Only one planting is made before fallow. Gardens are planted in October-January. Tree crops such as coconut and betel nut may be planted in the garden to mature after the annual crops have finished.

Extends across provincial border to System(s) None

Altitude range (m) 0-80 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Pumpkin fruit, Tulip
FRUITS	Pineapple, Sugarcane
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco, Kava

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

GARDEN SEGREGATION	Minor
CROP SEGREGATION	Minor
CROP SEQUENCES	None
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 Crocodile	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION

Survey description

In May 1992, boat traverses on the Aramia River over two days: from Balimo west to Awaba mission, and Balimo east to Emeti station on the Bamu River. Gardens inspected and interviews held at Kimama and Kawito villages en route to Awaba; and at Kala, Iuwo, Garu, Kenewa and Emeti villages along the Aramia and Bamu Rivers. One day vehicle traverse from Balimo to Wasua station on the north bank of the Fly River.

Boundary definition

The southern boundary with System 0115 was based on a road traverse from Balimo to Wasua mission. The eastern boundary with System 0114 was based on a boat traverse on the Aramia and lower Bamu Rivers. The northern boundary with System 0104 was based on interviews in the Balimo area and Wood (1982). The western boundary with System 0107 was based on population distribution; interviews in the Morehead and Lake Murray areas; and Williams (1937).

Notes

This system is distinguished from System 0115 where sago is the most important food and banana is grown in drained gardens and is an important crop; from System 0114 where sago is the most important food and gardens are of minor significance; from Systems 0104 and 0107 where fallow vegetation is tall woody regrowth.

Gardens are regarded as the responsibility of men. Women are responsible for sago processing and fishing. French (1986, 145, 261, 273, 293, 323) reported the consumption of wild waterlily seeds, and a number of minor cultivated fruit trees (Planchonella sp., Horsfieldia sylvestris, Canarium sp., Calamus sp.) from the Kawito area. In the early part of the century, Lyons (1926, 335) described the dimensions of garden beds as 3 to 10 m long and 4 m wide. In 1992, beds up to 20 m long and 2 m wide were noted. Ditches, 50 cm wide and 10-30 cm deep, were made on the long sides. In the western part of the system around Wasapea village, there is less use of subsystem 1 and its associated practice of long garden beds (Wood 1982, 40).

In the past, kava was cultivated as a sole crop in special garden beds under shade, and manured with wallaby dung collected and brought to the garden (Lyons 1926, 336; Crawford 1981, 51). Although not seen in 1992, kava cultivation probably continues in some locations (Lebot et al. 1992, 89). In the mid-1970s, pig dung was added to tobacco gardens (Baldwin 1982, 38).

During 1992, the major cash income sources in the Balimo area were wages from an oil prospecting company at Kawito (over K50,000/month), and K80,000 worth of crocodile skins sold through the Balimo Wildlife Officer. Villagers said rubber was not being tapped. A minor amount of sago was being shipped direct to Port Moresby for sale. Local fresh food sales provide minor income. Although there are approximately 36 cattle projects in this system, which average some 40 head per project, cattle sales provide only sporadic income to a few people. There are also other income sources, such as the sale of canoes or timber, but these are restricted to specific locations. These do not reach significance in the system as a whole.

National Nutrition Survey 1982/83

216 families from 7 villages were asked in February, March or June 1983 what they had eaten the previous day. All reported eating sago, 42 per cent coconut, 3 per cent sweet potato, 3 per cent banana, and none taro, Chinese taro, cassava or yam. 13 per cent reported eating rice. 51 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

Crawford, A.L. 1981 Aida: Life and Ceremony of the Gogodala. Bathurst, NSW, National Cultural Council of Papua New Guinea in association with R. Brown and Associates.

Other References

Agricultural Development Services (Singapore) in association with Sime Darby Services and ADS (PNG) 1992 Smallholder Rubber Development in Selected Provinces Project (Project Reference: TA1344-PNG): Draft Final Report. Working Paper No. 11: Economics and Marketing Aspects, Department of Agriculture and Livestock and Asian Development Bank, Port Moresby.

Baldwin, J.A. 1982 Pig rearing and the domestication process in New Guinea and the Torres Strait region. National Geographic Society Research Report 14, 31-43.

Other References continued

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Learoyd, D. 1985 Nutrition survey: Balimo/Wasua area: October-November 1985. Unpublished report, Balino Health Centre, Balino.
Lebot, V., M. Merlin and L. Lindstrom 1992 Kava: The Pacific Drug. New Haven, Yale University Press.
Lyons, A.P. 1926 Notes on the Gogodara tribe of Western Papua. Journal of the Royal Anthropological Institute 56, 329-360.
Williams, F.E. 1937 Papuans of the Transfly. Oxford, Clarendon.
Wood, M. 1982 Kamula social structure. PhD thesis, Macquarie University, Sydney.

PROVINCE 1 Western **AGRICULTURAL SYSTEM No.** 16 **Subsystem No.** 2 **of** 2

Districts 3 Balimo **Subsystem Extent** 25 %

System Summary

In this subsystem, tall woody regrowth, more than 15 years old, is cut and burnt. A mixture of crops are interplanted in October-January. These include banana, taro, cassava, sweet potato and yam (D. alata and D. esculenta). Only one planting is made before fallowing.

Extends across provincial border to System(s) None

Altitude range (m) 0-80 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Sago
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Taro (Colocasia), Yam (D. alata), Yam (D. esculenta)
OTHER VEGETABLES	Aibika, Pumpkin fruit, Tulip
FRUITS	Pineapple, Sugarcane
NUTS	Breadfruit
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco, Kava

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	Minor
CROP SEQUENCES	None
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 Cattle	Minor
2 Crocodile	Minor
3 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

Water Management:	
DRAINAGE	Minor
IRRIGATION	None
Soil Management:	
PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Significant
TILLAGE	None
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	None
SMALL MOUNDS	None
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	Significant

OTHER DOCUMENTATION
None

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)[1]. 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.

[1] R = (Number of years of cultivation x 100) / (Number of years of cultivation + 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.

WESTERN PROVINCE

Fallow clearing practices

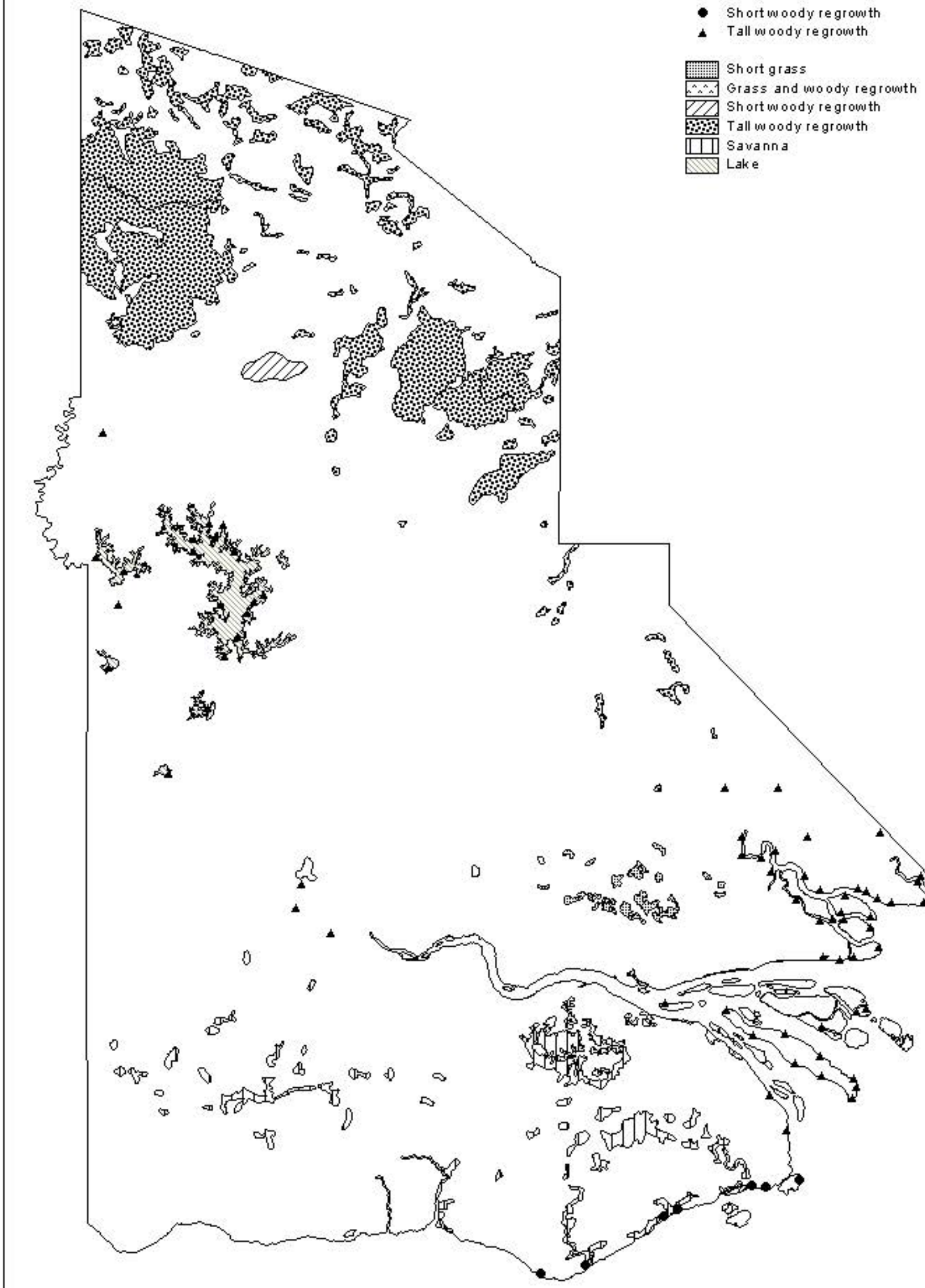
- Fallow cut and not burnt
- Fallow cut and burnt

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

40 0 40 Kilometers

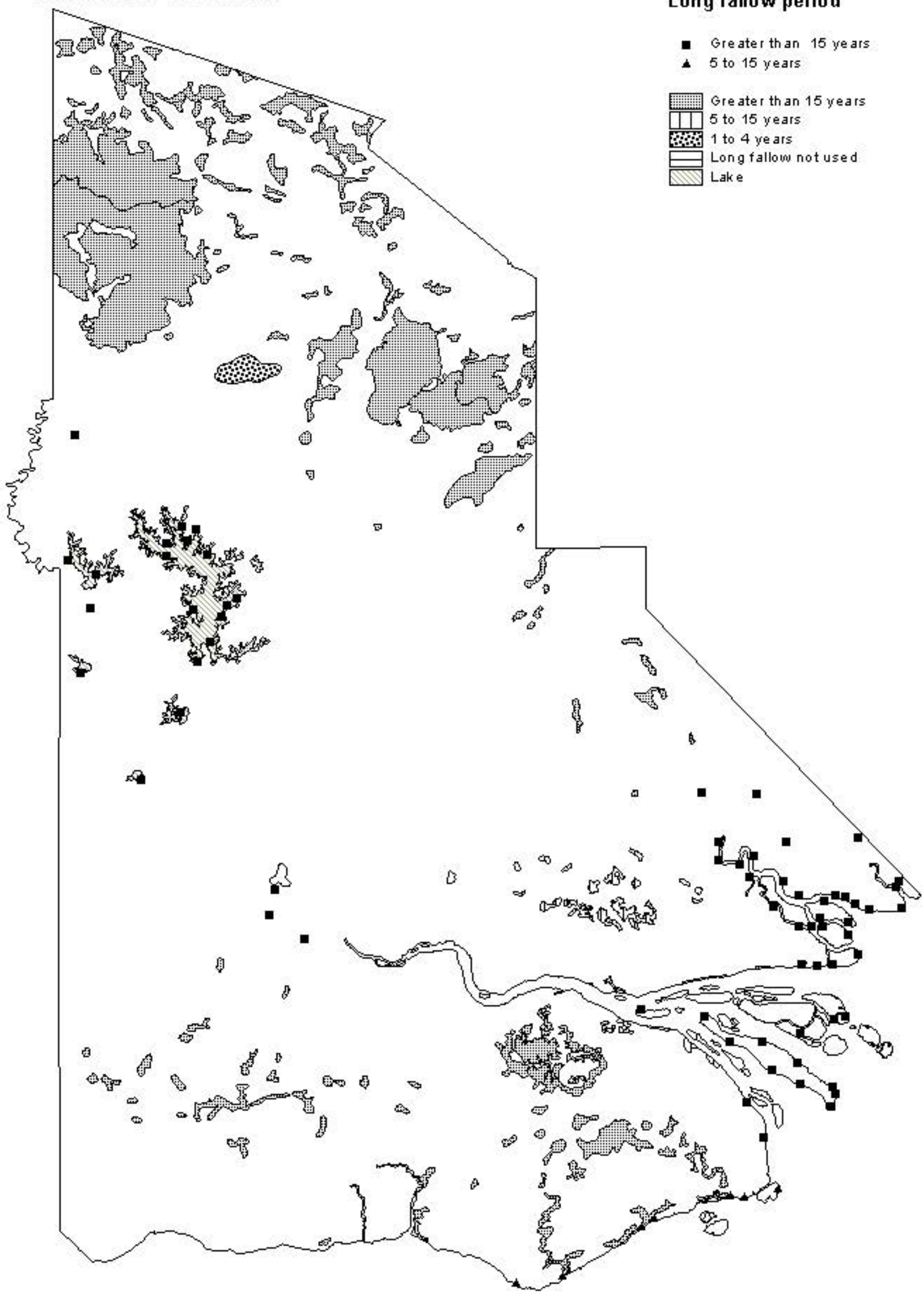
Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE

