

AUSTRALIAN AGENCY for INTERNATIONAL DEVELOPMENT

AGRICULTURAL SYSTEMS OF PAPUA NEW GUINEA

Working Paper No. 6

MILNE BAY PROVINCE

TEXT SUMMARIES, MAPS, CODE LISTS AND VILLAGE IDENTIFICATION

R.L. Hide, R.M. Bourke, B.J. Allen, T. Betitis, D. Fritsch, R. Grau, L. Kurika,
E. Lowes, D.K. Mitchell, S.S. Rangai, M. Sakiasi, G. Sem and B. Suma

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

PREFACE

Acknowledgments

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

Participants

The following persons participated in the production of this paper:

Papua New Guinea Department of Agriculture and Livestock: Michael Siri and Balthazar Wayi (coordination and planning); Thomas Betitis, Louis Kurika, Sam Rangai and Budary Suma (field mapping).

Division of Agriculture and Livestock, Department of Milne Bay: Mark A'Arón, Wilfred Giarua, David Mitchell, Kauwe Murley, Leki Rumulars, Michael Sakiasi, Lester Tapune and Weisman Kiram (field mapping).

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, Elanna Lowes, Stephen Lyons (research assistance); Merv Commons (technical assistance); Sandra Davenport, (editorial assistance).

Field survey

This report is based on field surveys carried out by three teams between January and March 1994. One team covered the mainland region from the border with Northern Province through to Milne Bay, traveling by dinghy along the coast, and by foot, road and aircraft inland. The other two teams both travelled by DAL work boats: one surveyed Esa'ala and Losuia Districts, the other Misima and Samarai Districts.

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.

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1. INTRODUCTION

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

Identification of agricultural systems and subsystems

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

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

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

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

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

Relationship to PNGRIS

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

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

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

Note for reprinted edition

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

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

References

Bellamy, J. (ed) 1986 *Papua New Guinea Inventory of Natural Resources, Population Distribution and Land Use Handbook*. CSIRO Division of Water and Land Resources, Natural Resources Series No. 6, Canberra.

Bourke, R.M. 1976 Food crop farming systems used on the Gazelle Peninsula of New Britain. In K. Willson and R.M. Bourke (eds) *Proceedings of the 1975 Papua New Guinea Food Crops Conference*, Department of Primary Industry, Port Moresby, 81-100.

Bourke, R.M., R.L. Hide, B.J. Allen, R. Grau, G.S. Humphreys and H.C. Brookfield 1993 Mapping agricultural systems in Papua New Guinea. In T. Taufa and C. Bass (eds) *Population, Family Health and Development. Volume 1 of Papers from the 19th Waigani Seminar, Port Moresby, 16-22 June 1991*. University of Papua New Guinea Press, Port Moresby, 205-224.

Brookfield, H.C. with D. Hart 1971 *Melanesia: a Geographical Interpretation of an Island World*. Methuen, London.

Cuddy, S.M. 1987 *Papua New Guinea Inventory of Natural Resources, Population Distribution and Land Use: Code Files Parts I-VII*. CSIRO Division of Water and Land Resources, Canberra.

Hackett, C. 1988 *Matching Plants and Land: Development of a General Broadscale System from a Crop Project for Papua New Guinea*. CSIRO Division of Water and Land Resources, Natural Resources Series No. 11, Canberra.

Hide, R.L. and S.M. Cuddy 1988 *Papua New Guinea Inventory of Natural Resources, Population Distribution and Land Use: Annotated and Selected Bibliography of Smallholder Farming Systems in PNG: Part I New Guinea Mainland, New Guinea Islands*. CSIRO Division of Water and Land Resources, Canberra.

National Nutrition Survey 1982/3. Provincial Tabulations. Papua New Guinea Institution of Medical Research and Nutrition Section, National Department of Health, Goroka.

Ruthenberg, H. 1980 *Farming Systems in the Tropics*. Oxford University Press, London.

Saunders, J.C. 1993 *Agricultural Land Use of Papua New Guinea* [map with explanatory notes]. Scale 1:1 000 000. PNGRIS Publication No. 1. CSIRO, Brisbane.

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

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

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

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

ENVIRONMENTAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CROP COMPONENTS

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

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

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

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

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

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

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

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

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

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

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

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

FORMS OF GARDEN AND CROP SEGREGATION

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

All presence and significance measures are coded as follows:

0	None
1	Minor or insignificant
2	Significant
3	Very significant

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

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

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

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

SOIL FERTILITY MAINTENANCE TECHNIQUES

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

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

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

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

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

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

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

OTHER AGRICULTURAL PRACTICES

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

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

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

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

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

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

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

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

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

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

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

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

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

MOUNDING TECHNIQUES

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

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

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

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

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

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

GARDEN BED TECHNIQUES

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

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

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

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

CASH EARNING ACTIVITIES

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

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

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

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

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

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

SURVEY DETAILS

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

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

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

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

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

The type of survey [SURVTYPE]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3. AGRICULTURAL SYSTEMS: TEXT SUMMARIES

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

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

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 %	

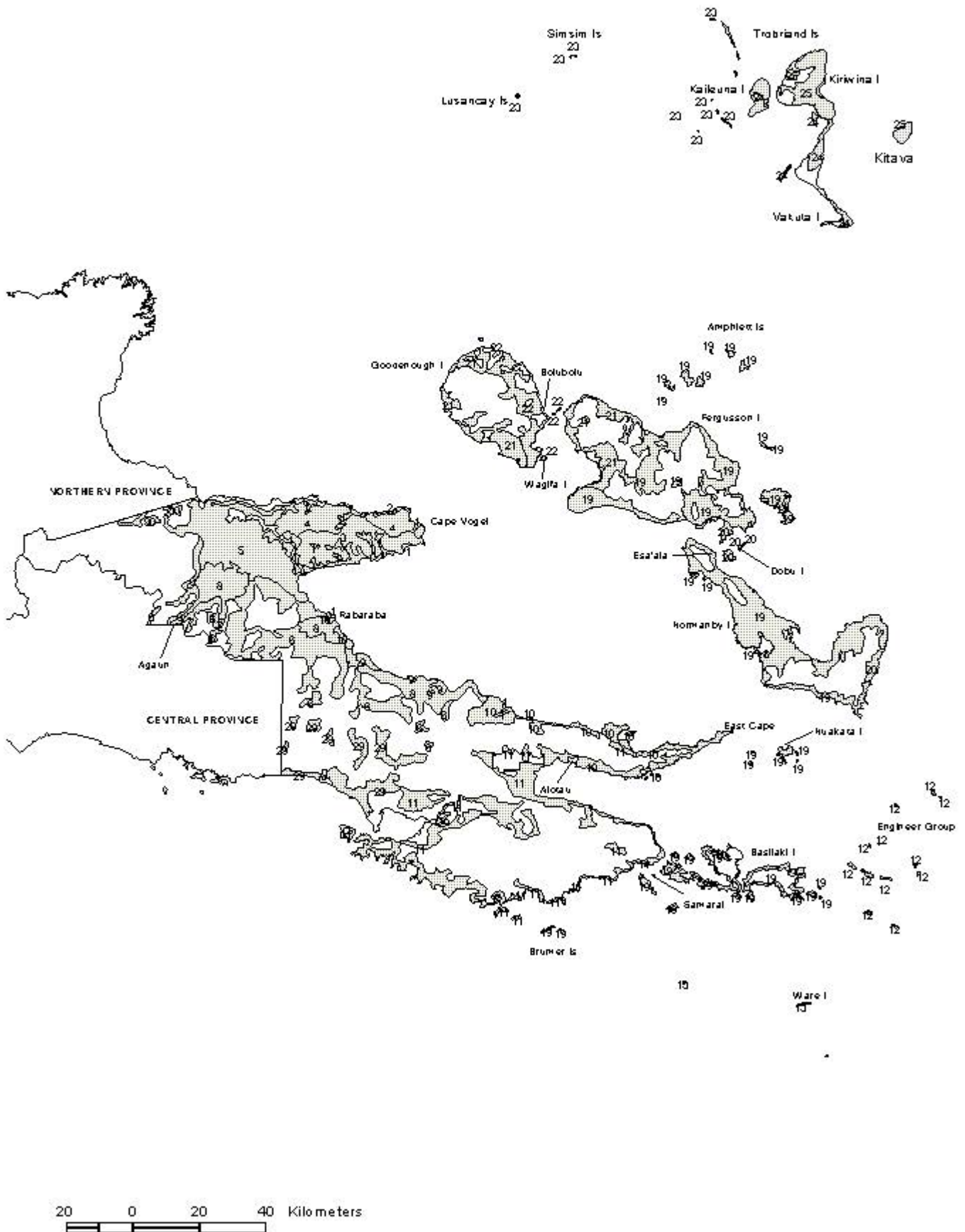
They contain information on Districts and subsystem extent only.

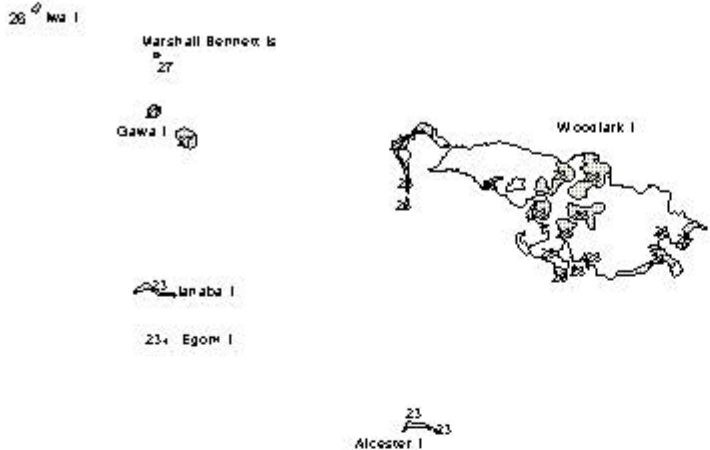
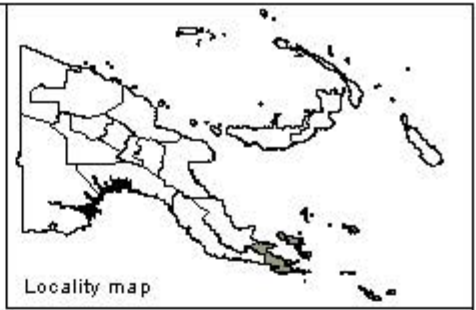
Headers on second and subsequent pages of summaries are as follows:

PROVINCE 15 West Sepik	AGRICULTURAL SYSTEM No. 1	Subsystem No 1 of 1
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MILNE BAY PROVINCE