Number of plantings before fallow

▲ 1 planting only

1 planting only
2 plantings
Lake

40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE

Intensity of land use

Ratio of cropping period to fallow period

- Very Low

- Very Low
- Low
- Medium
- High
- Lake

40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE

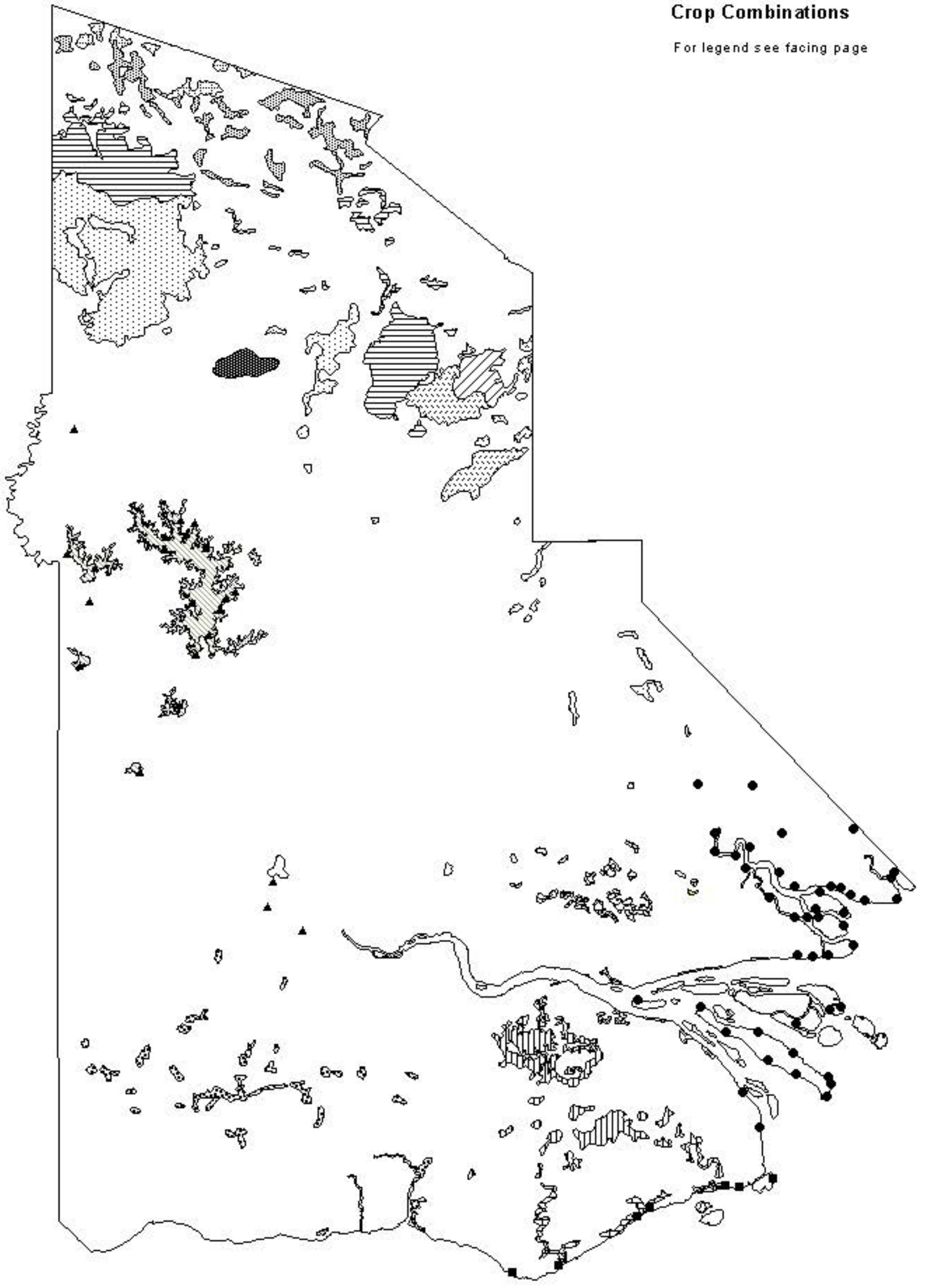
Crop Combinations

	Most important crops	Important crops
●	Sago	Coconut
▲	Sago	None
■	None	Banana/Cassava/Coconut/Sweet Potato
	None	Banana/Sweet Potato
	None	Cassava/Chinese Taro/Sweet Potato/Taro
	Sago	Banana
	Sago	Banana/Taro/Yam/Coconut
	Sago	Banana/Coconut
	Sago	Coconut
	Sago/Banana	None
	Banana	Sago
	Banana	Sago/Taro
	Yam (D. esculenta)	Cassava/Coconut
	Yam (D. esculenta)	Banana/Coconut
	Taro (C. esculenta)	Chinese Taro/Sweet Potato
	Sweet Potato	Sago
	No agricultural activity	
	Lake	

WESTERN PROVINCE

Crop Combinations

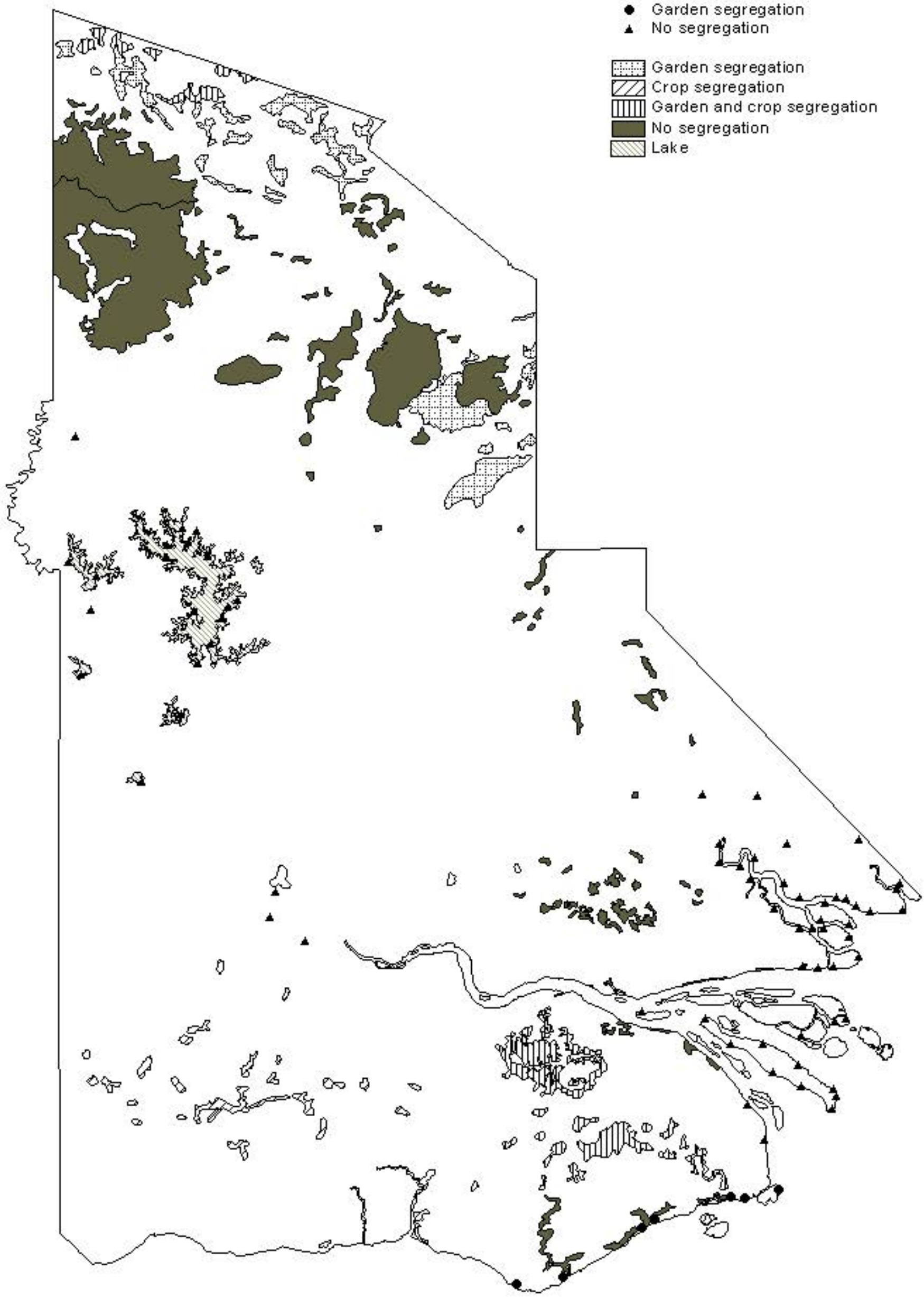
For legend see facing page



40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



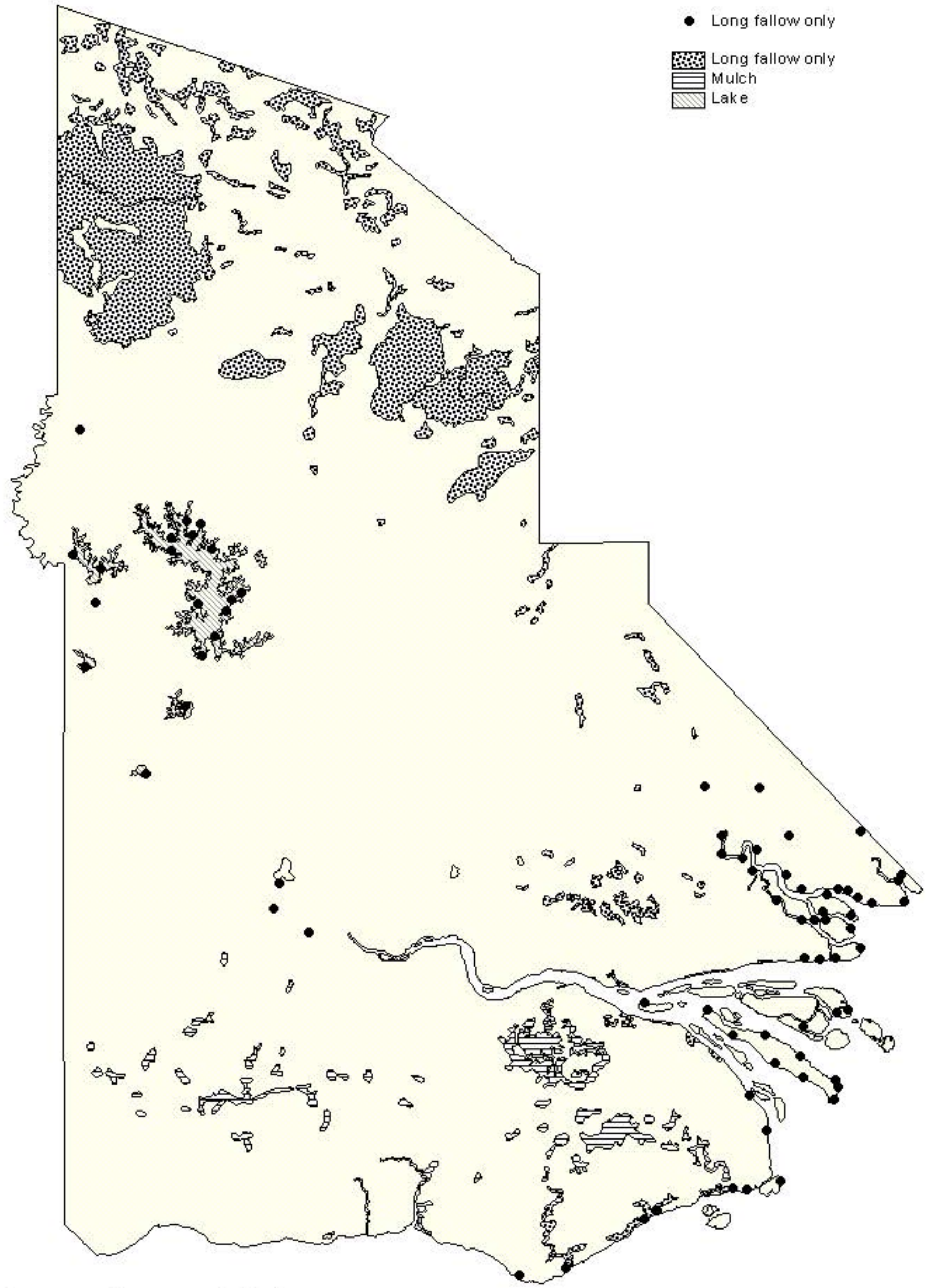
Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE

Soil Fertility Maintenance

- Long fallow only

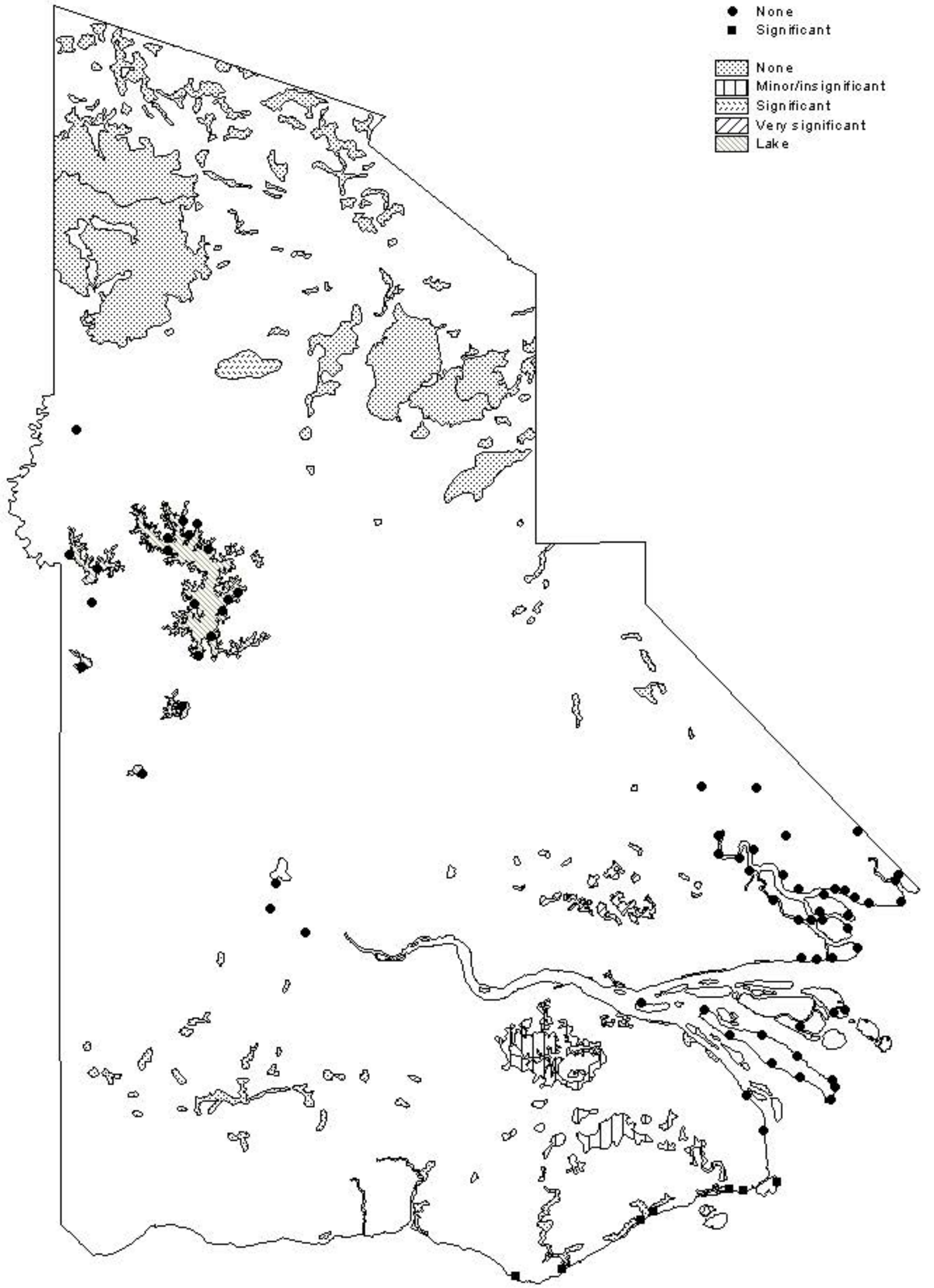
- Long fallow only
- Mulch
- Lake



40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



WESTERN PROVINCE

Fallow clearing practices

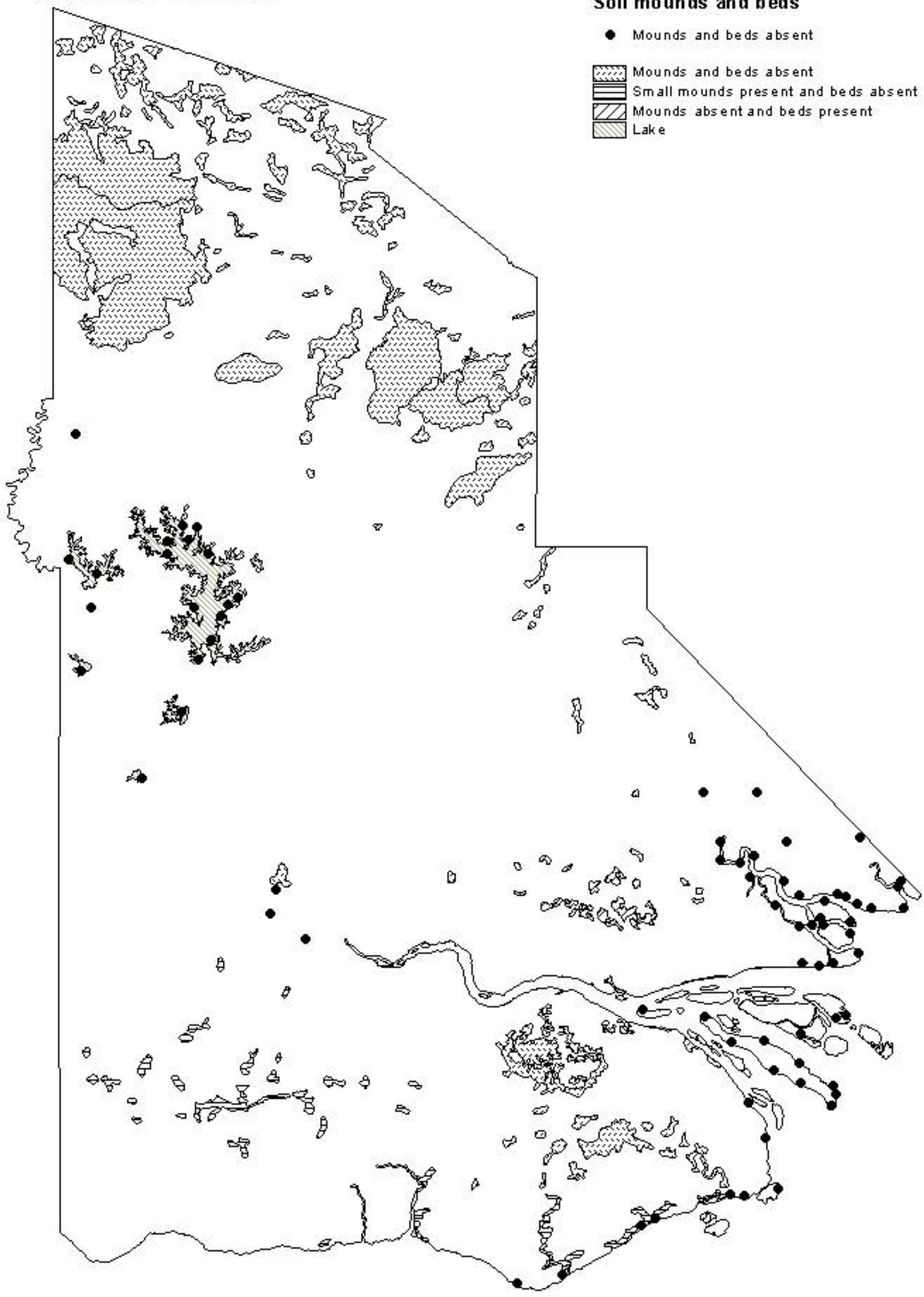
- Fallow cut and not burnt
- Fallow cut and burnt