Agricultural systems

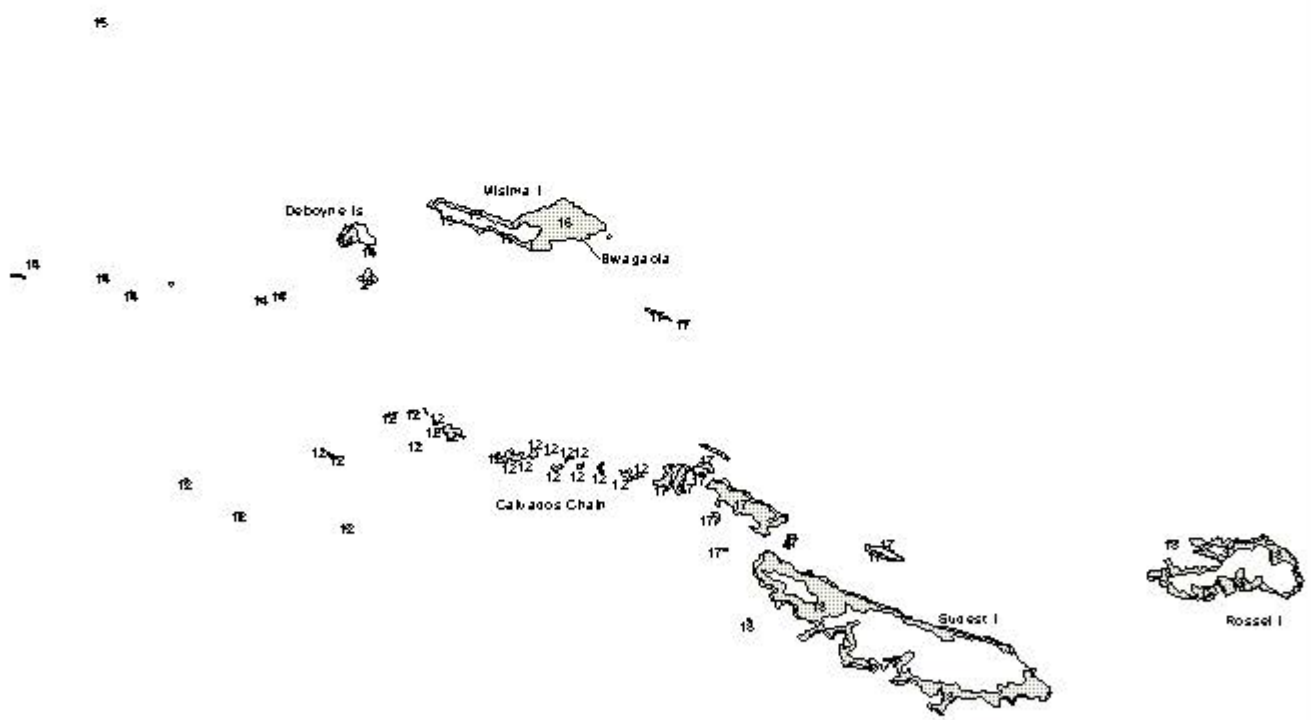




No agriculture

Agricultural system identified by number

Subsystems are present in systems 13, 14, 16, and 24



20 0 20 40 Kilometers

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 1	Subsystem No. 1 of 1
Districts 1 Rabaraba, 2 Alotau	Subsystem Extent 100 %	Area (sq km) 124
Population 2,148	Population density 17 persons/sq km	Population absent 15 %

System Summary

Located on the south side of the Cape Vogel peninsula in narrow, flat floored valley bottoms and along a narrow coastal terrace. The people who use this system also cultivate root crops on nearby hill slopes (System 0503). Woody regrowth, taller than 10 m and between 15 and 25 years old, is felled and burnt. Triploid ABB banana is the most important crop; coconut is an important crop; other crops are yams (*D. esculenta* and *D. alata*), cassava, taro, Chinese taro, *Alocasia* taro, sweet potato and Queensland arrowroot. New gardens are cleared between August and October and planted with root crops and bananas. After the harvest of the root crops, bananas are maintained as a monocrop. They produce for up to eight years. Fruit and nut trees are significant sources of food.

Extends across provincial border to System(s) None

Altitude range (m) 0-20 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Lowland pitpit, Peanuts, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Malay apple, Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Tulip, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	2 plantings
R VALUE	29 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fresh food	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	Minor
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	Minor
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	None
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	Significant

OTHER DOCUMENTATION**Survey description**

In January 1994, traverses by dinghy along the Cape Vogel peninsula and Rabaraba coast, with traverses inland on foot at Madina and Mukawa villages; from Mukawa to Cape Vogel airstrip, and from Banapa village to Menapi village; and an aerial inspection en route from Biniguni mission to Rabaraba via Cape Vogel (4 days). A dinghy traverse from Rabaraba station to Garuahi village via Radava, Vidia, Wedau and Topura villages (3 days).

Boundary definition

The boundaries with Systems 0503, 0504 and 0505 are based on field and aerial observations and on published sources. Land Systems 8, 9 and 17 in Haantjens et al. (1964) and the landforms map in Blake et al. (1973) were used to distinguish the alluvial valleys on the Cape Vogel peninsula from the grass and forest covered hills.

Notes

Two systems are found in close association in this area: one is dominated by the annual cultivation of root crops on steep coralline-limestone hill slopes (System 0503); the other, this system, is based on triploid ABB bananas which are cultivated for up to 8 years on heavy black soils in narrow, flat valley bottoms and on a coastal terrace. Some parts of these flats may be inundated from time to time. Bananas are more important than root crops in the diets of the people using these systems. Plantings are not made seasonally, except land is initially cleared between August and October. This is because the first crops planted are root crops, yam in particular, corn and greens. After the root crops have been harvested, more bananas are planted. Triploid ABB bananas are planted over the first two years of cultivation, until they dominate the garden, with some scattered cassava and sweet potato beneath. Weeds and grasses are slashed and left lying on the surface as a mulch. Bunches of maturing bananas are carefully wrapped and tied onto 3-4 m props to protect them from birds and to improve the appearance of the fruit when harvested. The use of magic to protect the bananas from sorcery attacks by other villagers is said to be very important. Even during severe droughts, greater emphasis is placed upon the failure of protective magic as an explanation of poor yields than lack of rain. The coastal strip and fallows are planted in many fruit and nut trees, including mango, Malay apple, citrus, Polynesian chestnut, Java almond and coconut. Fishing is an important source of food. Prior to about 1930, settlements were located inland on the hilltops. This system, with variants, is spreading from an origin on the south side of the Cape Vogel peninsula. It has reached Wanigela mission to the north in Oro Province and Topura village to the southeast. At Uga village, this system has replaced an irrigated taro system (0509) after the headworks of the irrigation were repeatedly destroyed by flooding.

National Nutrition Survey 1982/83

65 families from 3 villages were asked in February or August 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 97 per cent banana, 45 per cent yam, 25 per cent sweet potato, 12 per cent cassava, 6 per cent taro, 5 per cent sago and none Chinese taro. 9 per cent reported eating rice. 25 per cent reported eating fresh fish. This is similar to the crop pattern except for the high consumption of yam. This reflects the fact that people have yam gardens in System 0503.

Main References

None.

Other References

Betitis, T. 1992 Soil survey and land evaluation of Koiabagira/Sirisiri, Goodenough Bay. Report No. 657, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

Betitis, T. and W. Daure 1993 Soil survey and land evaluation of Ruaba Basin, Milne Bay Province. Report No. 658, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

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

Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 2	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 62
Population 933	Population density 15 persons/sq km	Population absent 23 %

System Summary

Located on the north and northeast side of the Cape Vogel peninsula. People who use this system also grow root crops on nearby hill slopes (System 0504), and people living on the hill slopes in System 0504 also grow bananas in this system. Short grass and low leguminous shrubs, between 5 and 10 years old, are cleared and burnt. The site is dug over twice to remove grass roots. Triploid ABB banana is the most important crop; coconut is an important crop; other crops are yams (*D. esculenta* and *D. alata*), cassava, taro, Chinese taro, *Alocasia* taro, sweet potato and Queensland arrowroot. Root crops, corn and greens are planted with bananas from October to December. Two plantings of root crops are made and the bananas are maintained for a third year before fallowing. In the second and third year banana densities are increased. Fruit and nut trees are significant sources of food. Fish are an important source of food.

Extends across provincial border to System(s) None

Altitude range (m) 0-20 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Banana
STAPLES SUBDOMINANT	Coconut
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Lowland pitpit, Peanuts, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Malay apple, Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Tulip, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	23 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Crocodile	Minor
3 Fresh food	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	Minor
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	Minor
SMALL MOUNDS	None
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	None
SEASONAL SEC'DARY CROPS	Significant

OTHER DOCUMENTATION**Survey description**

In January 1994, traverses by dinghy along the Cape Vogel peninsula and Rabaraba coast, with traverses inland on foot at Madina and Mukawa villages; from Mukawa to Cape Vogel airstrip, and from Banapa village to Menapi village; and an aerial inspection en route from Biniguni mission to Rabaraba via Cape Vogel (4 days). A dinghy traverse from Rabaraba station to Garuahi village via Radava, Vidia, Wedau and Topura villages (3 days).

Boundary definition

The boundaries with Systems 0503, 0504 and 0505 are based on field and aerial observations and on published sources. Land Systems 8, 9 and 17 in Haantjens et al. (1964) and the landforms map in Blake et al. (1973) were used to distinguish the alluvial valleys on the Cape Vogel peninsula from the grass and forest covered hills.

Notes

The population density figure displayed above includes 600 people resident in System 0501. Two systems are found in close association in this area: one is dominated by the annual cultivation of root crops on steep hill slopes (System 0504); the other, this system, is based on triploid ABB bananas which are cultivated in alluvial soils in flat valley bottoms and on a coastal terrace. Some parts of these flats may be inundated from time to time. This system is similar to System 0501 except that the fallow vegetation is grass and shrubs rather than tall woody regrowth, and both the fallow and cultivation periods are shorter. Banana is more important than root crops in the diets of the people using these systems. Triploid bananas are said to have become the most important crop relatively recently following the adoption of a variant of System 0501 from the south coast of the Cape Vogel peninsula. When a site is cleared for cultivation, root crops (yams, cassava and sweet potato) are planted with banana in segregated blocks. More bananas are planted in the second year until by the third year, the garden is almost a banana monocrop. At the end of the third year, banana suckers are transferred to a new garden, although the old garden continues to produce for at least two more years without further maintenance. Weeds and grasses are slashed and left lying on the surface as a mulch. Bunches of maturing bananas are carefully wrapped and tied onto 3-4 m props to protect them from birds and to improve the appearance of the fruit when harvested. The coastal strip and fallows are planted in many fruit and nut trees, including mango, Malay apple, citrus, Polynesian chestnut, Java almond and coconut. Fishing is an important source of food. Prior to about 1930, settlements were located inland on the hilltops.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Rew, A. 1980 A ranch for Cape Vogel: failure and promise in regional development. In Walter, M.A.H.B. (ed), Cattle Ranches are About People: Social Science Dimensions of a Commercial Feasibility Study. Monograph No. 14. Port Moresby, Institute of Applied Social and Economic Research, 43-97.

Other References

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

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 3	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 246
Population 0	Population density 0 persons/sq km	Population absent 0 %

System Summary

Located on the southern side of the Cape Vogel peninsula on hill slopes. No population is assigned to this system because the people who use this system live in nearby valleys and on a coastal terrace where they also grow bananas (System 0501). Woody regrowth, taller than 10 m and older than 15 years is felled and burnt. Cassava and sweet potato are the most important crops; yam (*D. esculenta*) is an important crop; other crops are banana, Chinese taro, taro, Alocasia taro, Amorphophallus taro, yam (*D. alata*) and Queensland arrowroot. Gardens are planted in October to December. Two plantings are made before fallowing. Yams are planted first together with some sweet potato and cassava. In the second planting, sweet potato and cassava are more important; some yams may be replanted. Fruit and nut trees are significant sources of food. Fish are an important food.

Extends across provincial border to System(s) None

Altitude range (m) 0-100 **Slope** Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	Cassava, Sweet potato
STAPLES SUBDOMINANT	Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Cucumber, Lowland pitpit, Peanuts, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Malay apple, Mango, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Coconut, Java almond, Tulip, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fresh food	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	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	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In January 1994, traverses by dinghy along the Cape Vogel peninsula and Rabaraba coast, with traverses inland on foot at Madina and Mukawa villages; from Mukawa to Cape Vogel airstrip, and from Banapa village to Menapi village; and an aerial inspection en route from Biniguni mission to Rabaraba via Cape Vogel (4 days). A dinghy traverse from Rabaraba DHQ to Garuahi village via Radava, Vidia, Wedau and Topura villages (3 days).