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

40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



WESTERN PROVINCE

Water management techniques

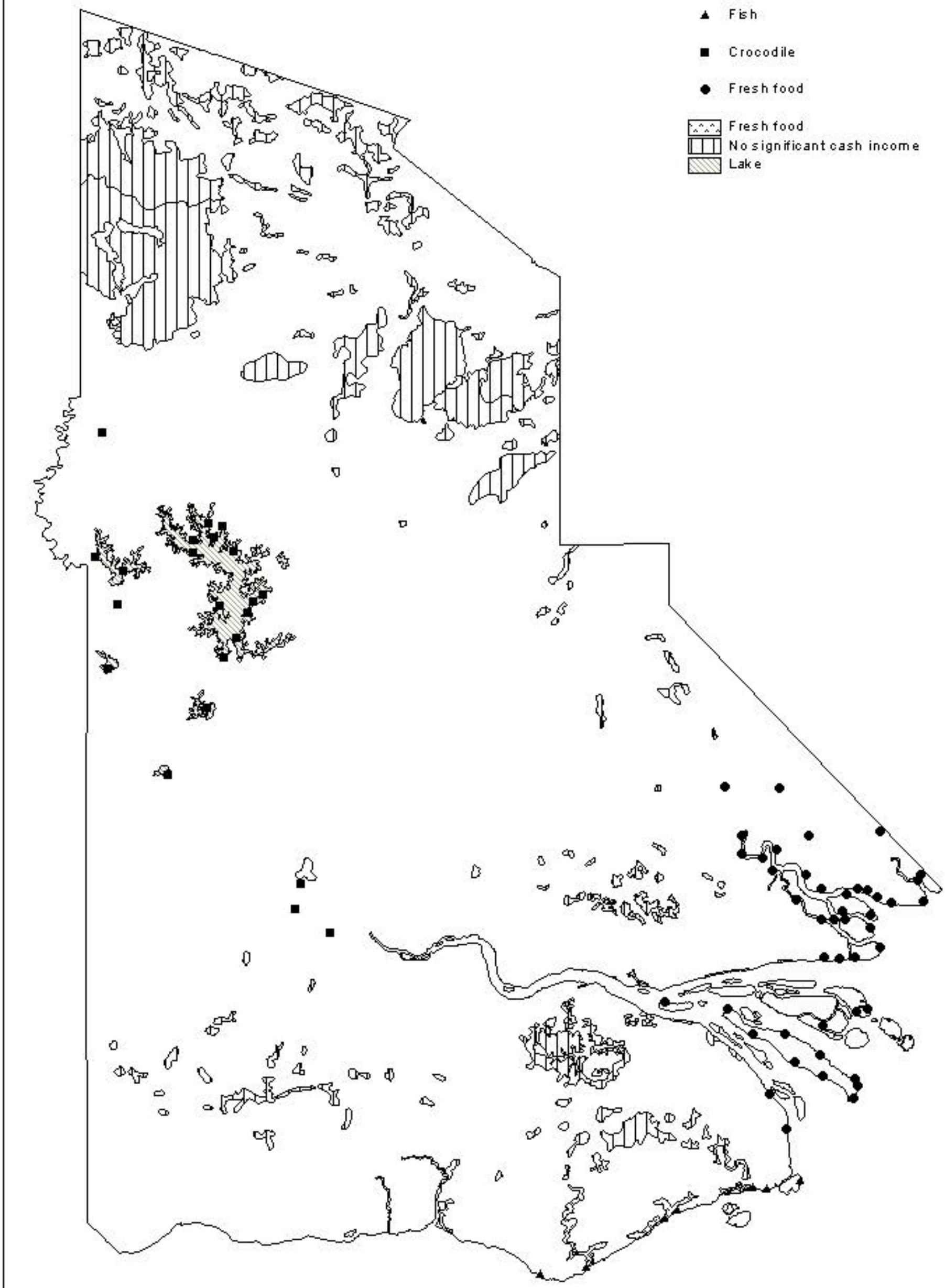
- No water control

- No water control
- Drainage
- Lake

40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE

Seasonality of main crops

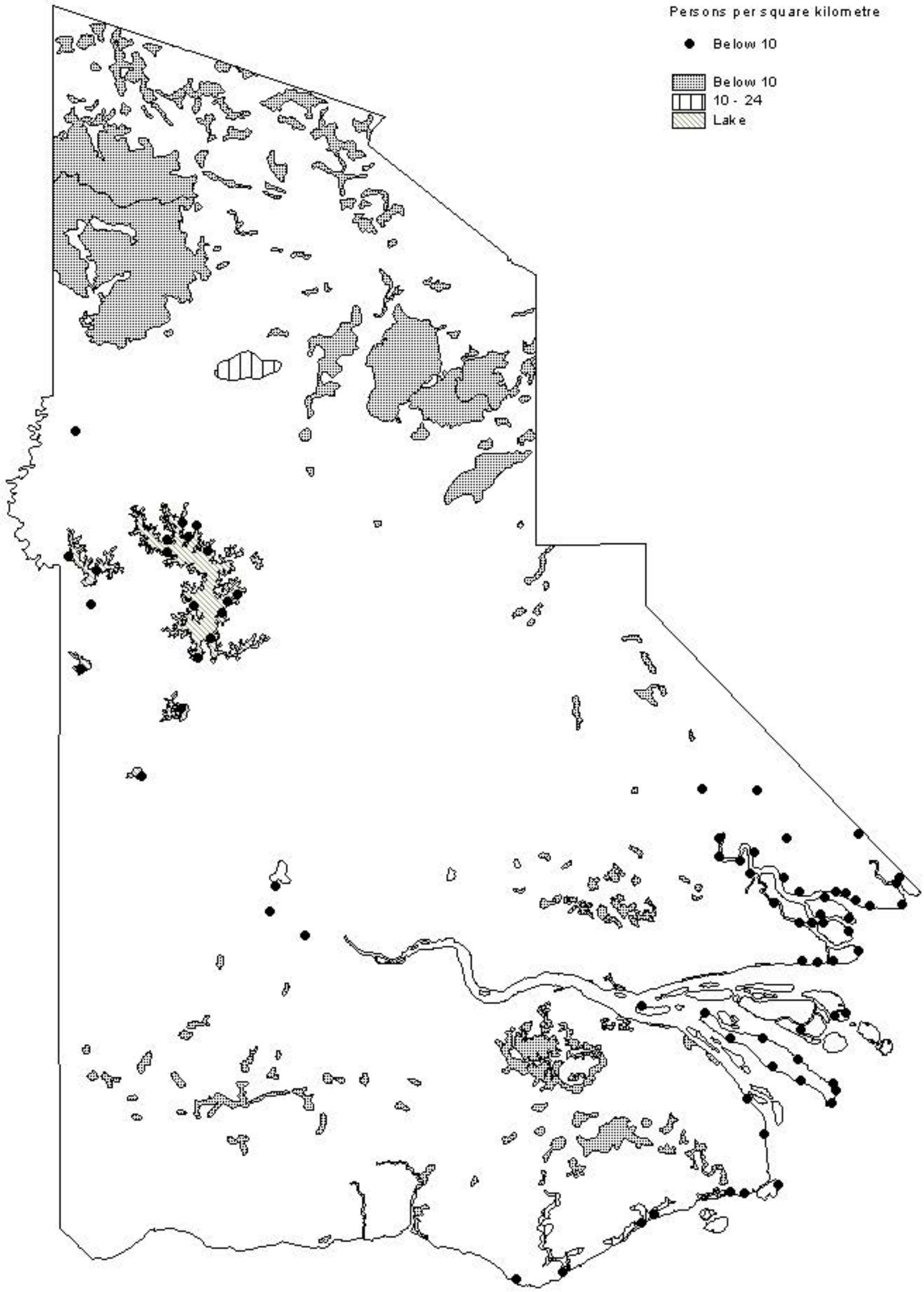
- No seasonal planting

- No seasonal planting
- Planted seasonally
- Lake

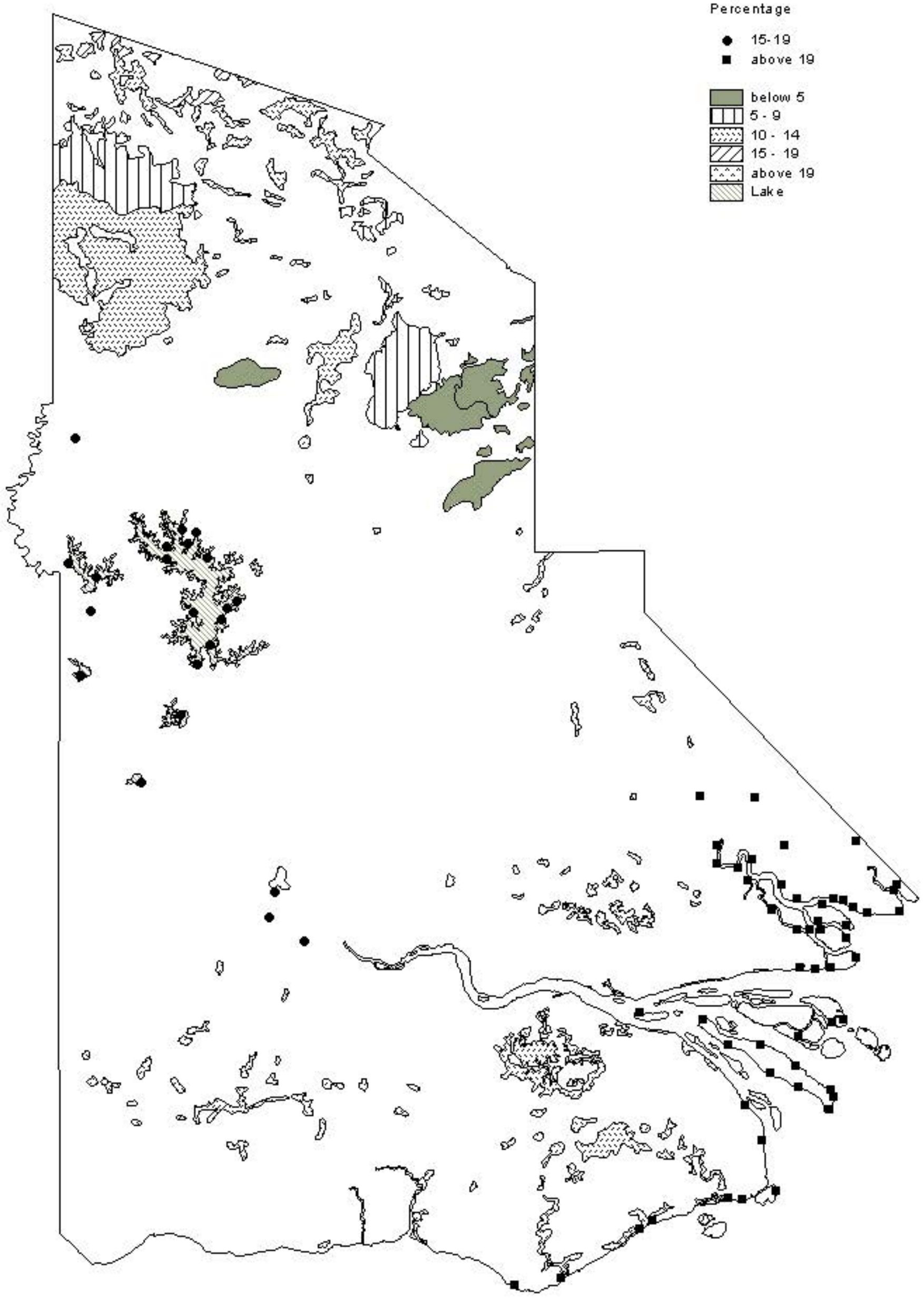
40 0 40 Kilometers

Mapping Agricultural Systems Project. Human Geography. ANU: PNG DAL: Geography. UPNG. 1999

WESTERN PROVINCE



WESTERN PROVINCE



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: 01 Western

System	Sub sys	No. of subsys	Subsys extent	Same sys oth prov	Districts	Census Divisions
101	1	1	4	1501	6	28-29
102	1	1	4	1505	6	28-29-30-31
103	1	1	4		4-5	15-17-18-21-26-27-32
104	1	1	4		3-4-5	09-14-19-20-21-22-23-24-25-26-27
105	1	1	4	0709	4	14-15-16
106	1	2	3		4	16
106	2	2	1		4	16
107	1	1	4		2-4-5	06-12-13-20
108	1	1	4		5	21
109	1	1	4	0707	4	16-18
110	1	1	4		2	02-04-05-06
111	1	2	2		1	02-03
111	2	2	2		1	02-03
112	1	1	4		1-2	03-04
113	1	1	4		1	02
114	1	1	4		1-3	01-02-07-09-10-11
115	1	2	3		1-3	01-02-07
115	2	2	1		1-3	01-02-07
116	1	2	3		3	07-08
116	2	2	1		3	07-08

KEY

Subsys	Subsystem
Same sys oth prov	Same system in other province

AGRICULTURAL SYSTEM DATA LISTING - CODES Province: 01 Western

System	Sub sys	Area km^2	Population			Altitude range m		Slope	Fallows		
			Total	Abs	Den	Low	High		Veg	Sht	Per
101	1	205	1064	16	5	900	2000	5	5	0	3
102	1	718	2547	11	4	400	1800	5	5	0	3
103	1	2068	5004	5	2	150	400	3	5	0	3
104	1	2670	10933	12	4	60	150	2	5	0	3
105	1	658	2077	1	3	100	200	2	5	0	3
106	1	288	2185	1	8	200	600	2	5	0	3
106	2	0	0	0	0	200	600	2	4	0	2
107	1	11461	7414	17	1	20	50	1	5	0	3
108	1	176	3521	0	20	100	150	2	4	1	1
109	1	57	0	0	0	600	1200	3	5	0	3
110	1	425	3582	11	8	20	80	2	8	0	3
111	1	167	2798	45	17	0	30	2	8	0	3
111	2	0	0	0	0	0	30	1	2	0	3
112	1	826	3153	14	4	0	80	1	8	0	3
113	1	0	1157	46	0	0	50	1	4	0	2
114	1	4389	7323	23	2	0	30	1	5	0	3
115	1	2501	4540	25	2	0	30	1	3	0	2
115	2	0	0	0	0	0	30	2	5	0	3
116	1	4720	10601	26	2	0	80	2	1	0	2
116	2	0	0	0	0	0	80	2	5	0	3

KEY

Subsys	Subsystem
Area km^2	Area of System

Population

Total	Resident population 1980
Abs	Absent population (%)
Den	Population density (persons/km^2)

Fallows

Veg	Type of Fallow vegetation
Sht	Short fallows
Per	Long fallow period

AGRICULTURAL SYSTEM DATA LISTING - CODES Province: 01 Western

System	Sub sys	Staple crops			Narcotic crops
		Most import	Important	Present	
101	1	13	05-11	02-04-05-11-13-14	5
102	1	00	04-05-11-13	02-04-05-09-11-13	5
103	1	02-09	00	02-04-09-11-13	2-4-5
104	1	09	02	02-04-09-11-13	2-4-5
105	1	02	09	02-05-09-11-13-14-15-19	5-6
106	1	02	09-13	02-09-13	5-6
106	2	00	09-15	04-05-09-11-13-14-15-19	5-6
107	1	09	00	02-04-09-11-14-15	5
108	1	00	02-11	02-04-05-11-13	5
109	1	11	09	02-04-05-09-11-13-14	5
110	1	15	04-06	02-04-05-06-09-11-13-14-15	5-6
111	1	15	02-06	02-04-05-06-09-11-13-14-15-19	2-4-5-6
111	2	13	06	02-04-06-11-13-15	2-4-5-6
112	1	09	02-06-13-15	02-04-05-06-09-11-13-14-15-19	2-4-5
113	1	00	02-04-06-11-13	02-04-06-09-11-13-14-15	5-6
114	1	09	06	02-05-06-09-11-13-14-15	5
115	1	09	02-06	02-06-09-11-13	6
115	2	09	06	02-06-04-11-13-14-15	6
116	1	09	06	02-04-06-09-11-13-14-15	2-4-5-6
116	2	09	06	02-04-06-09-11-13-14-15	2-4-5-6

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES Province: 01 Western

System	Sub sys	Vegetable crops	Fruit crops	Nut crops
101	1	01-02-08-09-10-11-13-15-21-23	08-15	01-03-08-09
102	1	01-08-09-10-11-13-16-21-23	08-12-13-15	01
103	1	01-09-10-13-23	08-12-13-15	01-04-10
104	1	01-09-10-13-16-23	08-12-13-15	01-04-10
105	1	01-02-05-12-13-15-16-22-23	08-12-13-15	01-10
106	1	01-02-05-12-13-15-16-22-23	08-12-13-15	01-10
106	2	01-02-05-12-13-15-16-22-23	08-12-13-15	01-10
107	1	01-09-14-20-21-23	07-09-12-13-15-17	01-04-14
108	1	01-07-09-10-14-16-19-21-27	15	00
109	1	01-05-10-13-16-17-19-20-22-23	08-12-13-15	01
110	1	01-02-03-09-10-19-20-21-23-27	07-09-12-13-15-17-23	01-02-07-10
111	1	01-03-05-09-16-19-21-27	07-12-13-15-17-23-30	01
111	2	01-03-05-09-16-19-21-27	07-12-13-15-17-23-30	01
112	1	01-02-09-16-20-21-23-26-27-36	07-08-12-13-15-17-23-30	01-06-10
113	1	01-03-10-13-16-21	04-05-07-09-12-13-15-23	01
114	1	01-10-16-21	13-15	01
115	1	01-20-21-23	05-07-09-13	01
115	2	01-20-21-23	05-07-09-13	01
116	1	01-20-23	13-15	01
116	2	01-20-23	13-15	01

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES Province: 01 Western

System	Sub	Segregation		Crop	Gard types		Soil fertility maintenance techniques						
	sys	Gar	Crp	Seq	Mix	H'ld	Leg	Tre	Com	Man	Isl	Sil	Fer
101	1	2	2	0	0	1	0	0	0	0	0	0	0
102	1	3	1	0	0	0	0	0	0	0	0	0	0
103	1	0	0	0	0	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0	0	0	0	0
105	1	2	0	0	0	0	0	0	0	0	0	0	0
106	1	0	0	0	0	1	0	0	0	0	0	0	0
106	2	0	0	0	0	1	0	0	0	0	0	0	0
107	1	0	0	0	0	1	0	0	0	0	0	1	0
108	1	0	1	1	0	0	1	0	0	0	0	0	0
109	1	3	1	0	0	2	0	0	0	0	0	0	0
110	1	1	2	1	0	3	0	0	0	0	0	1	0
111	1	1	1	1	0	2	0	0	0	0	0	1	0
111	2	2	1	0	0	2	0	0	0	0	0	2	0
112	1	2	2	1	0	2	0	0	0	0	0	0	0
113	1	2	1	0	0	1	0	0	0	0	0	0	0
114	1	1	1	0	0	1	0	0	0	0	0	0	0
115	1	0	0	0	0	0	0	0	0	0	0	3	0
115	2	0	1	0	0	0	0	0	0	0	0	0	0
116	1	1	1	0	0	1	0	0	0	0	0	0	0
116	2	1	1	0	0	1	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: 01 Western**

System	Sub sys	Management techniques											
		Water		Soil						Fallow		Other	
		Irr	Drn	Pig	Till	Hol	Bar	Mul	Mec	Brn	Cut	Fen	Stk
101	1	0	0	0	0	0	0	0	0	1	0	2	1
102	1	0	0	0	0	0	0	0	0	2	0	2	1
103	1	0	0	0	0	0	0	0	0	0	1	0	0
104	1	0	0	0	0	0	0	0	0	0	1	0	0
105	1	0	0	0	0	0	0	0	0	1	2	1	0
106	1	0	0	0	0	0	0	0	0	0	3	0	0
106	2	0	0	0	0	0	0	0	0	2	0	3	1
107	1	0	0	0	0	0	0	0	0	1	0	1	1
108	1	0	0	0	2	0	0	0	0	2	1	0	0
109	1	0	0	0	0	0	0	0	0	0	3	3	1
110	1	0	2	0	0	1	0	2	0	3	0	3	3
111	1	0	0	0	0	0	0	0	0	3	0	3	2
111	2	0	2	0	2	0	0	3	0	1	0	1	1
112	1	0	2	0	1	1	1	2	0	3	0	3	2
113	1	0	1	0	2	0	0	1	0	2	0	3	1
114	1	0	1	0	0	0	0	1	0	2	0	1	1
115	1	0	3	0	0	0	0	0	0	2	0	0	1
115	2	0	1	0	1	0	0	0	0	2	0	0	1
116	1	0	2	0	3	0	0	0	0	2	0	0	1
116	2	0	1	0	0	0	0	0	0	2	0	0	1

KEY

Subsys Subsystem

Management techniques

Water management

Irr Irrigation

Drn Drainage

Soil management

Pig 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: 01 Western**

System	Sub sys	Management techniques						Crop planting seasonality		Cropping intensity	R value
		Soil mounds				Garden beds					
		Vsm	Sm	Md	Lge	Sq	Lg	Maj	Min		
101	1	0	1	0	0	0	0	0	0	1	5
102	1	0	1	0	0	0	0	0	0	1	5
103	1	0	0	0	0	0	0	0	0	1	5
104	1	0	0	0	0	0	0	0	0	1	5
105	1	0	0	0	0	0	0	1	1	1	5
106	1	0	0	0	0	0	0	1	0	1	5
106	2	0	0	1	0	0	0	0	0	1	9
107	1	0	0	1	0	0	0	0	1	1	5
108	1	0	2	0	0	0	0	0	0	2	40
109	1	3	0	0	0	0	0	1	0	1	5
110	1	0	3	0	0	0	1	3	1	1	5
111	1	0	3	0	0	0	0	3	2	1	5
111	2	0	1	0	0	0	2	2	2	1	5
112	1	0	2	0	0	1	0	2	2	1	5
113	1	0	1	0	0	0	1	0	0	1	9
114	1	0	1	0	0	0	0	0	1	1	5
115	1	0	0	0	0	0	0	0	0	1	50
115	2	0	0	0	0	0	2	0	0	1	5
116	1	0	0	0	0	0	3	0	2	1	9
116	2	0	0	0	0	0	0	0	2	1	5

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: 01 Western

System	Sub	Cash income sources											
	sys	An	Bet	Crd	Cat	Chi	Coc	Cnt	CfA	CfR	Crc	Fwd	Fsh
101	1	1	0	0	0	0	0	0	0	0	0	0	0
102	1	1	0	0	0	0	0	0	0	0	0	0	0
103	1	1	0	0	0	0	0	0	0	0	0	0	0
104	1	0	1	0	0	0	0	0	0	0	1	0	0
105	1	0	0	0	0	0	0	0	0	0	0	0	0
106	1	0	0	0	0	0	0	0	0	0	0	0	0
106	2	0	0	0	0	0	0	0	0	0	0	0	0
107	1	0	0	0	0	0	0	0	0	0	2	0	1
108	1	0	0	0	0	0	0	0	0	0	0	0	0
109	1	1	0	0	0	0	0	0	0	0	0	0	0
110	1	0	0	0	0	1	0	0	0	0	1	0	0
111	1	0	1	0	0	0	0	0	0	0	0	0	0
111	2	0	1	0	0	0	0	0	0	0	0	0	0
112	1	0	0	0	0	0	0	0	0	0	1	0	1
113	1	0	0	0	0	0	0	0	0	0	0	0	3
114	1	0	0	0	0	0	0	0	0	0	0	0	1
115	1	0	0	0	1	0	0	0	0	0	0	0	0
115	2	0	0	0	1	0	0	0	0	0	0	0	0
116	1	0	0	0	0	0	0	0	0	0	1	0	0
116	2	0	0	0	1	0	0	0	0	0	1	0	0

KEY

Subsys Subsystem

Cash Income Sources

An	Animal skins	Chi	Chillie	CfR	Coffee Robusta
Bet	Betel nut	Coc	Cocoa	Crc	Crocodile
Crd	Cardamom	Cnt	Coconut	Fwd	Firewood
Cat	Cattle	CfA	Coffee Arabica	Fsh	Fish

AGRICULTURAL SYSTEM DATA LISTING - CODES **Province: 01 Western**

System	Sub	Cash income sources										
	sys	Fod	Op	Pot	Pyr	Ric	Rub	Shp	Tea	Tob	Ot1	Ot2
101	1	1	0	0	0	0	0	0	0	0	0	0
102	1	0	0	0	0	0	0	0	0	0	0	0
103	1	1	0	0	0	0	0	0	0	0	0	0
104	1	1	0	0	0	0	1	0	0	0	0	0
105	1	1	0	0	0	0	0	0	0	0	0	0
106	1	1	0	0	0	0	0	0	0	0	0	0
106	2	1	0	0	0	0	0	0	0	0	0	0
107	1	1	0	0	0	0	0	0	0	0	0	0
108	1	1	0	0	0	0	0	0	0	0	1	0
109	1	0	0	0	0	0	0	0	0	0	0	0
110	1	1	0	0	0	0	1	0	0	0	0	0
111	1	2	0	0	0	0	0	0	0	0	0	0
111	2	2	0	0	0	0	0	0	0	0	0	0
112	1	1	0	0	0	0	0	0	0	0	0	0
113	1	1	0	0	0	0	0	0	0	0	1	0
114	1	2	0	0	0	0	0	0	0	0	0	0
115	1	1	0	0	0	0	0	0	0	0	0	0
115	2	1	0	0	0	0	0	0	0	0	0	0
116	1	1	0	0	0	0	0	0	0	0	0	0
116	2	1	0	0	0	0	0	0	0	0	0	0

KEY

Subsys Subsystem

Cash Income Sources

Fod	Fresh food	Ric	Rice	Tob	Tobacco
Op	Oil Palm	Rub	Rubber	Ot1	Other 1
Pot	Potato	Shp	Sheep	Ot2	Other 2
Pyr	Pyrethrum	Tea	Tea		

AGRICULTURAL SYSTEM DATA LISTING - CODES **Province: 01 Western**

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
101	1	01 87	-	4	BJA	06 91	-	3	RMB	05 92	-	3	RMB
102	1	05 92	-	3	RMB	01 96	-	4	CB	- -	-	-	
103	1	05 92	-	3	BJA	01 96	-	4	CB	- -	-	-	
104	1	06 79	-	3	RMB	05 92	-	3	RMB	- -	-	-	
105	1	05 92	-	3	BJA	- -	-	-		- -	-	-	
106	1	05 92	-	3	BJA	- -	-	-		- -	-	-	
106	2	05 92	-	3	BJA	- -	-	-		- -	-	-	
107	1	05 92	-	2	RMB	- -	-	-		- -	-	-	
108	1	05 92	-	1	BJA	- -	-	-		- -	-	-	
109	1	01 93	-	3	BJA	- -	-	-		- -	-	-	
110	1	05 92	-	3	RLH	- -	-	-		- -	-	-	
111	1	05 92	-	3	RLH	- -	-	-		- -	-	-	
111	2	05 92	-	3	RLH	- -	-	-		- -	-	-	
112	1	07 67	-	3	RLH	05 92	-	3	RLH	- -	-	-	
113	1	05 92	-	3	RLH	- -	-	-		- -	-	-	
114	1	05 92	-	4	RMB	05 92	-	4	RLH	- -	-	-	
115	1	05 92	-	2	RLH	- -	-	-		- -	-	-	
115	2	05 92	-	2	RLH	- -	-	-		- -	-	-	
116	1	05 92	-	3	RLH	- -	-	-		- -	-	-	
116	2	05 92	-	3	RLH	- -	-	-		- -	-	-	

KEY

Subsys	Subsystem	BJA	B.J. Allen
Sv tp	Survey type	RMB	R.M. Bourke
Sv in	Surveyor initials	CB	C. Ballard
		RLH	R.L. Hide

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: 1 Western

	Village	Population	System
DISTRICT	1 DARU		
Division	1 EAST KIWAI		
1	ABERAGEREMA	241	0115
2	AGOBARO	42	0114
3	AIBINIO	86	0114
4	DAMERA	228	0115
5	DAMERATAMU	273	0114
6	DOUMORI	187	0115
7	GESOA	66	0114
8	IASA	49	0114
9	IPISIA	84	0114
10	KENAME	225	0115
11	KOAVISI	72	0114
12	KUBIRA	71	0114
13	MADADUO	184	0115
14	MAIPANI	218	0114
15	OROMOSAPUO	167	0114
16	SAGASIA	46	0114
17	SAGERO	145	0114
18	SAMARI	260	0114
19	SAGUANE	34	0114
20	SEPE	120	0114
21	TIRERE	438	0114
22	U'UWO	294	0114
23	WAPAURA	56	0114
24	WAPI	170	0114
25	WARIOBODORO	146	0115
Division	2 WEST KIWAI		
1	BER	85	0110
2	BUJI	155	0110
3	DAWARE	20	0114
4	KADAWA	245	0113
5	KATATAI	161	0113
6	KOABU	149	0115
7	MABUDAWAN	445	0113
8	MADAME	159	0115
9	MAWATTA	74	0111
10	PARAMA	104	0113
11	SEVERIAMBU	286	0115
12	SIGABADURU	202	0113
13	SUI	182	0114
14	TURETURE	309	0111
15	WEDEREHIAMO	127	0115
Division	3 ORIOMO-BITURI		
1	ABAM	135	0112
2	BIAMBOD	172	0112
3	BOZE	150	0111
4	DOROGORI	132	0111
5	DRAGELI	71	0111
6	GAMAEVE	135	0112
7	GIRINGAREDE	213	0111
8	GLABI	64	0112
9	GANO	240	0111
10	IAMEGA	249	0112
11	IRUPI	157	0111
12	KAPAL	122	0112
13	KIBULI	143	0111
14	KUNINI	110	0111
15	KUPERE	99	0111
16	KURU	125	0112
17	MASINGARA	259	0111
18	NANU	129	0112
19	PEAWA 1	126	0112
21	RUAL	98	0112
22	SANGUANSO	113	0112
23	SEBE	92	0111
24	SOGALE	82	0112
25	TATI	28	0111
26	TEWARA	110	0112
27	TOGO	252	0111
28	U'UME	178	0111
29	UPIARA	201	0112
30	WAIDORO	212	0111
31	WAMORON	79	0111
32	WIM	218	0112
33	WIPIM	146	0112
34	WONIE	102	0112
35	ZIM	108	0112
36	PEAWA 2	46	0112
DISTRICT	2 MOREHEAD		
Division	4 TRANSFLY		
1	ARUFI	193	0110
2	BIMEDEBEN	125	0110
3	BUK	79	0112
4	DERIDERI	49	0110
5	DIMIRI	117	0110
6	DIMISISI	253	0110
7	GARAITA	100	0110
8	GUBAM	107	0110
9	JARAI	77	0110
10	KINKIN	53	0112
11	KONDOBOL	169	0112
12	KWIWANG	95	0112
13	LIMOL	117	0112
14	MALAM	159	0112
15	MARI	99	0110
16	MATA	184	0110
17	MIBINI	123	0110
18	PONGARIKI	72	0110
19	SIBIDIRI	97	0110
20	TAIS	72	0110
Division	5 BENSBACH		
1	BONDOBOL	53	0110
2	BULA	69	0110
3	INDORODORO	86	0110
4	IOKWA	89	0110
5	KANDARISA	34	0110
6	KOROMBO	29	0110
7	MENGETE	43	0110
8	ROUKU	107	0110
9	UPARUA	71	0110
10	WANDO	147	0110
11	WEAM	117	0110
12	WEMENEVER	61	0110
13	WEREAVE	71	0110
Division	6 SARU		
1	AEWE	458	0107

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 1 Western

	Village	Population	System
2	DURU	258	0107
3	GOE	58	0110
4	GWAKU	134	0107
5	GWIBAKU	362	0107
6	INAPOROK	231	0107
7	IWEWE	215	0107
8	KERU	146	0110
9	KIRIWO - SERISA	207	0110
10	SERKI	184	0110
11	SETAVI	102	0110
DISTRICT 3	BALIMO		
Division 7	EAST GOGODALA		
1	ADULU	226	0114
2	BALAMULA	138	0115
3	BALIMO	691	0116
4	BAMUSTA	281	0116
5	DEDE	446	0115
6	DEWALA	272	0115
7	DUABA	115	0116
8	KALA	295	0116
9	KAWIYAPO	316	0115
10	KEBANE	303	0116
11	KENALIYA	90	0115
12	KENEDIBI	114	0115
13	KENEWA	216	0116
14	KIMAMA	536	0116
15	KINI	272	0116
16	KUBU	134	0116
17	LEWADA	471	0115
18	MUTAM	82	0115
19	PAGONA	166	0115
20	PEDAEYA	201	0116
21	SAWASE	149	0116
22	SAWETA	395	0116
23	TAPILA	23	0115
24	TIRIP	215	0115
25	ULADU	244	0116
26	URIO	84	0115
27	WALIYAMA	191	0115
28	WAYA	122	0116
Division 8	WEST GOGODALA		
1	ADIBA	794	0116
2	AKETA	371	0116
3	ALI	678	0116
4	DADI	547	0116
5	DOGONO	331	0116
6	IKE	303	0116
7	ISAGO	589	0116
8	KEWA	448	0116
9	KOTALE	403	0116
10	MAKAPA	352	0116
11	MUMUNI	245	0116
12	PIKIWA	272	0116
13	PISI	672	0116
14	TAI	235	0116
15	WASAPEA	164	0116
16	YOU	243	0116
Division 9	UPPER BAMU		
1	ARAGI	84	0114
2	BIBISA	98	0114
3	DIWAMI	49	0114
4	GAGORO - MATAKAM	149	0114
5	GARU	159	0114
6	IOWA	184	0114
7	KASIGI	408	0104
9	KUBEAI	56	0114
10	KURIA	153	0114
12	PARIEME - SIPOI	202	0104
14	WAREHO	83	0114
Division 10	LOWER BAMU		
1	AMAGOWA	87	0114
2	ANIADAI	99	0114
3	ARIKINADE	119	0114
4	ASARAMIO - TAPAPI	135	0114
5	BAMIO	133	0114
6	BIMARAMIO	100	0114
7	BINA 1	66	0114
8	BINA 2	192	0114
9	BUNIGI	198	0114
10	DARAVI	46	0114
11	ETERE	83	0114
12	MIRUO	133	0114
13	OROPAI	54	0114
14	PIRU PIRU 1	162	0114
15	PIRU PIRU 2	120	0114
16	SIBARA	21	0114
17	SISIAMI 1	89	0114
18	SISIAMI 2	58	0114
19	SOGERE	126	0114
21	TOROBINA	264	0114
22	UPATI	79	0114
23	WAKAU	38	0114
24	WARIO	90	0114
Division 11	GAMA RIVER		
1	AIRUA	22	0114
2	BINOURI	33	0114
3	GAMARI	128	0114
5	GIWARITORE	92	0114
6	IBUO	185	0114
7	KOPORAMI	59	0114
8	MAISAVE	65	0114
9	NEMETI - GIMERIME	84	0114
10	UKUSI	29	0114
DISTRICT 4	NOMAD		
Division 12	MIDDLE FLY		
1	BOIKMAVA	195	0107
2	BOSSET	544	0107
3	KAVIANANGA	464	0107
4	KOMOVAI	162	0107
5	KUEM	249	0107
6	MANDA	194	0107
7	MIPAN	281	0107
8	LEVAME	96	0107
9	WANGAWANGA	276	0107
Division 13	LAKE MURRAY		
1	AEWA	41	0107