Boundary definition

The boundaries with Systems 0501, 0502, 0504 and 0505 are based on field and aerial observations and on published sources. The landforms and vegetation maps in Blake et al. (1973), Land Systems 8, 9 and 17 in Haantjens et al. (1964) and the agricultural land use map in Saunders (1993) were used to distinguish the forested and grass covered, hilly land on the Cape Vogel peninsula from the alluvial valley floors.

Notes

This hill slope root crop system is closely associated with one based on triploid bananas which are continuously cultivated for up to 8 years in narrow, flat valley bottoms and on a narrow coastal terrace (System 0501). Banana is more important than root crops in the diets of the people using these systems. Patches of grass which occur on the hills are not used for cultivation. Most garden sites are located on steep slopes on coral-limestone soils. Soil retention barriers are not used, probably because the outcropping rock prevents slope failure and reduces surface wash. Planting can be delayed by a failure of early wet season rains but yams which are planted later than January are said to be unlikely to yield well. Yams from the first planting are harvested in June and July. They are divided into those to be stored and consumed later, those for replanting in the following November and those for immediate replanting. Yams from the second harvest in December are consumed immediately. Taro, which is nurseried in damp areas near streams to maintain it during the the dry season, is planted out in January. Yams are usually segregated from other crops and cassava tends to be planted on upper slopes and in hedgerows through the garden. Flowers and mint plants are commonly planted in the gardens. The use of magic to protect crops from sorcery attacks by other villagers is said to be very important. The coastal terrace and valley floors are planted in numerous fruit and nut trees, including mango, Malay apple, citrus, Polynesian chestnut, Java almond and coconut. Prior to about 1930, settlements were located inland on the hilltops.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

- Betitis, T. 1992 Soil survey and land evaluation of Koiabagira/Sirisiri, Goodenough Bay. Report No. 657, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.
- Betitis, T. and W. Daure 1993 Soil survey and land evaluation of Ruaba Basin, Milne Bay Province. Report No. 658, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.
- Blake, D.H., P. Pajmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 4	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 226
Population 599	Population density 7 persons/sq km	Population absent 18 %

System Summary

Located on the northern side of the Cape Vogel peninsula where short grasses dominate on upper hill slopes and degraded lowland hill forest occupies lower slopes and narrow valley floors. Residents in the area occupied by this system also use nearby flat valley floors and a coastal terrace to grow bananas (System 0502), and people living in System 0502 grow root crops here. Gardens are sited on steep lower hillslopes and on narrow, discontinuous valley bottoms. Short grass and woody regrowth fallows less than 10 m tall and between 8 and 10 years old are cleared and burnt. All gardens are fenced. Cassava and sweet potato are the most important crops; yam (*D. esculenta*) is an important crop; other crops are banana, taro, Chinese taro, yam (*D. alata*), *Alocasia taro*, and *Amorphophallus taro*. Gardens are planted between October and December. Two plantings are made before fallowing. Yams are planted first together with some sweet potato and cassava. In the second planting, sweet potato and cassava are more important; some yams may be replanted. Fruit and nut trees are significant sources of food.

Extends across provincial border to System(s) None

Altitude range (m) 0-80 **Slope** Steep (10-25 degrees)

CROPS

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

FALLOW & CROPPING PERIOD

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In January 1994, traverses by dinghy along the Cape Vogel peninsula and Rabaraba coast, with traverses inland on foot at Madina and Mukawa villages; from Mukawa to Cape Vogel airstrip, and from Banapa village to Menapi village; and an aerial inspection en route from Biniguni mission to Rabaraba via Cape Vogel (4 days). A dinghy traverse from Rabaraba station to Garuahi village via Radava, Vidia, Wedau and Topura villages (3 days).

Boundary definition

The boundaries with Systems 0501, 0502, 0503 and 0505 are based on field and aerial observations and on published sources. The landforms and vegetation maps in Blake et al. (1973), Land Systems 8, 9 and 17 in Haantjens et al. (1964) and the agricultural land use map in Saunders (1993) were used to distinguish the forested and grass covered, hilly land on the Cape Vogel peninsula from the alluvial valley floors.

Notes

This hill slope root crop system is closely associated with one based on triploid bananas which are cultivated for three years in flat valley bottoms and on a narrow coastal terrace (System 0502). The population density calculated for this system includes the resident population of 599 and the 933 people who live in System 0502. Banana is more important than root crops in the diet of the people using these systems. This system is almost identical to System 0503 on the south side of the Cape Vogel peninsula except that fallow vegetation here contains more grass (covering up to 80 per cent of the area) and low woody regrowth, and fallow periods are shorter. Observation from the air confirmed that almost no gardens are made in grass fallows. Grasslands are burnt annually. Cattle which have escaped from the Pumani cattle project cause damage to gardens here and are hunted for meat.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Rew, A. 1980 A ranch for Cape Vogel: failure and promise in regional development. In Walter, M.A.H.B. (ed), Cattle Ranches are About People: Social Science Dimensions of a Commercial Feasibility Study. Monograph No. 14. Port Moresby, Institute of Applied Social and Economic Research, 43-97.

Other References

Betitis, T. and W. Daure 1993 Soil survey and land evaluation of Ruaba Basin, Milne Bay Province. Report No. 658, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

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

Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 5	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 516
Population 1,401	Population density 3 persons/sq km	Population absent 8 %

System Summary

Located inland of a coastal escarpment in poorly drained, forested valley bottoms in a large area of short grassland surrounding the swampy headwaters of the Kwinimaga River; and along the base of the main mountain range from Biniguni mission to Pumani mission and Sirisiri village. Woody regrowth, taller than 10 m and older than 20 years is felled and burnt. Sweet potato is the most important crop; yam (*D. esculenta*), cassava and banana are important crops; other crops are taro, yam (*D. alata*), Chinese taro and sago. Up to three crops may be planted before fallowing. Yams and sweet potato are segregated when planted in the same garden. Yams are planted between December and January. Sweet potato is planted from April and harvested from September. Cassava is planted at any time. Fruit and nut trees are significant sources of food.

Extends across provincial border to System(s) None

Altitude range (m) 20-150 **Slope** Gentle (2-10 degrees)

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fresh food	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	Significant
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	Very significant
SEASONAL SEC'DARY CROPS	Very significant

OTHER DOCUMENTATION**Survey description**

In January 1994, traverses by dinghy along the Cape Vogel peninsula and Rabaraba coast, with traverses inland on foot at Madina and Mukawa villages; and an aerial inspection en route from Biniguni mission to Rabaraba via Cape Vogel (4 days). A traverse on foot from Agaun mission to Pumani health centre via Danawan, Gwawi, Nauwandowan and Bimat villages (4 days). An aerial inspection en route from Rabaraba airstrip to Agaun airstrip and from Pumani airstrip to Biniguni airstrip. A dinghy traverse from Rabaraba station to Uga village (1 day).

Boundary definition

The boundaries with Systems 0501, 0502, 0503, 0504, 0506 and 0508 are based on field and aerial observations and on published sources. The landforms and vegetation maps in Blake et al. (1973), Land Systems 8, 9, 17 and 18 in Haantjens et al. (1964) and the agricultural land use map in Saunders (1993) were used to distinguish between forested and grass covered, hilly land, low hills and alluvial valleys and plains.

Notes

The northeastern part of this system occurs in extensive areas of short grasslands. No gardens are made in the grasslands. Gardens are made in woody regrowth in narrow valley bottoms and on alluvial and colluvial river terraces and rolling hills. Before 1945, taro was more important than it is now and sweet potato less important. Sweet potato is now planted as a first crop with yam in segregated blocks; it is a second and sometimes a third planting with cassava and banana. Yams are sometimes planted in second year gardens. Near the coast and in the Ruaba River Valley, this system is associated with an intensive banana system (System 0502). A large provincial government supported cattle project is located at Maurebi, north of Pumani airstrip, but appears to provide little employment or cash earning opportunities (see Rew 1980 for an early appraisal of this project). Many beasts have become feral and gardens are fenced against them. They are hunted for meat by villagers right across the Cape Vogel peninsula.

National Nutrition Survey 1982/83

9 families from 1 village were asked in August 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 89 per cent yam, 67 per cent sweet potato, 33 per cent cassava, 33 per cent banana, 22 per cent taro and none sago or Chinese taro. 11 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the high consumption of coconut and yam.

Main References

Rew, A. 1980 A ranch for Cape Vogel: failure and promise in regional development. In Walter, M.A.H.B. (ed), Cattle Ranches are About People: Social Science Dimensions of a Commercial Feasibility Study. Monograph No. 14. Port Moresby, Institute of Applied Social and Economic Research, 43-97.

Other References

Betitis, T. 1992 Soil survey and land evaluation of Koiabagira/Sirisiri, Goodenough Bay. Report No. 657, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

Betitis, T. and W. Daure 1993 Soil survey and land evaluation of Ruaba Basin, Milne Bay Province. Report No. 658, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

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

Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 6	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 677
Population 6,929	Population density 12 persons/sq km	Population absent 9 %

System Summary

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

Extends across provincial border to System(s) 0322

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

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

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

OTHER AGRONOMIC PRACTICES

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	Very significant
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	Significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

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

Boundary definition

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

Notes

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

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

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

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

National Nutrition Survey 1982/83

15 families from 1 village were asked in August 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 93 per cent sweet potato, 60 per cent taro, 33 per cent banana, 7 per cent cassava, 7 per cent Chinese taro and none sago or yam. 13 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the high consumption of coconut.

Main References

None.

Other References

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

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 7	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 9
Population 1,320	Population density 75 persons/sq km	Population absent 10 %

System Summary

Located on flat, open valley floors at Agaun station and Param mission above 900 m altitude. Villages are located along the boundary between System 0506 and this system and people make gardens in both systems. Tall grasses and low scattered shrubs are cut down and burnt. Fallows are between 5 and 10 years old. Most gardens are fenced. Taro and sweet potato are the most important crops; banana is an important crop; other crops are cassava, Chinese taro, potato and yams (*D. esculenta* and *D. bulbifera*). Two plantings are made before fallow. In three-quarters of the gardens, taro is planted first with small segregated plots of yams; in the remainder, sweet potato and some bananas are planted first. Sweet potato is the second planting in all gardens. Gardens are planted between September and December. Fruit and nut trees are significant sources of food.

Extends across provincial border to System(s) None

Altitude range (m) 900-1200 **Slope** Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT	Sweet potato, Taro (<i>Colocasia</i>)
STAPLES SUBDOMINANT	Banana
STAPLES PRESENT	Banana, Cassava, Chinese taro, Potato, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>), Yam (<i>D. bulbifera</i>)
OTHER VEGETABLES	Aibika, Amaranthus spp., Bean (lablab), Bean (winged), Corn, Highland pitpit, Lowland pitpit, Pumpkin fruit, Other
FRUITS	Avocado, Malay apple, Marita pandanus, Orange, Pineapple, Sugarcane, Watermelon
NUTS	Candle nut, Finschia, Galip, Karuka (wild), Okari
NARCOTICS	Betel nut (highland), Betel nut (lowland), Betel pepper (highland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coffee Arabica	Minor
2 Fresh food	Minor
3 Potato	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	Significant
SMALL MOUNDS	None
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	Very significant
SEASONAL SEC'DARY CROPS	Very significant

OTHER DOCUMENTATION**Survey description**

In January 1994, a traverse on foot from Agaun mission to Pumani health centre via Danawan, Gwawi, Nauwandowan and Bimat villages (4 days). An aerial inspection en route from Rabaraba airstrip to Agaun airstrip and from Gurney airport to Jacksons airport.