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 1 Western

	Village	Population	System
2	BOIMBALAVU	210	0107
3	BUSEKI	130	0107
4	DIMU	189	0107
5	KUSIKINA - GIGIABO	318	0107
6	MAGIOPO	216	0107
7	MIWA	312	0107
8	NAGO	175	0107
9	TAGUM	342	0107
10	UPOBIA	190	0107
11	USUKOF	351	0107
12	KAPIKAM	249	0107
Division	14 TOMU RIVER		
1	ASALABI	118	0105
2	BABUA	39	0105
3	GOIYOBOM	89	0104
4	USUMA	51	0105
5	WAGALIBI	67	0105
Division	15 LOWER RENTOUL		
1	BASUBI	37	0105
2	DADALIBI	87	0105
3	FABI	36	0105
4	GASTOBI	101	0105
5	HONABI	120	0103
7	KUKODOBI	135	0103
8	SIRIGUBI	133	0105
9	WABMOSOM	41	0105
10	YULABI	76	0105
Division	16 BIAMI		
1	ABADO	169	0106
2	ADUMARI	225	0106
3	ALOWOBI	53	0105
4	AWOBI	108	0105
5	DUGUDAMOBI	44	0105
6	DIMARIFI	98	0106
7	GAMISE	85	0106
8	GESUAMA	194	0106
9	GIGE	59	0105
10	GIWEDULA	33	0105
11	GUAMALI	103	0105
12	HAFIMI	101	0105
13	IGIBIA	135	0106
14	IGUROBI	99	0106
16	KOGEYOBI	184	0105
17	KONO 1	75	0106
18	KONO 2	102	0106
19	MOSAMO	137	0106
20	MOUGULU	183	0106
21	OBEIMI	108	0106
22	SABASIBI	42	0105
23	SAFIGI	150	0105
24	SEDADO	114	0106
25	SEFALOBI	117	0106
26	SOROBOSOGO	98	0105
27	SOYA	91	0105
28	TIGASUBI	65	0105
29	UMABIBI	166	0106
30	WAGULUBI	178	0106
31	WAIOFI	105	0105
32	WALIBI	55	0105
Division	17 UPPER STRICKLAND		
1	BEBELUBI	39	0103
2	GIWOBI	74	0103
3	HEADUBI	41	0103
5	KWOBI	65	0103
6	MAGWIBI	129	0103
7	SIUHAMASOM	116	0103
8	SUABI	80	0103
9	SOKABI	97	0103
10	SUGIABI	157	0103
11	TERIABI	88	0103
12	UDAMOBI	105	0103
13	WODIOBI	81	0103
Division	18 UPPER STRICK.TRIBS		
21	OSIOHUBE	18	0103
Division	19 PARE		
1	BEREDINA	209	0104
2	DISINA	144	0104
3	IGABIRA	80	0104
4	KUDA	234	0104
6	WAKIANA	88	0104
DISTRICT	5 KIUNGA		
Division	20 MOIAN		
1	EREKTA	146	0107
2	IULAUA	123	0104
3	KAREMGU	128	0107
4	KAWOK	54	0104
5	KUKUJABA	132	0107
6	MEMBOK	166	0107
Division	21 EAST AWIN		
1	DRIMDEMASUK	272	0104
2	DRIMGAS	174	0104
3	DRIMSKAI	59	0104
4	GASUKE	285	0104
5	GIPONAI	147	0104
6	GUERETIMIN	105	0104
7	GUSIORE	97	0104
8	SEPIPEN	76	0102
9	TAMIFEN	109	0104
10	TIMINGONDOK	168	0104
11	TIMINSIRIAP	70	0103
12	TMANSAVANAI	75	0104
13	TRIFEN	37	0104
14	TUPENSOMARE	68	0104
Division	22 SOUTH AWIN		
1	BRIOMPENE	130	0104
2	GI	272	0104
3	GRE	274	0104
4	GRIENGAS	325	0104
5	MENEMSORE	136	0104
6	MEPU	129	0104
7	MIASOMRAE	126	0104
8	RALENGRE	141	0104
9	TIMINDEMASOK	289	0104
10	TIOMNAI	224	0104
11	TOPE	35	0104
Division	23 SOUTH OKTEDI		
1	ARAN 1 AND 2	247	0104

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 1 Western

	Village	Population	System
2	BONGUBUN	44	0104
3	DOME	204	0104
4	IERAN	78	0104
5	IOGI	125	0104
6	KOMOKPIN	123	0104
7	KONKONDA	167	0104
Division	24 WEST AWIN		
2	DANDE	147	0104
3	GREHOSORE	137	0104
5	HOLEPENAI	68	0104
6	HOSOKOMGU	61	0104
7	IENKENAI	137	0104
8	IPOKNAI	91	0104
9	KASRENAI	139	0104
11	KRANAI	157	0104
12	KWIAPAE	138	0104
13	MENUMGRUP	74	0104
14	MIAHRAE	122	0104
15	MIMINGIRI	124	0104
16	NONINGIRI	137	0104
17	PAMPENI	135	0104
18	SENAMRAE	153	0104
19	MENUM	91	0104
20	SONAI	92	0104
21	WANGENAI	138	0104
Division	25 NORTH OKTEDI		
1	AMBAGA	194	0104
2	KUNAEMBIT	127	0104
3	KUNGIM	465	0104
Division	26 NORTH AWIN		
1	APRAM	165	0103
2	BRUNAI	77	0103
3	HAWANAI	185	0104
4	HIORENKIA	92	0103
5	HORHOMRAE	171	0103
6	HOSANAI	82	0104
7	HOSOMRAE	46	0104
8	IHORE	80	0104
9	KETEMOKNAI	58	0103
10	KIMIANAI	114	0104
11	KWILOKNAI	151	0103
12	MOHOMTIENAI	176	0103
13	RIPNAI	125	0103
14	RUNAI	78	0104
15	SAISUKURIME	133	0103
16	SAPIRAE	90	0103
17	SOMAIKWANKIA	116	0104
18	TAPKO	127	0103
19	TIMINHORE	62	0104
20	TIMOKNAI	231	0104
Division	27 NINGERUM		
1	AMBARE	109	0103
2	BANKIM NO 1	35	0103
3	BANKIM NO 2	140	0103
4	BIKIM	99	0104
5	BINKAWOK	88	0104
6	BOLIWOGAM	95	0103
7	BULIPKAWOK	32	0103
8	BUMBIN	81	0103
9	DERONGO	213	0103
10	DIGAM	25	0104
11	DUOMBONKIM	47	0103
12	HAIDAUWOGAM	34	0103
13	HUKIM	164	0103
14	KOLEBON	72	0103
15	KUMGUIT	56	0103
16	KWAKWI	33	0103
17	KWIKIM	142	0103
18	MINIPON	95	0104
19	MONGOLAVURAM	135	0103
20	NIOKSIKWI	76	0103
21	OKTIDETAU	32	0102
22	TAMARO	95	0104
23	TARAKBITS	225	0104
24	TENGKIM	89	0104
25	TUNDENGHIAIKWI	75	0103
26	TWINKWI	54	0103
27	WOGAM	153	0103
28	WOMBON	104	0103
29	WURIMKANATGO	69	0103
30	WUWUNGO	57	0103
31	YONGTAU 1	52	0103
32	YONGTAU 2	63	0103
DISTRICT	6 TABUBIL		
Division	21 EAST AWIN		
15	REFUGEE CAMP	3521	0108
Division	28 STAR MOUNTAIN		
1	ATEMBIT	98	0102
2	BULTEM	106	0102
3	FINALBIN	51	0102
4	KAVORABIP	74	0101
5	KAWENTINGAN	120	0102
6	MIGALSIMBIP	73	0102
7	WANGBIN	34	0102
Division	29 FAIWOLMIN		
1	BOLIVIP	305	0102
2	BOLANGONG	175	0101
3	DARABIK	138	0102
4	GOLGOBIP	331	0101
5	IMIGABIP	484	0101
6	KONGABIP	91	0102
7	LOUBIP	79	0102
Division	30 KABAN		
1	ABOLGOBIP	44	0102
2	BIANGABIP	142	0102
3	DUMINAK	90	0102
4	KIANGABIP	53	0102
5	MARONTIGIN	40	0102
6	SOGONGOBIP	76	0102
7	SWETIGIN	65	0102

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 1 Western

	Village	Population	System	Village	Population	System
Division	31 MURRAY VALLEY					
1	BAKTAMIN	184	0102			
2	FAKOBIP	121	0102			
4	SARIPTIKIN	91	0102			
5	SELBANG	218	0102			
6	SELTAMIN	220	0102			
Division	32 BLUCHER					
2	DABEREBIP	133	0103			

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 1 Western

Village	Dist	Div	Unit	System
ABADO	4	16	1	0106
ABAM	1	3	1	0112
ABERAGEREMA	1	1	1	0115
ABOLGOBIP	6	30	1	0102
ADIBA	3	8	1	0116
ADULU	3	7	1	0114
ADUMARI	4	16	2	0106
AEWA	4	13	1	0107
AEWE	2	6	1	0107
AGOBARO	1	1	2	0114
AIBINIO	1	1	3	0114
AIRUA	3	11	1	0114
AKETA	3	8	2	0116
ALI	3	8	3	0116
ALOWOBI	4	16	3	0105
AMAGOWA	3	10	1	0114
AMBAGA	5	25	1	0104
AMBARE	5	27	1	0103
ANIADAI	3	10	2	0114
APRAM	5	26	1	0103
ARAGI	3	9	1	0114
ARAN 1 AND 2	5	23	1	0104
ARIKINADE	3	10	3	0114
ARUFI	2	4	1	0110
ASALABI	4	14	1	0105
ASARAMIO - TAPAPI	3	10	4	0114
ATEMBIT	6	28	1	0102
AWOBI	4	16	4	0105
BABUA	4	14	2	0105
BAKTAMIN	6	31	1	0102
BALAMULA	3	7	2	0115
BALIMO	3	7	3	0116
BAMIO	3	10	5	0114
BAMUSTA	3	7	4	0116
BANKIM NO 1	5	27	2	0103
BANKIM NO 2	5	27	3	0103
BASUBI	4	15	1	0105
BEBELUBI	4	17	1	0103
BER	1	2	1	0110
BEREDINA	4	19	1	0104
BIAMBOD	1	3	2	0112
BIANGABIP	6	30	2	0102
BIBISA	3	9	2	0114
BIKIM	5	27	4	0104
BIMARAMIO	3	10	6	0114
BIMEDEBEN	2	4	2	0110
BINA 1	3	10	7	0114
BINA 2	3	10	8	0114
BINKAWOK	5	27	5	0104
BINOURI	3	11	2	0114
BOIKMAVA	4	12	1	0107
BOIMBALAVU	4	13	2	0107
BOLANGONG	6	29	2	0101
BOLIVIP	6	29	1	0102
BOLIWOGAM	5	27	6	0103
BONDOBOL	2	5	1	0110
BONGUBUN	5	23	2	0104
BOSSET	4	12	2	0107
BOZE	1	3	3	0111
BRIOMPENE	5	22	1	0104
BRUNAI	5	26	2	0103
BUJI	1	2	2	0110
BUK	2	4	3	0112
BULA	2	5	2	0110
BULIPKAWOK	5	27	7	0103
BULTEM	6	28	2	0102
BUMBIN	5	27	8	0103
BUNIGI	3	10	9	0114
BUSEKI	4	13	3	0107
DABEREBIP	6	32	2	0103
DADALIBI	4	15	2	0105
DADI	3	8	4	0116
DAMERA	1	1	4	0115
DAMERATAMU	1	1	5	0114
DANDE	5	24	2	0104
DARABIK	6	29	3	0102
DARAVI	3	10	10	0114
DAWARE	1	2	3	0114
DEDE	3	7	5	0115
DERIDERI	2	4	4	0110
DERONGO	5	27	9	0103
DEWALA	3	7	6	0115
DIGAM	5	27	10	0104
DIMARIFI	4	16	6	0106
DIMIRI	2	4	5	0110
DIMISISI	2	4	6	0110
DIMU	4	13	4	0107
DISINA	4	19	2	0104
DIWAMI	3	9	3	0114
DOGONO	3	8	5	0116
DOME	5	23	3	0104
DOROGORI	1	3	4	0111
DOUMORI	1	1	6	0115
DRAGELI	1	3	5	0111
DRIMDEMASUK	5	21	1	0104
DRIMGAS	5	21	2	0104
DRIMSKAI	5	21	3	0104
DUABA	3	7	7	0116
DUGUDAMOBI	4	16	5	0105
DUMINAK	6	30	3	0102
DUOMBONKIM	5	27	11	0103
DURU	2	6	2	0107
EREKTA	5	20	1	0107
ETERE	3	10	11	0114
FABI	4	15	3	0105
FAKOBIP	6	31	2	0102
FINALBIN	6	28	3	0102
GAGORO - MATAKAM	3	9	4	0114
GAMAEVE	1	3	6	0112
GAMARI	3	11	3	0114
GAMISE	4	16	7	0106
GANO	1	3	9	0111
GARAITA	2	4	7	0110