Boundary definition

The boundaries with Systems 0506 and 0508 are based on a walking traverse from Agaun station to Pumani mission, aerial observations and published documents. The geology map (1:1,000,000) in Blake et al. (1973) was used to distinguish the alluvial and colluvial deposits of the flat valley floor and gently sloping fans on which this system is located, from the strongly dissected sandstones, mudstones, siltstones and conglomerates and metamorphics of the surrounding mountains.

Notes

This system is restricted to poorly drained, alluvial and low alluvial fans on the grass covered valley floors at Agaun station and Param mission. Most households living in the area also make bush fallow gardens in System 0506 on the forested slopes above the valley floors. The population density displayed is adjusted to take this practice into account. Fewer make gardens in grasslands in System 0508. In parts of the gardens, the roots of tall cane grass are dug out before crops are planted. At the lower end of the valley, stones are placed in strips down the slopes and crops planted between them in segregated plots. Where taro is planted as the first crop, it is commonly followed by sweet potato as the second planting. Where sweet potato is the first crop, there is usually no second planting. Sweet potato is commonly planted in very small mounds. Sugarcane and yams are staked. House gardens are important and contain sweet potato, cassava, corn, taro and banana. Villages are located in the grasslands but are surrounded with large numbers of fruit and nut trees. Relatively large blocks of Arabica coffee exist near villages but are badly cared for and are overgrown. Some villages raise sheep in fenced paddocks in the grasslands. Attempts have been made to grow commercial amounts of temperate vegetables at Agaun, but production appears to be very low. The area is served by two commercial aircraft flights per week.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

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

Haantjens, H.A., E.A. Fitzpatrick, B.W. Taylor and J.C. Saunders 1964 General report on lands of the Wanigela-Cape Vogel area, Territory of Papua and New Guinea. Land Research Series No. 12, Commonwealth Scientific and Industrial Research Organization, Melbourne.

Rangai, S.S. 1992 Smallholder Market Access and Food Supply Project: Rabaraba District, Milne Bay Province. Phase 4 Rapid Rural Appraisal Report, Department of Agriculture and Livestock, Port Moresby.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 8	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 388
Population 3,065	Population density 8 persons/sq km	Population absent 15 %

System Summary

Located on steep, grass covered mountains and razor-back-ridge hill country from the Nauwandawan gorge east to Agaun station, Mt Gwoira and Aragip mission and from the inland of Uga Point along the coast to the immediate southeast of Wedau mission. Short grass fallows around 25 to 30 years old on very steep hillslopes are slashed and burnt. The site is dug into a series of horizontal steps or terraces, about 100 cm high and 50 to 70 cm wide. Taro and sweet potato are the most important crops; other crops are cassava, banana and yam (*D. alata*). Gardens are cleared from September and are planted by December. A monocrop of taro is the first planting; sweet potato with some cassava is planted in second and subsequent plantings. Second and subsequent plantings are not made seasonally. Between two and five plantings are made before fallowing. Fruit and nut trees are significant sources of food.

Extends across provincial border to System(s) None

Altitude range (m) 400-1000 **Slope** Very steep (>25 degrees)

CROPS

STAPLES DOMINANT	Sweet potato, Taro (<i>Colocasia</i>)
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Cassava, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>)
OTHER VEGETABLES	Aibika, Bean (<i>lablab</i>), Bean (<i>winged</i>), Corn, Lowland pitpit, Pigeon pea
FRUITS	Avocado, Malay apple, Mango, Marita pandanus, Pawpaw, Pineapple, Watermelon
NUTS	Breadfruit, Finschia, Galip, Karuka (<i>wild</i>), Okari
NARCOTICS	Betel nut (<i>highland</i>), Betel nut (<i>lowland</i>), Betel pepper (<i>highland</i>), Betel pepper (<i>lowland</i>), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short grass
SHORT FALLOW	None
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	3-5 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coffee Arabica	Minor
2 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In January 1994, a traverse on foot from Agaun mission to Pumani mission via Danawan, Gwawi, Nauwandowan and Bimat villages (4 days). An aerial inspection en route from Rabaraba station to Agaun station and from Pumani to Biniguni mission, a dinghy traverse from Rabaraba station to Uga village (1 day). A dinghy traverse from Rabaraba to Topura village via Radava, Vidia and Wedau villages (3 days).

Boundary definition

The boundaries with Systems 0505, 0506, 0507, 0509 and 0510 are based on walking traverses from Agaun station to Pumani mission and from Wedau mission inland, on aerial observations and published documents. The landforms and vegetation maps in Blake et al. (1973), Land Systems 1, 4, 8, 18 and 21 in Haantjens et al. (1964) and the agricultural land use map in Saunders (1993), were used to distinguish between forested and grass covered mountains, hilly land, low hills and alluvial plains. The boundary with System 0511 is the watershed of the main range west of Cape Frere.

Notes

The characteristic field marks left by this system provide evidence of its use right across the grass covered mountains and 'badlands' (Haantjens et al. 1964) from Mt Dayman to Wedau. The first written account seems to be that of Rangai (1992). Present occupants explain that most of this land has been cultivated in the past and that the previous forest cover was destroyed by cultivation. Little land is presently cultivated. Most people who use this system also use forest fallows (System 0506) along the present forest-grassland boundary with sweet potato as the most important crop. Movements of people from the interior to the coast during the past 80 years has further reduced land use in this system. Taro is planted first as a monocrop and takes almost a year to mature. After the taro harvest, sweet potato, cassava and sometimes yam (*D. alata*) are planted. Up to four plantings of sweet potato and cassava may follow the initial taro crop. The terraces or steps are constructed by a number of men working together in a line moving from the bottom of the slope to the top. Wooden digging sticks were previously used but have been replaced by metal spades. The first step is formed and spoil from the next step is brought down on top of the first to form a low ridge along the top of the first step. In this way the whole slope is stepped and ridged. Taro is planted into the ridge of spoil. The outcome is similar to complete soil tillage. It seems likely that ground water seeps out of the step wall and collects behind the ridges, but the technique is described mainly in terms of soil retention. It is said that, unless this technique is used, severe soil loss will result if substantial rain is received. Vegetables are grown almost solely in house gardens which contain aibika, lablab beans, winged beans, corn, lowland pitpit and pigeon pea. Villages are surrounded by numerous fruit and nut trees including mango, Malay apple, citrus, okari, Polynesian chestnut, Java almond, breadfruit and coconut.

National Nutrition Survey 1982/83

67 families from 3 villages were asked in February or September 1983 what they had eaten the previous day. 73 per cent reported eating sweet potato, 21 per cent banana, 16 per cent Chinese taro, 4 per cent coconut, 4 per cent taro, 1 per cent cassava and none sago or yam. 4 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the low taro consumption, and the higher than expected consumption of Chinese taro and banana.

Main References

Rangai, S.S. 1992 Smallholder Market Access and Food Supply Project: Rabaraba District, Milne Bay Province. Phase 4 Rapid Rural Appraisal Report, Department of Agriculture and Livestock, Port Moresby.

Other References

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

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 9	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 33
Population 1,739	Population density 53 persons/sq km	Population absent 29 %

System Summary

Located on coastal alluvial terraces and fans between Rabaraba station and Topura village. Fallow vegetation of short grass and low woody regrowth, between 8 and 10 years old, is slashed. Cut vegetation is burnt or removed from the site by hand. The soil is worked into a fine tilth. Taro and sweet potato are the most important crops; banana, cassava and coconut are important crops; other crops are yams (*D. esculenta*, *D. alata* and *D. nummularia*), *Amorphophallus taro* and Queensland arrowroot. Two plantings are made before fallowing. The first planting is dominated by taro, the second by banana, sweet potato, cassava and sugarcane. Both crops are flood irrigated with water led to the gardens in ditches from sources some kilometres away. Taro and banana are planted all year round. Yams are only planted between December and March. Bananas are also planted in separate, unirrigated gardens as a monocrop. Fruit and nut trees are significant sources of food. At Vidia village, fallow periods are shorter, fallow vegetation is short grass and cassava has replaced taro as the most important crop.

Extends across provincial border to System(s) None

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

CROPS

STAPLES DOMINANT	Sweet potato, Taro (<i>Colocasia</i>)
STAPLES SUBDOMINANT	Banana, Cassava, Coconut
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot, Taro (<i>Amorphophallus</i>), Yam (<i>D. nummularia</i>)
OTHER VEGETABLES	Aibika, Bean (lablab), Corn, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Bean (snake), Spring onion, Other, Pigeon pea
FRUITS	Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Polynesian chestnut
NARCOTICS	Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Grass/woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fish	Minor
3 Fresh food	Minor

OTHER AGRONOMIC PRACTICES

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

In January 1994, a dinghy traverse from Rabaraba station to Topura village via Radava, Vidia and Wedau villages (3 days).

Boundary definition

The boundaries with System 0508 are based on walking traverses inland from the coast at Radava village, Wedau village and Vidia village, and published documents. The geology map (1:1,000,000) in Blake et al. (1973) was used to distinguish the alluvial and colluvial deposits of the flat to gently sloping river terraces and fans, on which this system is located, from the strongly dissected sandstones, mudstones, siltstones and conglomerates of the coastal mountains.

Notes

The outstanding feature is the irrigation of relatively large areas of land under shifting cultivation. This allows crops to be cultivated through the dry season from April to November when monthly rainfall is consistently below 100 mm. A weir constructed from boulders is placed across part of the river, 3 to 4 kilometres inland. This raises the water to the level of a large ditch (called a 'doba'). 'Doba' run along the contour on the inland and upslope side of the irrigable land. Water is led to the fields being cultivated through a large number of smaller ditches, most of which are hidden beneath fallow vegetation. When a field is brought back into cultivation, the fallow vegetation is cut. The cut grass may be left lying on the surface for some time, before it is removed by hand or burnt. The site is dug over up to three times by groups of men using heavy metal forks, to remove grass roots. The soil is worked into a fine tilth. Men plant taro progressively across the gardens, usually from the inland side towards the coast and from east to west. Yams are planted in a narrow strip around the three inland sides of the garden. Taro is planted into 10 to 15 cm deep holes made with a digging stick, which are filled in as the plants mature. About 75 per cent of the taro planted is single stalks for consumption and about 25 per cent is clusters of 3 or 4 small suckers planted into a single hole which will be replanted later into new gardens. Women weed, mound earth around the growing tubers and cut away dried leaves. Men harvest. After the taro harvest, bananas, sweet potato, cassava, lowland pitpit and sugarcane are planted. These crops are also irrigated. Kahn (1984, 207) noted that at Wamira in 1978 only taro gardens ('wapu') were irrigated (presumably for both years of cultivation, p.207, footnote 2), while separate banana gardens (known as 'peipei') were not.

Cowpea beans (*Vigna sinensis*) are used as a vegetable here. Taro is affected by a leaf disease, probably taro blight. The disease is less serious now than in the 1970s. A very limited dietary survey by Kahn (1986, 54, 173) found that in terms of weight and calories, taro and sweet potato were almost of equal importance as foods. In contrast the National Nutrition Survey found at Wamira in March 1983 that coconut, rice, cassava, sweet potato and tinned fish were the foods most commonly eaten by 22 families.

Taro growing was formerly surrounded by many customary restrictions and the use of magic. Magic remains an important part of taro growing, but many of the old customs are rapidly being lost. For example no fenced gardens were observed at Wedau in 1994, whereas Kahn (1986) found all gardens fenced against supernatural attack at nearby Wamira between 1976 and 1982. Floods in the main rivers frequently damage the irrigation system intakes. It is possible, but not certain, that floods are more frequent now than they used to be. People using the irrigation systems say the cultivation of land in the headwaters has removed forest there, causing flashier flooding. Taro was formerly irrigated at Uga Point, north of Rabaraba station and Musara south of Rabaraba, but the main irrigation headworks and ditches there have been destroyed by repeated flash flooding and continuous taro cultivation has been replaced with intensive banana production (System 0501).

Villages and paths are planted with numerous fruit and nut trees. Kahn (1986, 50) lists the most important species and their main production periods as mango (October to January), Malay apple (December to February), Polynesian chestnut (October to December) and Java almond (February to May). Betel nut is not grown near the coastal villages but is imported from inland. Coconut is used daily as a food. Freshwater and saltwater fish, shellfish and crustacea and pigs, bandicoots and birds are fished or hunted and eaten.

At Vidia village between Radava and Wedau villages, about 350 people use similar irrigation methods to those at the Mase and Wamira Rivers, although the irrigated area is much smaller. Here water is relatively abundant, but land suitable for irrigation is restricted. Soils are colluvial containing many stones. During cultivation the stones are removed by hand and thrown onto what are now substantial heaps in the middle of fields and to ridges around the edges. Fallow vegetation is short grass and fallow periods are around 5 years. Taro yields are no longer satisfactory and taro has been replaced as the most important crop by cassava. Yam (*D. esculenta*), cassava and sweet potato are planted in the first

Notes continued

year; sweet potato, cassava and sugarcane are planted in the second year. There is a widespread concern over the future of this system at Vidia. The people at Vidia also cultivate gardens inland in Systems 0506 and 0508. The possibility of a permanent return to inland settlement sites is presently under serious consideration in the village.

National Nutrition Survey 1982/83

22 families from 1 village were asked in March 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 45 per cent cassava, 32 per cent sweet potato, 9 per cent banana, 5 per cent taro, and none Chinese taro or yam. 82 per cent reported eating rice. 5 per cent reported eating fresh fish. The low taro consumption differs from the crop pattern.

Main References

Kahn, M. 1984 Taro irrigation: a descriptive account from Wamira, Papua New Guinea. *Oceania* 54, 3, 204-222.
Kahn, M. 1986 *Always Hungry, Never Greedy: Food and the Expression of Gender in a Melanesian Society*. Cambridge, Cambridge University Press.

Other References

Blake, D.H., P. Paijmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
Kahn, M. 1979 The spectre of famine in Wamira, Milne Bay Province. History of Agriculture Working Paper No. 25, University of Papua New Guinea and the Department of Primary Industry, Port Moresby.
Kahn, M. 1985 A sabotaged aqueduct: sociopolitical constraints on agricultural intensification in lowland Papua New Guinea. In Farrington, I.S. (ed), *Prehistoric Intensive Agriculture in the Tropics*. Oxford, BAR International Series 232, 683-698.
Kahn, M. 1988 'Men are taro' (they cannot be rice): political aspects of food choices in Wamira, Papua New Guinea. *Food and Foodways* 3, 41-57.
Newton, H. 1914 *In Far New Guinea*. London, Seeley, Service and Company.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 10	Subsystem No. 1 of 1
Districts 1 Rabaraba, 2 Alotau	Subsystem Extent 100 %	Area (sq km) 221
Population 4,524	Population density 20 persons/sq km	Population absent 16 %

System Summary

Located in small patches of woody regrowth on the north coast of the mainland, at Uga Point, and Rabaraba; and on steep, mainly grass covered, mountains and hills from Cape Frere (Girumia) to both sides of East Cape. Short grass areas are rarely cultivated, except on East Cape. In valley bottoms and on river terraces, woody regrowth taller than 10 m and between 15 and 20 years old, is cleared and burnt. Fallow periods are longer in the west than in the east; fallow vegetation is lower and scrubbier in the east. Yam (*D. esculenta*), sweet potato, cassava, coconut and taro are important crops, cassava, coconut and sago are more important towards the east; other crops are yams (*D. alata* and *D. nummularia*), Chinese taro, Alocasia taro and banana. Two plantings are made before fallowing. Fruit and nut trees are significant sources of food. New gardens are planted between October and January.

Extends across provincial border to System(s) None

Altitude range (m) 0-150 **Slope** Steep (10-25 degrees)

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Cocoa	Minor
2 Coconuts	Minor
3 Fresh food	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	Very significant
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	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Very significant

OTHER DOCUMENTATION**Survey description**

In January 1994, a dinghy traverse from Topura village to Garuahi village via Taupota village (2 days). Road traverses from Alotau to Garuahi via Huhuna village; from Bubuleta station to East Cape and Biwa village.

Boundary definition

The boundaries with System 0511 are based on vehicle traverses from Alotau to Garuahi village and from Bubuleta station to East Cape and Biwa village, and on published documents. The boundaries with 0501 are based on walking traverses at Topura village and the geology map (1:1,000,000) in Blake et al. (1973). The latter was used to distinguish the strongly dissected coastal mountains, on which this system is located, from the flat to gently sloping river terraces and fans of System 0501 at Topura village. The boundary with System 0508 is based on the landforms and vegetation maps in Blake et al. (1973) and the agricultural land use map in Saunders (1993), which distinguish between forested and grass covered mountains.

Notes

Located along the grass covered coastal mountains mainly at the mouths of streams in patches of gallery or narrow floodplain forest. A number of crops are important, but no crops stand out as most important. The eastern part of the coast, particularly from Taupota village east, appears in the past to have suffered periodically from severe food shortages brought about by drought. Government reports for the years 1895, 1896, 1899, 1902 and 1911 describing significant occurrences have been summarised by Kahn (1986, 56-58). A range of crops is maintained which can withstand drought (cassava, yams), and which can yield heavily in good years (sweet potato). Seed yams are stored in houses during the dry season and sweet potato in the ground as tubers. Taro and banana suckers are planted in nurseries in swamps and ox-bow lakes beside rivers to maintain them through the dry season. However, these run the risk of being lost to flash flooding caused by cyclonic rains. Crops are segregated into small blocks within gardens. On steep land, gardens are protected from erosion by logs, fixed by pegs, placed across the slope at frequent intervals. The crops in the second planting are usually similar to the first, but sometimes yams are more important in the first planting and sweet potato, cassava and bananas in the second. Sago is used as food about once per year in the west, but about once every six weeks in the east. The intensive banana system (0501) is spreading eastwards along the coast from the Cape Vogel peninsula. It has recently been adopted at Topura village, where the bananas are planted on forested river terraces above the flood level and this system (0510) occupies narrow valley bottoms in the surrounding low hills. East from Taupota village and Bubuleta station, fallow vegetation becomes lower and areas of grass become larger; fallow periods appear to be shorter; population density increases; and the soils become poorer. According to May and Tuckson (1982, 112), villagers at East Cape in the early 1970s did not produce all their own food. They exported clay pots to Normanby, Nuakata and Dobu Islands in exchange for yam, taro and betel nut. They also exported Polynesian chestnuts to Ware Island. Everywhere villages are surrounded by numerous fruit and nut trees including mango, Malay apple, citrus, Polynesian chestnut, Java almond, breadfruit and coconut. Villages in the eastern part of the system have good road access to Alotau market (see Jackson et al. 1973 for the origins of sellers at Alotau market in 1973, and Rural Statistics Section 1992 for the origins of produce by district in 1988).

National Nutrition Survey 1982/83

34 families from 2 villages were asked in February or March 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 68 per cent cassava, 21 per cent banana, 9 per cent sweet potato, 6 per cent yam and none taro, sago or Chinese taro. 56 per cent reported eating rice. 18 per cent reported eating fresh fish. This differs from the crop pattern, with lower consumption of sweet potato, yam and taro, and higher banana consumption.

Main References

None.

Other References

- Blake, D.H., P. Pajmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Cheung, P. 1980 Subsistence agriculture in Milne Bay Sub-District (1965). In, Six Studies in Subsistence Agriculture. Extension Bulletin No. 11. Port Moresby, Department of Primary Industry, 9-14.
- Cottrell-Dormer, W. 1961 Rural extension in eastern Papua. Papua and New Guinea Agricultural Journal 14, 2-3, 92-112.
- Jackson, R.T., D.A.M. Lea, A. O'Neill and A. Richardt 1973 Alotau - a new town in Papua New Guinea. Department of Geography, Occasional Paper No. 7, University of Papua New Guinea, Port Moresby.
- Kahn, M. 1986 Always Hungry, Never Greedy: Food and the Expression of Gender in a Melanesian Society. Cambridge, Cambridge University Press.

Other References continued

May, P. and M. Tuckson 1982 The Traditional Pottery of Papua New Guinea. Sydney, Bay Books.

Rural Statistics Section 1992 Report on Food Crop Market Survey 1988: Alotau. Port Moresby, Department of Agriculture and Livestock

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 11	Subsystem No. 1 of 1
Districts 2 Alotau, 3 Samarai	Subsystem Extent 100 %	Area (sq km) 723
Population 12,414	Population density 17 persons/sq km	Population absent 19 %

System Summary

Located inland of Bentley Bay on the Goodenough Bay side of East Cape Peninsula, on the coasts of Milne Bay, in the Maiwara, Gumini and Sagarai valleys and the Suau Coast. Woody regrowth, taller than 10 m and between 15 and 30 years old, is cut down and burnt. Sweet potato, taro, cassava, banana and coconut are important crops; other crops are Chinese taro, yams (*D. esculenta* and *D. alata*), *Amorphophallus* taro and sago. Sago is more important along the Suau Coast. Two plantings are made before fallowing. The first crop is dominated by taro and the second by sweet potato and cassava. New gardens are planted between October and January. Fruit and nut trees are significant sources of food. A number of villages produce smallholder oil palm in association with estates at Hagita and Sagarai.

Extends across provincial border to System(s) None

Altitude range (m) 10-300 **Slope** Multiple classes

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fresh food	Significant
2 Betel nut	Minor
3 Coconuts	Minor
4 Fish	Minor
5 Oil Palm	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	Minor
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	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In January 1994, a dinghy traverse from Topura village to Garuahi village via Taupota village (2 days). A series of road traverses from Alotau to East Cape via Biwa village; from Alotau to Hagita, Waigani, Naura, Watunou, Maiwara, Wagawaga, Daio and Gelemalaia villages; and from Alotau to Sagarai, and Borowai and Suaibina villages (4 days). A traverse by work boat along the Suau Coast, from Sideia Island to Aloalo village via Suau Island, and Ipulei and Saga'aho villages (4 days).

Boundary definition

The boundary with System 0506 is taken as the Owen Stanley divide. The boundary with System 0510 was based on a one day road traverse from Alotau to Huhuna village and from Bubuleta station to both sides of East Cape. The boundary with System 0519 was based on boat traverses from Sideia to the Suau Coast, and from Alotau to Sariba and Logea Islands. The boundary with System 0529 is based on the estimated area of influence of the large oil palm estates and road developments.