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 1 Western

Village	Dist	Div	Unit	System
GARU	3	9	5	0114
GASTOBI	4	15	4	0105
GASUKE	5	21	4	0104
GESOA	1	1	7	0114
GESUAMA	4	16	8	0106
GI	5	22	2	0104
GIGE	4	16	9	0105
GIPONAI	5	21	5	0104
GIRINGAREDE	1	3	7	0111
GIWARITORE	3	11	5	0114
GIWEDULA	4	16	10	0105
GIWOBI	4	17	2	0103
GLABI	1	3	8	0112
GOE	2	6	3	0110
GOIYOBOM	4	14	3	0104
GOLGOBIP	6	29	4	0101
GRE	5	22	3	0104
GREHOSORE	5	24	3	0104
GRIENGAS	5	22	4	0104
GUAMALI	4	16	11	0105
GUBAM	2	4	8	0110
GUERETIMIN	5	21	6	0104
GUSIORE	5	21	7	0104
GWAKU	2	6	4	0107
GWIBAKU	2	6	5	0107
HAFIMI	4	16	12	0105
HAIDAUWOGAM	5	27	12	0103
HAWANAI	5	26	3	0104
HEADUBI	4	17	3	0103
HIORENKIA	5	26	4	0103
HOLEPENAI	5	24	5	0104
HONABI	4	15	5	0103
HORHOMRAE	5	26	5	0103
HOSANAI	5	26	6	0104
HOSOKOMGU	5	24	6	0104
HOSOMRAE	5	26	7	0104
HUKIM	5	27	13	0103
IAMEGA	1	3	10	0112
IASA	1	1	8	0114
IBUO	3	11	6	0114
IENKENAI	5	24	7	0104
IERAN	5	23	4	0104
IGABIRA	4	19	3	0104
IGIBIA	4	16	13	0106
IGUROBI	4	16	14	0106
IHORE	5	26	8	0104
IKE	3	8	6	0116
IMIGABIP	6	29	5	0101
INAPOROK	2	6	6	0107
INDORODORO	2	5	3	0110
IOGI	5	23	5	0104
IOKWA	2	5	4	0110
IOWA	3	9	6	0114
IPISIA	1	1	9	0114
IPOKNAI	5	24	8	0104
IRUPI	1	3	11	0111
ISAGO	3	8	7	0116
IULAUA	5	20	2	0104
IWEWE	2	6	7	0107
JARAI	2	4	9	0110
KADAWA	1	2	4	0113
KALA	3	7	8	0116
KANDARISA	2	5	5	0110
KAPAL	1	3	12	0112
KAPIKAM	4	13	12	0107
KAREMGU	5	20	3	0107
KASIGI	3	9	7	0104
KASRENAI	5	24	9	0104
KATATAI	1	2	5	0113
KAVIANANGA	4	12	3	0107
KAVORABIP	6	28	4	0101
KAWENTINGAN	6	28	5	0102
KAWIYAPO	3	7	9	0115
KAWOK	5	20	4	0104
KEBANE	3	7	10	0116
KENALIYA	3	7	11	0115
KENAME	1	1	10	0115
KENEDIBI	3	7	12	0115
KENEWA	3	7	13	0116
KERU	2	6	8	0110
KETEMOKNAI	5	26	9	0103
KEWA	3	8	8	0116
KIANGABIP	6	30	4	0102
KIBULI	1	3	13	0111
KIMAMA	3	7	14	0116
KIMIANAI	5	26	10	0104
KINI	3	7	15	0116
KINKIN	2	4	10	0112
KIRIWO - SERISA	2	6	9	0110
KOABU	1	2	6	0115
KOAVISI	1	1	11	0114
KOGEYOBI	4	16	16	0105
KOLEBON	5	27	14	0103
KOMOKPIN	5	23	6	0104
KOMOVAI	4	12	4	0107
KONDOBOL	2	4	11	0112
KONGABIP	6	29	6	0102
KONKONDA	5	23	7	0104
KONO 1	4	16	17	0106
KONO 2	4	16	18	0106
KOPORAMI	3	11	7	0114
KOROMBO	2	5	6	0110
KOTALE	3	8	9	0116
KRANAI	5	24	11	0104
KUBEAI	3	9	9	0114
KUBIRA	1	1	12	0114
KUBU	3	7	16	0116
KUDA	4	19	4	0104
KUEM	4	12	5	0107
KUKODOBI	4	15	7	0103
KUKUJABA	5	20	5	0107
KUMGUIT	5	27	15	0103
KUNAEMBIT	5	25	2	0104
KUNGIM	5	25	3	0104

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 1 Western

Village	Dist	Div	Unit	System
KUNINI	1	3	14	0111
KUPERE	1	3	15	0111
KURIA	3	9	10	0114
KURU	1	3	16	0112
KUSIKINA - GIGIABO	4	13	5	0107
KWAKWI	5	27	16	0103
KWIAPAE	5	24	12	0104
KWIKIM	5	27	17	0103
KWILOKNAI	5	26	11	0103
KWIWANG	2	4	12	0112
KWOBI	4	17	5	0103
LEVAME	4	12	8	0107
LEWADA	3	7	17	0115
LIMOL	2	4	13	0112
LOUBIP	6	29	7	0102
MABUDAWAN	1	2	7	0113
MADADUO	1	1	13	0115
MADAME	1	2	8	0115
MAGIOPO	4	13	6	0107
MAGWIBI	4	17	6	0103
MAIPANI	1	1	14	0114
MAISAVE	3	11	8	0114
MAKAPA	3	8	10	0116
MALAM	2	4	14	0112
MANDA	4	12	6	0107
MARI	2	4	15	0110
MARONTIGIN	6	30	5	0102
MASINGARA	1	3	17	0111
MATA	2	4	16	0110
MAWATTA	1	2	9	0111
MEMBOK	5	20	6	0107
MENEMSORE	5	22	5	0104
MENGETE	2	5	7	0110
MENUM	5	24	19	0104
MENUMGRUP	5	24	13	0104
MEPU	5	22	6	0104
MIAHRAE	5	24	14	0104
MIASOMRAE	5	22	7	0104
MIBINI	2	4	17	0110
MIGALSIMBIP	6	28	6	0102
MIMINGIRI	5	24	15	0104
MINIPON	5	27	18	0104
MIPAN	4	12	7	0107
MIRUO	3	10	12	0114
MIWA	4	13	7	0107
MOHOMTIENAI	5	26	12	0103
MONGOLAVURAM	5	27	19	0103
MOSAMO	4	16	19	0106
MOUGULU	4	16	20	0106
MUMUNI	3	8	11	0116
MUTAM	3	7	18	0115
NAGO	4	13	8	0107
NANU	1	3	18	0112
NEMETI - GIMERIME	3	11	9	0114
NIOKSIKWI	5	27	20	0103
NONINGIRI	5	24	16	0104
OBEIMI	4	16	21	0106
OKTIDETAU	5	27	21	0102
OROMOSAPUO	1	1	15	0114
OROPAI	3	10	13	0114
OSIOHUBE	4	18	21	0103
PAGONA	3	7	19	0115
PAMPENI	5	24	17	0104
PARAMA	1	2	10	0113
PARIEME - SIPOI	3	9	12	0104
PEAWA 1	1	3	19	0112
PEAWA 2	1	3	36	0112
PEDAEYA	3	7	20	0116
PIKIWA	3	8	12	0116
PIRU PIRU 1	3	10	14	0114
PIRU PIRU 2	3	10	15	0114
PISI	3	8	13	0116
PONGARIKI	2	4	18	0110
RALENGRE	5	22	8	0104
REFUGEE CAMP	6	21	15	0108
RIPNAI	5	26	13	0103
ROUKU	2	5	8	0110
RUAL	1	3	21	0112
RUNAI	5	26	14	0104
SABASIBI	4	16	22	0105
SAFIGI	4	16	23	0105
SAGASIA	1	1	16	0114
SAGERO	1	1	17	0114
SAGUANE	1	1	19	0114
SAISUKURIME	5	26	15	0103
SAMARI	1	1	18	0114
SANGUANSO	1	3	22	0112
SAPIRAE	5	26	16	0103
SARIPTIKIN	6	31	4	0102
SAWASE	3	7	21	0116
SAWETA	3	7	22	0116
SEBE	1	3	23	0111
SEDADO	4	16	24	0106
SEFALOBI	4	16	25	0106
SELBANG	6	31	5	0102
SELTAMIN	6	31	6	0102
SENAMRAE	5	24	18	0104
SEPE	1	1	20	0114
SEPIPEN	5	21	8	0102
SERKI	2	6	10	0110
SETAVI	2	6	11	0110
SEVERIAMBU	1	2	11	0115
SIBARA	3	10	16	0114
SIBIDIRI	2	4	19	0110
SIGABADURU	1	2	12	0113
SIRIGUBI	4	15	8	0105
SISIAMI 1	3	10	17	0114
SISIAMI 2	3	10	18	0114
SIUHAMASOM	4	17	7	0103
SOGALE	1	3	24	0112
SOGERE	3	10	19	0114
SOGONGOBIP	6	30	6	0102

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 1 Western

Village	Dist	Div	Unit	System
SOKABI	4	17	9	0103
SOMAIKWANKIA	5	26	17	0104
SONAI	5	24	20	0104
SOROBOSOGO	4	16	26	0105
SOYA	4	16	27	0105
SUABI	4	17	8	0103
SUGIABI	4	17	10	0103
SUI	1	2	13	0114
SWETIGIN	6	30	7	0102
TAGUM	4	13	9	0107
TAI	3	8	14	0116
TAIS	2	4	20	0110
TAMARO	5	27	22	0104
TAMIFEN	5	21	9	0104
TAPILA	3	7	23	0115
TAPKO	5	26	18	0103
TARAKBITS	5	27	23	0104
TATI	1	3	25	0111
TENGKIM	5	27	24	0104
TERIABI	4	17	11	0103
TEWARA	1	3	26	0112
TIGASUBI	4	16	28	0105
TIMINDEMASOK	5	22	9	0104
TIMINGONDOK	5	21	10	0104
TIMINHORE	5	26	19	0104
TIMINSIRIAP	5	21	11	0103
TIMOKNAI	5	26	20	0104
TIOMNAI	5	22	10	0104
TIRERE	1	1	21	0114
TIRIP	3	7	24	0115
TMANSAVANAI	5	21	12	0104
TOGO	1	3	27	0111
TOPE	5	22	11	0104
TOROBINA	3	10	21	0114
TRIFEN	5	21	13	0104
TUNDENGHIAIKWI	5	27	25	0103
TUPENSOMARE	5	21	14	0104
TURETURE	1	2	14	0111
TWINKWI	5	27	26	0103
U'UME	1	3	28	0111
U'UWO	1	1	22	0114
UDAMOBI	4	17	12	0103
UKUSI	3	11	10	0114
ULADU	3	7	25	0116
UMABIBI	4	16	29	0106
UPARUA	2	5	9	0110
UPATI	3	10	22	0114
UPIARA	1	3	29	0112
UPOBIA	4	13	10	0107
URIO	3	7	26	0115
USUKOF	4	13	11	0107
USUMA	4	14	4	0105
WABMOSOM	4	15	9	0105
WAGALIBI	4	14	5	0105
WAGULUBI	4	16	30	0106
WAIDORO	1	3	30	0111
WAIOFI	4	16	31	0105
WAKAU	3	10	23	0114
WAKIANA	4	19	6	0104
WALIBI	4	16	32	0105
WALIYAMA	3	7	27	0115
WAMORON	1	3	31	0111
WANDO	2	5	10	0110
WANGAWANGA	4	12	9	0107
WANGBIN	6	28	7	0102
WANGENAI	5	24	21	0104
WAPAURA	1	1	23	0114
WAPI	1	1	24	0114
WAREHO	3	9	14	0114
WARIO	3	10	24	0114
WARIOBODORO	1	1	25	0115
WASAPEA	3	8	15	0116
WAYA	3	7	28	0116
WEAM	2	5	11	0110
WEDEREHIAMO	1	2	15	0115
WEMENEVER	2	5	12	0110
WEREAVE	2	5	13	0110
WIM	1	3	32	0112
WIPIM	1	3	33	0112
WODIOBI	4	17	13	0103
WOGAM	5	27	27	0103
WOMBON	5	27	28	0103
WONIE	1	3	34	0112
WURIMKANATGO	5	27	29	0103
WUWUNGO	5	27	30	0103
YONGTAU 1	5	27	31	0103
YONGTAU 2	5	27	32	0103
YOU	3	8	16	0116
YULABI	4	15	10	0105
ZIM	1	3	35	0112

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM Province: 1 Western

Village	Dist	Div	Unit	RMU
SYSTEM 0101				
BOLANGONG	6	29	2	40
GOLGOBIP	6	29	4	61
IMIGABIP	6	29	5	61
KAVORABIP	6	28	4	10
SYSTEM 0102				
ABOLGOBIP	6	30	1	334
ATEMBIT	6	28	1	32
BAKTAMIN	6	31	1	67
BIANGABIP	6	30	2	334
BOLIVIP	6	29	1	2
BULTEM	6	28	2	29
DARABIK	6	29	3	57
DUMINAK	6	30	3	57
FAKOBIP	6	31	2	67
FINALBIN	6	28	3	7
KAWENTINGAN	6	28	5	28
KIANGABIP	6	30	4	334
KONGABIP	6	29	6	43
LOUBIP	6	29	7	43
MARONTIGIN	6	30	5	48
MIGALSIMBIP	6	28	6	43
OKTIDETAU	5	27	21	20
SARIPTIKIN	6	31	4	67
SELBANG	6	31	5	66
SELTAMIN	6	31	6	67
SEPIPEN	5	21	8	124
SOGONGOBIP	6	30	6	57
SWETIGIN	6	30	7	334
WANGBIN	6	28	7	28
SYSTEM 0103				
AMBARE	5	27	1	17
APRAM	5	26	1	119
BANKIM NO 1	5	27	2	119
BANKIM NO 2	5	27	3	119
BEBELUBI	4	17	1	338
BOLIWOGAM	5	27	6	48
BRUNAI	5	26	2	119
BULIPKAWOK	5	27	7	119
BUMBIN	5	27	8	119
DABEREBIP	6	32	2	115
DERONGO	5	27	9	119
DUOMBONKIM	5	27	11	119
GIWOBI	4	17	2	338
HAIDAUWOGAM	5	27	12	119
HEADUBI	4	17	3	338
HIORENKIA	5	26	4	119
HONABI	4	15	5	338
HORHOMRAE	5	26	5	119
HUKIM	5	27	13	119
KETEMOKNAI	5	26	9	119
KOLEBON	5	27	14	119
KUKODOBI	4	15	7	338
KUMGUIT	5	27	15	17
KWAKWI	5	27	16	119
KWIKIM	5	27	17	17
KWILOKNAI	5	26	11	119
KWOBI	4	17	5	338
MAGWIBI	4	17	6	338
MOHOMTIENAI	5	26	12	119
MONGOLAVURAM	5	27	19	119
NIOKSIKWI	5	27	20	119
OSIOHUBE	4	18	21	89
RIPNAI	5	26	13	119
SAISUKURIME	5	26	15	119
SAPIRAE	5	26	16	119
SIUHAMASOM	4	17	7	338
SOKABI	4	17	9	338
SUABI	4	17	8	338
SUGIABI	4	17	10	338
TAPKO	5	26	18	119
TERIABI	4	17	11	338
TIMINSIRIAP	5	21	11	120
TUNDENGHIAIKWI	5	27	25	17
TWINKWI	5	27	26	119
UDAMOBI	4	17	12	338
WODIOBI	4	17	13	338
WOGAM	5	27	27	119
WOMBON	5	27	28	119
WURIMKANATGO	5	27	29	119
WUWUNGO	5	27	30	119
YONGTAU 1	5	27	31	119
YONGTAU 2	5	27	32	119
SYSTEM 0104				
AMBAGA	5	25	1	121
ARAN 1 AND 2	5	23	1	120
BEREDINA	4	19	1	333
BIKIM	5	27	4	119
BINKAWOK	5	27	5	119
BONGUBUN	5	23	2	120
BRIOMPENE	5	22	1	123
DANDE	5	24	2	122
DIGAM	5	27	10	120
DISINA	4	19	2	124
DOME	5	23	3	120
DRIMDEMASUK	5	21	1	124
DRIMGAS	5	21	2	120
DRIMSKAI	5	21	3	120
GASUKE	5	21	4	124
GI	5	22	2	123
GIPONAI	5	21	5	123
GOIYOBOM	4	14	3	338
GRE	5	22	3	123
GREHOSORE	5	24	3	122
GRIENGAS	5	22	4	123
GUERETIMIN	5	21	6	120
GUSIORE	5	21	7	120
HAWANAI	5	26	3	123
HOLEPENAI	5	24	5	122
HOSANAI	5	26	6	123
HOSOKOMGU	5	24	6	120
HOSOMRAE	5	26	7	123
IENKENAI	5	24	7	122
IERAN	5	23	4	121
IGABIRA	4	19	3	333