Notes

Located south of the Owen Stanley divide and south of the watershed on the East Cape peninsula (except for a small area around Huhuna village north of the East Cape divide), and extending to the Suau Coast. Rainfall in these areas is higher than on the Goodenough Bay coast and the dry season (not usually pronounced) occurs between November and February instead of May to November. In the Huhuna area, localised topographic conditions bring rain during the normal Goodenough Bay coast dry season. There is some variation within the system; in particular, fallow lengths, the importance of soil retention, fencing, staking of yams and in the use of sago. However overall the system is characterised by the cultivation of taro as a first planting everywhere, followed by a second planting of sweet potato and cassava. Banana, planted with the taro, matures over the two year life of the garden. Taro has probably declined in importance over the last 50 years, at least partly due to disease. However the staple combination of 'taro, sweet potato, yam, banana, and coconut, with sago as a standby' was recorded nearly 70 years ago on the Suau Coast (Williams 1933, 37). Soil retention barriers are significant in the vicinity of Milne Bay. At Hagita, Waigani, Naura and Sagarai, where people have been displaced by oil palm plantations, fallows older than 50 years are being cleared at present but elsewhere fallows are between 15 and 20 years. Along the main rivers, flooding contributes small amounts of silt to garden sites.

Sweet potato is planted in small mounds in most gardens. All gardens have a few yams segregated from other crops, but yams are a minor crop. Sago is an important food in places on the Suau coast; nearer to Alotau it is used infrequently. Purchased rice is a significant food near Alotau and has probably replaced sago. Villages are surrounded by numerous fruit and nut trees including mango, Malay apple, rukam, Polynesian chestnut, Java almond, breadfruit and coconut. Other fruit trees include orange, watery rose apple, mon, guava, golden apple and *Baccaurea papuana* (known as 'mabeo'). Other nuts include *Pangium edule* and cycads. Villagers in the Gurney, Hagita and Waigani areas are growing oil palm for sale to the factory at Hagita. In the Sagarai Valley, oil palm plantings are still immature. The northern part of the system has good road access to Alotau for the sale of fresh food (see Jackson et al. 1973 for the origins of sellers at Alotau market in 1973, and Rural Statistics Section 1992 for the origins of produce by district in 1988). Several other smaller markets occur away from Alotau (including Hagita, Sagarai, Fyfe Bay and Suau Island). In the eastern part of the Suau Coast, betel nut is an important source of cash income. It is sold at Samarai and Alotau within the province, and at Mailu and Port Moresby in Central Province. There is a high but variable rate of boat ownership along the Suau Coast; for example, 10 workboats and 14 dinghies were claimed at Suau Island, but none at Sago'aho village further west. Until the early 1980s, the region was one of the major copra producing areas in the province (Milne Bay Rural Development Study 1981, 44). Logging provided some income in the Sagarai area in the 1980s (Milne Bay Rural Development Study 1981, 31). In the last few years, there has been logging at Bila Bila Bay on the Suau Coast (Oa 1991).

National Nutrition Survey 1982/83

193 families from 9 villages were asked in February or March 1983 what they had eaten the previous day. 97 per cent reported eating coconut, 71 per cent sweet potato, 30 per cent banana, 19 per cent cassava, 17 per cent taro, 9 per cent sago, 7 per cent yam and none Chinese taro. 78 per cent reported eating rice. 24 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

None.

Other References

- Blake, D.H., P. Pajmans, J.R. McAlpine and J.C. Saunders 1973 Land-form types and vegetation of eastern Papua. Land Research Series No. 32, Commonwealth Scientific and Industrial Research Organization, Melbourne.
- Cheung, P. 1980 Subsistence agriculture in Milne Bay Sub-District (1965). In, Six Studies in Subsistence Agriculture. Extension Bulletin No. 11. Port Moresby, Department of Primary Industry, 9-14.
- Hays, T.E. 1991 'No Tobacco, No Hallelujah': missions and the early history of tobacco in eastern Papua. Pacific Studies 14, 4, 91-112.
- Jackson, R.T., D.A.M. Lea, A. O'Neill and A. Richardt 1973 Alotau - a new town in Papua New Guinea. Department of Geography, Occasional Paper No. 7, University of Papua New Guinea, Port Moresby.
- Milne Bay Rural Development Study 1981 Milne Bay Development Programme. Volume 3. Background papers, Department of Milne Bay Province, Alotau.
- Moulik, T.K. 1973 Money, motivation and cash cropping. New Guinea Research Bulletin No. 53, Australian National University, Port Moresby and Canberra.
- Oa, S. n.d. Semi-detailed soil survey and land evaluation for rubber, cocoa, pepper, nutmeg and food crops, Bila Bila Bay area, Milne Bay Province. Land Utilisation Section Report No. 652, Department of Agriculture and Livestock, Port Moresby.
- Rural Statistics Section 1992 Report on Food Crop Market Survey 1988: Alotau. Port Moresby, Department of Agriculture and Livestock.
- Williams, F.E. 1933 Depopulation of the Suau District. Anthropology Report No. 13, Government Printer, Territory of Papua, Port Moresby.
- Young, M.W. 1981 Oil Palm for Milne Bay? A Social Feasibility Study of a Proposed Oil Palm Project in Milne Bay Province. Port Moresby, Institute of Applied Social and Economic Research.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 12	Subsystem No. 1 of 1
Districts 3 Samarai, 6 Misima	Subsystem Extent 100 %	Area (sq km) 52
Population 1,601	Population density 31 persons/sq km	Population absent 17 %

System Summary

Located on the islands in the Engineer Group and the West Calvados Chain, and on Dawson Island. Fallow vegetation of woody regrowth, typically less than 10 m high and 5-15 years old, is cleared and burnt. Gardens are subdivided into plots. Cassava, sweet potato, banana, yam (*D. esculenta*) and coconut are important crops; other crops are yam (*D. alata*), taro, *Amorphophallus* taro and Queensland arrowroot. Gardens are usually planted twice before fallow. Yams (mainly *D. esculenta* but with some *D. alata*) predominate in new gardens, with other crops planted in separate sections or at edges. Cassava, sweet potato and banana predominate in replanted gardens. New gardens are usually planted between October and January. Yams are not staked. Tree crops provide important foods. Fish is a significant food. Inter-island trading for subsistence by sailing canoes and work boats is common, and of particular significance for Brooker and Tubetube Islands.

Extends across provincial border to System(s) None

Altitude range (m) 0-150 **Slope** Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Taro (<i>Amorphophallus</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Chilli leaves, Tomato
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Mon
NUTS	Breadfruit, Galip, Java almond, Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fish	Minor
3 Marine produce	Minor
4 Clay pots	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	Minor
Mounding Techniques:	
VERY SMALL MOUNDS	Minor
SMALL MOUNDS	Significant
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February and March 1994, traverse by work boat west from Sudest Island through the Calvados Chain, with interviews and surveys at Panaumara, Bagaman, Motorina and Brooker Islands (2 days); and separate visits to Tubetube Island in the Engineer Group, and to Dawson Island in the Laseinie Islands (2 days).

Boundary definition

The agriculture on the islands of the Engineer Group, the West Calvados Chain and on Dawson Island was distinguished from System 0519 (Samarai and D'Entrecasteaux Islands) on the basis of differences in important crops, fallow type and fallow length. To the north and east, the system was distinguished from System 0514 (Deboyne Islands) in which yam (*D. esculenta*) replaces yam (*D. alata*) as an important crop, and there are two subsystems with differing fallow types and lengths.

Notes

Climatic extremes of drought and cyclones threaten food security in all the islands. According to Macintyre (1983, 13), Tubetube Island has experienced one complete crop failure every decade since the 1870s. Government has intervened in the past with food relief programs. Famine foods include the tubers of wild *Pueraria lobata* (known as 'bugam' on Bagaman Island). Different islands vary in the extent to which they are normally self-sufficient in food. In the case of the West Calvados, there is some regular annual trading for food (sago and yams) by most of the islands (Lepowsky 1979, 8-9). Brooker Island is the extreme case. Brooker islanders are specialist producers of clay pots, and report that trade is essential to their subsistence. Sailing canoes remain a major form of transport for trading, particularly in the Calvados Chain islands. While annual rainfall is probably similar (less than 2000 mm) throughout the two groups of islands, the seasonal regime differs. The usual dry season is apparently November-March in the Engineer Group (Macintyre 1983, 12; though spotty National Weather Service records for Kwaraiwa Island from 1984 to 1993 are ambiguous), but May-November in the Calvados (extrapolating from Nimowa Island to the east). There is no seasonality at Panasesa in the intervening Conflict Group where the annual rainfall averages 1700 mm.

In most cases, although residence is based on a main island, people have access to other islands for gardens, coconuts, or fishing. Thus in the Calvados, Bagaman islanders used to garden on Bobeina (but no longer due to the presence of pigs), and claim coconuts on Gilia; Panaumala islanders use Mabneian, Yaruman and Kurupan Islands; Brooker islanders use Panawidiwidi (many gardens currently) Gulowa, Panaroa, Venariwa, Ululina, and Tobwaiam (no gardens currently). Brooker people also have coconuts on two islands to the northeast (Panalobwa and Lal); gardens on islands to the southwest (Panasia and Pana-ala-alan); gardens on two of the Duchateau Islands (Kokolua and Salunol) to the south, and coconuts on a third (Panuluwuwala); gardens on only one of the Jomard Islands in the far southwest; and gardens on two of the Duperre Islands to the west-south-west with coconuts only on a third. In the Engineer Group, some of the smaller islands such as Good and Nare are primarily planted with coconuts. In the mid to late 19th Century, some of the small unoccupied islands held substantial numbers of megapodes (Moresby 1876, 258 for Blackeney Island in the Engineer Group; MacGillivray, 1852, Vol. 2, p. 63, for the Duchateau Islands south of the Calvados Chain).

On most islands, sago is either absent (Brooker, Panaumala, Anagusa, Kwaraiwa, Dawson) or generally scarce (Skelton, Tubetube, Bagaman). Motorina and Tewatewa appear to have more than other islands. The Calvados Chain islands import sago leaves for thatching from Misima, the Engineer Group from Basilaki or Normanby.

There is some variation from the usual fallow vegetation type (short woody regrowth) and period (5-15 years old). On Motorina there is some use of tall woody regrowth over 15 years old; on Bagaman the woody regrowth is short but the fallow periods are usually longer than 15 years; and on Dawson the fallow vegetation is a mixture of woody regrowth and grass. New gardens are cleared between August and November. In new gardens, yam is usually planted in separate sections from other crops such as sweet potato, cassava and taro. Taro is planted at the bottom of slopes in moister soils, while cassava and banana is generally planted at garden edges. Following a first crop of yam, sweet potato and cassava are usually planted. Gardens are laid out on a grid pattern, with plot dividers of wood, primarily for the purpose of organizing work and production. However on steep slopes these also serve to retain soil. Household gardens are not usual, but were seen on Tubetube where all pigs are kept in solid pens made of coconut tree trunks. Fencing is very variable, dependent on the location of pigs. No or little fencing was seen at Brooker and Tubetube, and only for gardens near villages on Dawson. But most gardens on Bagaman and Motorina were fenced. Other fruit trees present on some, but not all islands, include golden apple, guava, mandarin, orange, watery rose apple, soursop and rukam. Conspicuously absent on most islands (i.e. Tubetube and Bagaman) were such nut trees as *Pangium edule* and pao. Though galip was present on several islands, it was absent on Tubetube. Tulip was also said to be less common than on larger islands.

Notes continued

In the Engineer Group until the early 1980s, copra was the major source of cash providing incomes of K150-200 annually per household (Macintyre 1983, 73; Milne Bay Rural Development Study 1981, 44). In 1994, households were said to be still producing 5-10 bags annually, though drought during the previous two years had reduced production. For Tubetube, Macintyre (1983, 66-67) suggested a negative correlation between copra price and pig numbers: when the price is low, nuts are fed to pigs. Copra is also still produced on Motorina in the Calvados Chain, and on Dawson Island, but no longer on Brooker. Marine products (trochus, bêche-de-mer, etc) are sold by all islands. Clay pots are produced for sale and barter on several islands: by Tubetube islanders (trading mainly with Normanby); by Kwaraiwa people trading with Basilaki (Jenkins 1986, 13); and by Brooker islanders for trading with Misima, other Calvados islands and Sudest. Besides long term trends in trading, there appear to be short term fluctuations in pot making. For example in 1970-71, Berde (1974, 125) reported that almost every Brooker woman (and girl) was making pottery, while very few Paneati women were doing so. But in 1976 May and Tuckson (1982, 104) found little pot making on Brooker. During this survey, pot making appeared to be vigorous on Brooker. Fish are sold by the Calvados Chain islanders, mainly to Misima. Live pigs are a minor source of income in the Calvados Chain.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

- Lepowsky, M. 1979 A preliminary report on cultural factors affecting health and nutrition: Sudest Island and the Louisiade Archipelago, Milne Bay Province, Papua New Guinea. Unpublished paper, Department of Anthropology, University of California, Berkeley.
- Macintyre, M. 1983 Changing paths: an historical ethnography of the traders of Tubetube. PhD thesis, Australian National University, Canberra.
- Rayner, J.P. and M.T. Rayner 1989 A Report on Subsistence Agriculture, Nutrition and Health in the East Calvados Islands, Milne Bay Province. Alotau, Department of Milne Bay Province.

Other References

- Berde, S.J. 1974 Melanesians as Methodists: economy and marriage on a Papua and New Guinea island. PhD thesis, University of Pennsylvania, Philadelphia.
- Jenkins, C. 1986 IFAD Artisanal Fisheries Project Document: Nutritional Assessment of Project Communities, Milne Bay and Gulf Provinces, Papua New Guinea. Unpublished report, Papua New Guinea Institute of Medical Research, Goroka.
- MacGillivray, J. 1967 Narrative of the Voyage of HMS Rattlesnake... Adelaide, Libraries Board of South Australia.
- Macintyre, M. 1983 Kune on Tubetube and in the Bwanabwana region of the Southern Massim. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 369-382.
- Macintyre, M. 1987 Nurturance and nutrition: change and continuity in concepts of food and feasting in a Southern Massim Community. *Journal de la Societe des Oceanistes* 84, 1, 51-59.
- Macintyre, M. and J. Allen 1990 Trading for subsistence: the case from the southern Massim. In Yen, D.E. and J.M.J. Mummery (eds), *Pacific Production Systems: Approaches to Economic Prehistory*. Canberra, Department of Prehistory, Research School of Pacific Studies, Australian National University, 120-136.
- Macintyre, M. and M. Young 1982 The persistence of traditional trade and ceremonial exchange in the Massim. In May, R.J. and H. Nelson (eds), *Melanesia: Beyond Diversity*. Canberra, Research School of Pacific Studies, Australian National University, 207-222.
- May, P. and M. Tuckson 1982 *The Traditional Pottery of Papua New Guinea*. Sydney, Bay Books.
- Milne Bay Rural Development Study 1981 Milne Bay Development Programme. Volume 3. Background papers, Department of Milne Bay Province, Alotau.
- Moresby, J. 1876 *New Guinea and Polynesia: Discoveries and Surveys in New Guinea and the D'Entrecasteaux Islands*. London, John Murray

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 13	Subsystem No. 1 of 2
Districts 3 Samarai	Subsystem Extent 50 %	Area (sq km) 3
Population 498	Population density 166 persons/sq km	Population absent 16 %

System Summary

Restricted to the small island of Ware, lying to the south of Basilaki Island. The islanders are not self-sufficient in food production, and much of their livelihood is gained by trade throughout the island region of the province. There are two subsystems, distinguished on the basis of fallow vegetation and crops grown. For the entire system, cassava, sweet potato, yam (*D. alata*), banana, and coconut are important crops; other crops are yam (*D. esculenta*), Queensland arrowroot, taro, Chinese taro and *Amorphophallus* taro. This summary refers to subsystem 1, which is estimated to cover one half of the system. Gardens are made in short woody regrowth, 5-15 years old, growing on the lower slopes of the central ridge forming the backbone of the island. Some are also made under coconuts on flatter land. Vegetation is cleared and burnt. Gardens are divided into sections. New gardens are mainly planted with yam (*D. alata*), but include other crops. Second year gardens mostly contain sweet potato, cassava and banana. Yam, sweet potato and cassava are planted in small mounds. Yams are staked. New gardens are mainly planted between September and December. Fish and other seafood is important in the diet.

Extends across provincial border to System(s) None

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

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Yam (<i>D. alata</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot, Taro (<i>Amorphophallus</i>)
OTHER VEGETABLES	Aibika, Amaranthus spp., Corn, Ginger, Pumpkin fruit, Pumpkin tips, Bean (snake), Chilli leaves, Tomato
FRUITS	Bukabuk, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (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 Fish	Minor
2 Marine produce	Minor
3 Pigs	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	Significant
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	None
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, by work boat from Tubetube Island in the Engineer Group to Ware Island (meeting and garden visits on both sides of island, half day).

Boundary definition

The agriculture of Ware Island and its satellite islands differs from System 0519 on the neighbouring islands to the north in terms of crops, fallow type and fallow length. Further, agriculture is not the major means of livelihood on Ware.

Notes

The economy of Ware Island is an extreme case of specialist trading in a region in which inter-island trade is everywhere important (Macintyre and Allen 1990). Ware islanders have been traders for some time, with a considerable proportion of their food being imported. During this survey, informants estimated that local production only accounted for one third of food supply. An early brief account of agriculture on the island in April 1873 which described '...fine cocoa-nut groves and fenced-in plantations of fruits and vegetables, sufficient to feed three times the number of inhabitants' (Moresby 1876, 183), almost certainly overestimated the potential of the local system. In 1950 most cash income was derived from copra, and Ware was already importing large quantities of rice and sugar (Belshaw 1955, 32, Appendix V11). Copra was produced on the main island as well as small neighbouring islands such as Panaman. At this time, Ware trade was based on a fleet of small sailing cutters. In recent years, copra is no longer being made and cash income sources include boat building, remittances, marine products (trochus shell, bêche-de-mer), fish, and clay pots. Sailing cutters have been replaced by diesel-engined work boats, and dinghies with outboards. In 1991 Hayes (1994) estimated mean household income at K660, with marine products and remittances accounting for two-thirds. Clay pots are sold for money in Alotau, and exchanged for food on the Suau Coast, and on Normanby, Goodenough and Misima Islands. It is likely that Ware clay pots are the most widely traded of all in Milne Bay Province, and that trade expanded between the 1930s and 1970s (May and Tuckson 1982, 99). Hayes (1994) estimated that the sale of pots provided K50 per household annually in 1991.

There is a single large village on the southwest coast of the island. Bananas and sugarcane planted in small household gardens appear healthy in very sandy soil. Immediately behind the village is an extensive area of mature fruit and nut trees, interspersed with gardens. Similarly on the north coast, the coconut and nut/fruit tree belt on flat land immediately behind the beach, which is fringed by low woody regrowth below the grass-covered main ridge, is extensively gardened. Although there is some thinning of coconuts for such gardens, most are left standing.

Garden productivity is very vulnerable to climatic conditions, drought especially. In 1991 the yam harvest failed (Hayes 1994). In 1992 drought was again severe and a minimal amount of government food relief had reached the island shortly before the survey.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

- Belshaw, C.S. 1955 In search of wealth: a study of the emergence of commercial operations in the Melanesian society of Southeastern Papua. American Anthropological Association Memoir No. 80 57, 1-2, 1-84.
- Hayes, G. 1993 'MIRAB' processes and development on small Pacific Islands: a case study from the Southern Massim, Papua New Guinea. Pacific Viewpoint 34, 2, In press.
- Macintyre, M. and J. Allen 1990 Trading for subsistence: the case from the southern Massim. In Yen, D.E. and J.M.J. Mummery (eds), Pacific Production Systems: Approaches to Economic Prehistory. Canberra, Department of Prehistory, Research School of Pacific Studies, Australian National University, 120-136.
- May, P. and M. Tuckson 1982 The Traditional Pottery of Papua New Guinea. Sydney, Bay Books.
- Moresby, J. 1876 New Guinea and Polynesia: Discoveries and Surveys in New Guinea and the D'Entrecasteaux Islands. London, John Murray.

System Summary

In subsystem 2, gardens are made in fallows of short grass, 5-10 years old, which cover the steep slopes of the main island ridge. The grass is cut and burnt, and the soil tilled. New gardens are planted with segregated plots of yam (*D. alata*), sweet potato, and cassava. All these crops are planted in small mounds. Two plantings are made before fallow. Yams are staked. Coconut leaves are used as mulch to retain soil moisture.

Extends across provincial border to System(s) None

Altitude range (m) 0-100

Slope Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	Cassava, Sweet potato, Yam (<i>D. alata</i>)
STAPLES SUBDOMINANT	None
STAPLES PRESENT	Banana, Cassava, Sweet potato, Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>)
OTHER VEGETABLES	Aibika, Amaranthus spp., Corn, Ginger, Pumpkin fruit, Pumpkin tips, Bean (snake), Chilli leaves, Tomato
FRUITS	Bukabuk, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short grass
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (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 Fish	Minor
2 Marine produce	Minor
3 Pigs	Minor

OTHER AGRONOMIC PRACTICES**Water Management:**

DRAINAGE	None
IRRIGATION	None

Soil Management:

PIGS PLACED IN GARDENS	None
BURN FALLOW VEGETATION	Very significant
TILLAGE	Very significant
MECHANIZATION	None
DEEP HOLING	None
MULCHING	Minor
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	None
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Notes**

The grassland cultivation of subsystem 2 is highly distinctive. There is a patchwork of small, unfenced gardens and grass fallows on both sides of the main ridge running the length of the island, but more numerous on the south. On the lower slopes, stones are removed from the surface soil and heaped along plot borders. Estimating fallow lengths in the grass was difficult, with periods of less than 5 years favoured by informants. Based on the proportions of land under cultivation and fallow, 5-10 years seems more likely. The major crops grown, yam (*D. alata*), sweet potato and cassava are planted separately, either in separate areas, or in separate adjoining plots within the same garden. Both yams and sweet potato are planted in small mounds (15-20 cm high).

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 14	Subsystem No. 1 of 2
Districts 6 Misima	Subsystem Extent 75 %	Area (sq km) 23
Population 1,292	Population density 56 persons/sq km	Population absent 19 %

System Summary

Located on the Deboyne islands of Paneati and Panapompom west of Misima. There are two subsystems, distinguished on the basis of fallow vegetation and period, and crops. In the entire system, cassava, banana, sweet potato, yam (*D. esculenta*) and coconut are important crops; other crops are taro, Chinese taro, *Alocasia* taro, *Amorphophallus* taro and Queensland arrowroot. Tree crops are significant. Inter-island trade is important. Fish is of moderate importance in the diet. This summary refers to subsystem 1, which is estimated to cover three quarters of the system. Gardens are typically made in short woody regrowth, after fallows of 5-10 years. New gardens are mainly planted between October and December. Cut vegetation is burnt, and gardens divided into sections. New gardens are mainly planted with yam (mostly *D. esculenta*, but with some *D. alata*). Other crops are planted in separate sections. Two crops are planted before fallow.

Extends across provincial border to System(s) None

Altitude range (m) 0-100 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>), Taro (<i>Amorphophallus</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Kumu musong, Pumpkin fruit, Pumpkin tips, Tulip, Taro leaves, Chilli leaves
FRUITS	Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple, Mon
NUTS	Breadfruit, Java almond, <i>Pangium edule</i> , Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Coconuts	Minor
2 Fish	Minor
3 Marine produce	Minor
4 Pigs	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	Minor
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	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, travel by work boat from southwest Misima Island to Paneati Island, viewing the south and west coasts of Panapompom and Nivani Islands from the sea; garden visits and meeting on Paneati Island (1 day, 2 nights).