Village	Dist	Div	Unit	RMU
IHORE	5	26	8	123
IOGI	5	23	5	120
IPOKNAI	5	24	8	122
IULAUA	5	20	2	124
KASIGI	3	9	7	217
KASRENAI	5	24	9	122
KAWOK	5	20	4	125
KIMIANAI	5	26	10	123
KOMOKPIN	5	23	6	121
KONKONDA	5	23	7	120
KRANAI	5	24	11	122
KUDA	4	19	4	124
KUNAEMBIT	5	25	2	121
KUNGIM	5	25	3	121
KWIAPAE	5	24	12	122
MENEMSORE	5	22	5	123
MENUM	5	24	19	123
MENUMGRUP	5	24	13	122
MEPU	5	22	6	120
MIAHRAE	5	24	14	123
MIASOMRAE	5	22	7	123
MIMINGIRI	5	24	15	122
MINIPON	5	27	18	119
NONINGIRI	5	24	16	120
PAMPENI	5	24	17	123
PARIEME - SIPOI	3	9	12	195
RALENGRE	5	22	8	123
RUNAI	5	26	14	123
SENAMRAE	5	24	18	120
SOMAIKWANKIA	5	26	17	123
SONAI	5	24	20	120
TAMARO	5	27	22	120
TAMIFEN	5	21	9	120
TARAKBITS	5	27	23	121
TENGKIM	5	27	24	119
TIMINDEMASOK	5	22	9	123
TIMINGONDOK	5	21	10	120
TIMINHORE	5	26	19	123
TIMOKNAI	5	26	20	123
TIOMNAI	5	22	10	123
TMANSAVANAI	5	21	12	120
TOPE	5	22	11	120
TRIFEN	5	21	13	120
TUPENSOMARE	5	21	14	120
WAKIANA	4	19	6	124
WANGENAI	5	24	21	123
SYSTEM 0105				
ALOWOBI	4	16	3	338
ASALABI	4	14	1	338
AWOBI	4	16	4	111
BABUA	4	14	2	338
BASUBI	4	15	1	338
DADALIBI	4	15	2	338
DUGUDAMOBI	4	16	5	111
FABI	4	15	3	338
GASTOBI	4	15	4	338
GIGE	4	16	9	338
GIWEDULA	4	16	10	111
GUAMALI	4	16	11	111
HAFIMI	4	16	12	111
KOGEYOBI	4	16	16	111
SABASIBI	4	16	22	111
SAFIGI	4	16	23	338
SIRIGUBI	4	15	8	338
SOROBOSOGO	4	16	26	111
SOYA	4	16	27	111
TIGASUBI	4	16	28	111
USUMA	4	14	4	338
WABMOSOM	4	15	9	338
WAGALIBI	4	14	5	338
WAIOFI	4	16	31	111
WALIBI	4	16	32	111
YULABI	4	15	10	338
SYSTEM 0106				
ABADO	4	16	1	111
ADUMARI	4	16	2	111
DIMARIFI	4	16	6	338
GAMISE	4	16	7	111
GESUAMA	4	16	8	111
IGIBIA	4	16	13	111
IGUROBI	4	16	14	338
KONO 1	4	16	17	111
KONO 2	4	16	18	111
MOSAMO	4	16	19	111
MOUGULU	4	16	20	111
OBEIMI	4	16	21	111
SEDADO	4	16	24	111
SEFALOBI	4	16	25	111
UMABIBI	4	16	29	111
WAGULUBI	4	16	30	111
SYSTEM 0107				
AEWA	4	13	1	330
AEWE	2	6	1	188
BOIKMAVA	4	12	1	330
BOIMBALAVU	4	13	2	124
BOSSET	4	12	2	144
BUSEKI	4	13	3	124
DIMU	4	13	4	332
DURU	2	6	2	187
EREKTA	5	20	1	130
GWAKU	2	6	4	277
GWIBAKU	2	6	5	188
INAPOROK	2	6	6	224
IWEWE	2	6	7	187
KAPIKAM	4	13	12	124
KAREMGU	5	20	3	330
KAVIANANGA	4	12	3	180
KOMOVAI	4	12	4	137
KUEM	4	12	5	135
KUKUJABA	5	20	5	330
KUSIKINA - GIGIABO	4	13	5	330
LEVAME	4	12	8	137
MAGIOPO	4	13	6	124
MANDA	4	12	6	139
MEMBOK	5	20	6	330

Village	Dist	Div	Unit	RMU
MIPAN	4	12	7	136
MIWA	4	13	7	137
NAGO	4	13	8	124
TAGUM	4	13	9	332
UPOBIA	4	13	10	124
USUKOF	4	13	11	124
WANGAWANGA	4	12	9	137
SYSTEM 0108				
REFUGEE CAMP	6	21	15	
SYSTEM 0110				
ARUFI	2	4	1	277
BER	1	2	1	269
BIMEDEBEN	2	4	2	277
BONDOBOL	2	5	1	304
BUJI	1	2	2	270
BULA	2	5	2	310
DERIDERI	2	4	4	277
DIMIRI	2	4	5	275
DIMISISI	2	4	6	277
GARAITA	2	4	7	299
GOE	2	6	3	277
GUBAM	2	4	8	288
INDORODORO	2	5	3	296
IOKWA	2	5	4	300
JARAI	2	4	9	314
KANDARISA	2	5	5	277
KERU	2	6	8	277
KIRIWO - SERISA	2	6	9	277
KOROMBO	2	5	6	277
MARI	2	4	15	317
MATA	2	4	16	299
MENGETE	2	5	7	296
MIBINI	2	4	17	277
PONGARIKI	2	4	18	299
ROUKU	2	5	8	300
SERKI	2	6	10	277
SETAVI	2	6	11	277
SIBIDIRI	2	4	19	275
TAIS	2	4	20	317
UPARUA	2	5	9	298
WANDO	2	5	10	277
WEAM	2	5	11	277
WEMENEVER	2	5	12	300
WEREAVE	2	5	13	296
SYSTEM 0111				
BOZE	1	3	3	260
DOROGORI	1	3	4	256
DRAGELI	1	3	5	255
GANO	1	3	9	265
GIRINGAREDE	1	3	7	260
IRUPI	1	3	11	260
KIBULI	1	3	13	264
KUNINI	1	3	14	256
KUPERE	1	3	15	260
MASINGARA	1	3	17	256
MAWATTA	1	2	9	256
SEBE	1	3	23	265
TATI	1	3	25	260
TOGO	1	3	27	260
TURETURE	1	2	14	256
U'UME	1	3	28	260
WAIDORO	1	3	30	255
WAMORON	1	3	31	265
SYSTEM 0112				
ABAM	1	3	1	260
BIAMBOD	1	3	2	264
BUK	2	4	3	277
GAMAEVE	1	3	6	265
GLABI	1	3	8	265
IAMEGA	1	3	10	264
KAPAL	1	3	12	264
KINKIN	2	4	10	277
KONDOBOL	2	4	11	277
KURU	1	3	16	264
KWIWANG	2	4	12	264
LIMOL	2	4	13	264
MALAM	2	4	14	264
NANU	1	3	18	264
PEAWA 1	1	3	19	261
PEAWA 2	1	3	36	261
RUAL	1	3	21	278
SANGUANSO	1	3	22	278
SOGALE	1	3	24	265
TEWARA	1	3	26	278
UPIARA	1	3	29	278
WIM	1	3	32	264
WIPIM	1	3	33	264
WONIE	1	3	34	264
ZIM	1	3	35	264
SYSTEM 0113				
KADAWA	1	2	4	255
KATATAI	1	2	5	255
MABUDAWAN	1	2	7	267
PARAMA	1	2	10	254
SIGABADURU	1	2	12	260
SYSTEM 0114				
ADULU	3	7	1	229
AGOBARO	1	1	2	241
AIBINIO	1	1	3	238
AIRUA	3	11	1	210
AMAGOWA	3	10	1	200
ANIADAI	3	10	2	204
ARAGI	3	9	1	193
ARIKINADE	3	10	3	193
ASARAMIO - TAPAPI	3	10	4	193
BAMIO	3	10	5	198
BIBISA	3	9	2	
BIMARAMIO	3	10	6	199
BINA 1	3	10	7	203
BINA 2	3	10	8	205
BINOURI	3	11	2	210
BUNIGI	3	10	9	198

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM Province: 1 Western

Village	Dist	Div	Unit	RMU
DAMERATAMU	1	1	5	238
DARAVI	3	10	10	198
DAWARE	1	2	3	328
DIWAMI	3	9	3	195
ETERE	3	10	11	200
GAGORO - MATAKAM	3	9	4	193
GAMARI	3	11	3	207
GARU	3	9	5	193
GESOA	1	1	7	238
GIWARITORE	3	11	5	209
IASA	1	1	8	241
IBUO	3	11	6	206
IOWA	3	9	6	193
IPISIA	1	1	9	244
KOAVISI	1	1	11	200
KOPORAMI	3	11	7	209
KUBEAI	3	9	9	195
KUBIRA	1	1	12	241
KURIA	3	9	10	193
MAIPANI	1	1	14	200
MAISAVE	3	11	8	207
MIRUO	3	10	12	198
NEMETI - GIMERIME	3	11	9	209
OROMOSAPUO	1	1	15	244
OROPAI	3	10	13	205
PIRU PIRU 1	3	10	14	198
PIRU PIRU 2	3	10	15	198
SAGASIA	1	1	16	241
SAGERO	1	1	17	193
SAGUANE	1	1	19	244
SAMARI	1	1	18	241
SEPE	1	1	20	241
SIBARA	3	10	16	198
SISIAMI 1	3	10	17	199
SISIAMI 2	3	10	18	199
SOGERE	3	10	19	198
SUI	1	2	13	253
TIRERE	1	1	21	200
TOROBINA	3	10	21	200
U'UWO	1	1	22	241
UKUSI	3	11	10	209
UPATI	3	10	22	198
WAKAU	3	10	23	198
WAPAURA	1	1	23	241
WAPI	1	1	24	238
WAREHO	3	9	14	195
WARIO	3	10	24	203
SYSTEM 0115				
ABERAGEREMA	1	1	1	249
BALAMULA	3	7	2	252
DAMERA	1	1	4	193
DEDE	3	7	5	192
DEWALA	3	7	6	229
DOUMORI	1	1	6	227
KAWIYAPO	3	7	9	249
KENALIYA	3	7	11	189
KENAME	1	1	10	193
KENEDIBI	3	7	12	193
KOABU	1	2	6	250
LEWADA	3	7	17	251
MADADUO	1	1	13	193
MADAME	1	2	8	250
MUTAM	3	7	18	251
PAGONA	3	7	19	249
SEVERIAMBU	1	2	11	252
TAPILA	3	7	23	193
TIRIP	3	7	24	250
URIO	3	7	26	193
WALIYAMA	3	7	27	249
WARIOBODORO	1	1	25	193
WEDEREHIAMO	1	2	15	250
SYSTEM 0116				
ADIBA	3	8	1	191
AKETA	3	8	2	191
ALI	3	8	3	191
BALIMO	3	7	3	191
BAMUSTA	3	7	4	193
DADI	3	8	4	191
DOGONO	3	8	5	191
DUABA	3	7	7	192
IKE	3	8	6	329
ISAGO	3	8	7	191
KALA	3	7	8	191
KEBANE	3	7	10	193
KENEWA	3	7	13	193
KEWA	3	8	8	191
KIMAMA	3	7	14	191
KINI	3	7	15	329
KOTALE	3	8	9	191
KUBU	3	7	16	192
MAKAPA	3	8	10	191
MUMUNI	3	8	11	191
PEDAEYA	3	7	20	249
PIKIWA	3	8	12	191
PISI	3	8	13	191
SAWASE	3	7	21	193
SAWETA	3	7	22	191
TAI	3	8	14	191
ULADU	3	7	25	191
WASAPEA	3	8	15	191
WAYA	3	7	28	193
YOU	3	8	16	329

APPENDIX A.1

NATIONAL POPULATION CENSUS PROVINCIAL CODES

Province	Abbreviation	Code
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, WESTERN PROVINCE[1]

Code	Division
01	**DARU DISTRICT**
01	EAST KIWAI
02	WEST KIWAI
03	ORIOMO-BITURI
02	**MOREHEAD DISTRICT**
04	TRANSFLY
05	BENSBACH
06	SARU
03	**BALIMO DISTRICT**
07	EAST GOGODALA
08	WEST GOGODALA
09	UPPER BAMU
10	LOWER BAMU
11	GAMA RIVER
04	**NOMAD DISTRICT**
12	MIDDLE FLY
13	LAKE MURRAY
14	TOMU RIVER
15	LOWER RENTOUL
16	BIAMI
17	UPPER STRICKLAND
18	UPPER STRICKLAND TRIBUTARIES
19	PARE
05	**KIUNGA DISTRICT**
20	MOIAN
21	EAST AWIN
22	SOUTH AWIN
23	SOUTH OKTEDI
24	WEST AWIN
25	NORTH OKTEDI
26	NORTH AWIN
06	**TABUBIL DISTRICT**
27	NINGERUM
28	STAR MOUNTAIN
29	FAIWOLMIN
30	KABAN
31	MURRAY VALLEY
32	BULCHER

[1] 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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