Boundary definition

These islands were assigned to a separate system following visits to nearby islands.

Notes

The system was distinguished from System 0512 to the south and east (islands of the West Calvados Chain and Engineer Group), in which yam (*D. alata*) replaces yam (*D. esculenta*) as an important crop, and there is a single subsystem. It was distinguished from System 0515 (Western Misima) to the northeast by the presence of taro as an important crop, and the use of longer fallow periods and different fallow vegetation.

Unlike Brooker Island to the south, Paneati food production appears to have been generally self-sufficient from land and marine resources (Berde 1974, 312). No landing was made on Panapompom, the other major Deboyne island, but some 15 gardens on the south, west and northwest coasts were observed from the sea. The terrain was more hilly and steeper than that on Paneati. All gardens were on hillsides with slopes of about 15 degrees, made in woody regrowth generally taller than 10 m. All were fenced. The small island of Nivani immediately to the south of Panapompom was originally a coconut plantation. It is abandoned, has been burnt during droughts, and a heavy regrowth vegetation has now grown. Besides the two main occupied islands of Paneati and Panapompom, Paneati have access to the Torlesse Islands to the southwest, and to the Conflict Group to the west (coconuts and fish only).

Berde reported four kinds of soil on Paneati, varying in their ability to retain moisture. He correlated this variation with a strategy by which households planted 2-4 yam gardens each year on different soils, which he considered a post-Mission practice (Berde 1974, 68-75; 1979, 172). He suggested that changes during the colonial period, including the introduction of crops such as sweet potato and cassava, and increased freedom for inter-island trade, had led to a reduction in the severity of the customary period of food shortage between February and April (1979, 173). In 1994, agricultural committee members reported that recent community discussion on Paneati had focussed on the inadequacy of depending on a single major planting time for gardens, and that they were in the process of instituting a policy encouraging the establishment of other gardens at other times (sweet potato in December-January, and replanted gardens in June-July). Similar attention to community scheduling of work activity was described by Berde in 1970-71 (1974, 118-124).

The woody regrowth fallows, especially on the eastern side of Paneati Island, contain considerable numbers of a small, fast growing leguminous tree (known as 'kasiu'), which is probably either *Schleinitzia novoguineensis* or *Adenantha pavonina*. During clearing they are killed but many are left standing, giving a distinctive appearance to gardens. Leguminous vines (*Pueraria* and *centrosema*) are also very common in fallows.

The construction of planked, deep-water, sailing canoes ('sailau') is an important specialist activity on Paneati. The island has an important resource in hardwood timber (*Calophyllum inophyllum* known as 'malauwi') used for canoe construction (Berde 1974, 90ff). During this century, the islanders have established a virtual monopoly for building 'sailau' in the Louisiade region (as Gawa islanders have for the northern region of the province). The canoes are built under contract for purchasers in the Calvados Chain and Sudest. During the survey it was estimated that over 40 canoes were currently under construction on Paneati, similar to the number reported by Berde (1974, 31) for 1971, suggesting the continued strength of the industry.

Paneati people trade pots and smoked shellfish for sago from Misima and Sudest (Berde 1974, 76). Although there was little pot making on Paneati during 1970-71 (Berde 1974, 125), pots were still being produced in 1994. Berde (1974, 76) suggests that they export less fish to Misima than do Brooker islanders. While fishing is more important than on Misima Island, an average consumption of fish approximately twice a week (stable since the early 1970s, Berde 1974, 127) is considerably less than on the Calvados Islands to the south. Copra is now only a minor source of income. Marine products (trochus, bêche-de-mer) are collected and sold as a minor income source. Pigs are also traded and sold.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Berde, S.J. 1974 Melanesians as Methodists: economy and marriage on a Papua and New Guinea island. PhD thesis, University of Pennsylvania, Philadelphia.

Other References

Berde, S. 1979 The impact of Christianity on a Melanesian economy. *Research in Economic Anthropology* 2, 169-187.

Berde, S. 1983 The impact of colonialism on the economy of Paneati. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 431-443.

May, P. and M. Tuckson 1982 *The Traditional Pottery of Papua New Guinea*. Sydney, Bay Books.

System Summary

In subsystem 2, covering about one quarter of the system, gardens are made in tall woody regrowth more than 20 years old. This regrowth usually contains many old fruit and nut trees such as breadfruit. The undergrowth is cleared, some but not all trees are cut down, and the vegetation is dried and burnt. Banana is the predominant crop, but it is interplanted with a wide range of other crops.

Extends across provincial border to System(s) None

Altitude range (m) 0-100

Slope Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT Banana

STAPLES SUBDOMINANT None

STAPLES PRESENT Banana, Chinese taro, Taro (Alocasia), Taro (Colocasia), Yam (D. alata), Yam (D. esculenta), Queensland arrowroot, Taro (Amorphophallus)

OTHER VEGETABLES Corn, Pumpkin tips

FRUITS Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple, Mon

NUTS Breadfruit, Java almond, Pangium edule, Polynesian chestnut, Terminalia megalocarpa

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 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 Coconuts Minor

2 Fish Minor

3 Marine produce Minor

4 Piga 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 Minor

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 None

FALLOW CUT ONTO CROPS None

SEASONAL MAIN CROPS Minor

SEASONAL SEC'DARY CROPS Minor

OTHER DOCUMENTATION**Notes**

This type of garden was observed behind the middle section of Paneati village, in an extensive area between the village and the hill which dominates the island. Similar types were reported in the north of the island. In the location visited, the vegetation was dominated by old fruit and nut trees. Soils appeared to be deeper and moister than those in the major yam gardens. Although banana was the major crop, a wide range of other crops were planted. The bananas were both diploid and triploid. The cultivation period was not firmly established but is estimated as two years.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 15	Subsystem No. 1 of 1
Districts 6 Misima	Subsystem Extent 100 %	Area (sq km) 36
Population 2,165	Population density 60 persons/sq km	Population absent 16 %

System Summary

Located on the western end of Misima Island. Gardens are typically made in tall woody regrowth, more than 15 years old. Vegetation is cut, dried and burnt. Gardens are divided into sections. Yam (*D. esculenta*), taro, sweet potato, cassava, banana and coconut are important crops; other crops are *Alocasia taro*, Chinese taro, Queensland arrowroot and yam (*D. alata*). First year gardens are usually dominated by yam (*D. esculenta*). Taro is either planted in separate gardens, or in separate garden sections. Following the harvest of first year gardens, most are planted with sweet potato, cassava and banana before fallowing. Most new gardens for yam are planted between October and December. Fruit and nut tree crops are important. Fish is a minor component of the diet.

Extends across provincial border to System(s) None

Altitude range (m) 0-200 **Slope** Steep (10-25 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Kumu musong, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Spring onion, Taro leaves, Chilli leaves
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Golden apple, Watery rose apple
NUTS	Breadfruit, <i>Pangium edule</i> , Pao, Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Significant
2 Fresh food	Minor
3 Pigs	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	Minor
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	Significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, by work boat from Bwagabwaga village east along the south coast of Misima Island via Alhoga village (1 day); from Gulewa village west along the north coast of Misima Island via Ewena village to Eborā village (1 day). Meetings and surveys at Bwagabwaga, Alhoga and Eborā villages, and interview at Ewena village.

Boundary definition

The eastern boundaries with System 0516 were based on interviews at Bwagabwaga, Alhoga and Ewena villages, and offshore observations along both north and south Misima coasts. The boundaries were drawn between Bagilina (0515) and Liak (0516) villages on the north coast, and between Awaibi (0515) and Alhoga (0516) villages on the south coast. To the west, System 0514 was assigned to a separate system following field visits to the Deboyne Islands.

Notes

Up to the 1970s, taro was a most important crop (in combination probably with *D. esculenta*). Disease (probably taro blight) appeared in the 1970s on Misima, and production has since declined considerably. In the past, taro was typically planted in separate gardens. Today this is only done by people with sufficient planting material, and it is usually grown in separate sections within gardens containing other crops. Traditionally, taro was planted using a different sequence of clearing and burning to that used generally now on Misima. Underbrush was cleared under tall woody regrowth, taro was planted, trees were then felled onto the crop, and, if conditions were dry enough, the vegetation was then burnt before the taro had more than 2-3 leaves. Burning was not done if the vegetation was too wet. This practice is not generally followed today. *Alocasia* taro is planted similarly, except that there is no burning after the trees have been felled. (Apparently ordinary taro was also grown in this way, without burning, at Gulewa village on the north coast in System 0516, though the practice was discontinued there about 40 years ago). Only a few persons plant separate *Alocasia* gardens. It is said that planting material for *Alocasia* can always be recovered from old garden sites as it shoots after clearing and firing. Very little sago is grown by western Misima villages. Leaves for thatching are traded from the eastern villages of Kwaibwaga and Gulewa on the north coast, and from Narian village and Bwagaōia on the south.

West of Bwagabwaga village, there is some use of forest which is said to have never been cleared for gardens. The use of fencing is variable: gardens at a distance from villages tend not to be fenced. Gardens are divided into sections. On steep slopes, section dividers, logs placed along the contours, serve to prevent erosion. New gardens of yam and taro are mainly planted between October and December. Both yam and sweet potato are planted in small mounds.

Fishing is a relatively minor activity, but fish is acquired from traders from the Deboyne Islands and Brooker Island who occasionally bring fish and other seafood such as clam meat to sell or barter. During the survey, Bwagabwaga village was no longer producing copra, and only two copra driers were still functioning at Ewena village. Betel nut (including betel pepper and lime) is a significant source of income, especially for Ewena and Bagilina villages, with sales both at Bwagaōia market and informally. Willis (1994, 50) suggests that food crop sales are as significant as betel nut for income in Ewena, Eborā and Bwagabwaga villages. Pigs are produced for sale, and there is minor income from baskets and mats. The western part of Misima is not linked directly by road to the eastern half, and there is much less employment at Misima Mine. In 1991, there were only 65 workers from this part of Misima, compared to 425 from the east (Willis 1994, 48).

Ewena villagers claim two offshore islands northwest of Misima, East Island (which is not used), and the Strathord Islands (Panamote) on which some people are usually resident and there are gardens, tree crops and fishing. The Ewena community currently owns a work boat.

National Nutrition Survey 1982/83

50 families from 1 village were asked in February 1983 what they had eaten the previous day. 98 per cent reported eating coconut, 38 per cent sweet potato, 28 per cent taro, 26 per cent banana, 20 per cent cassava, 10 per cent sago, 2 per cent yam and none Chinese taro. 12 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the low yam consumption, and the relatively high sago consumption. Low yam consumption may be expected at this time of year before the new yam harvest.

Main References

Bruyn, H. 1980 Subsistence agriculture on Misima Island. In, Six Studies in Subsistence Agriculture Extension Bulletin No. 11. Port Moresby, Department of Primary Industry, 3-8.

Other References

Willis, D.C. 1994 Report Covering Agriculture, Livestock, Wildlife and Agroforestry in the Misima District. Misima, Misima Mines.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 16	Subsystem No. 1 of 2
Districts 6 Misima	Subsystem Extent 75 %	Area (sq km) 122
Population 4,930	Population density 40 persons/sq km	Population absent 18 %

System Summary

Located on the eastern end of Misima Island. There are two subsystems, distinguished on the basis of fallow vegetation and fallow length. In the entire system, cassava, sweet potato, banana, yam (*D. esculenta*), sago and coconut are important crops; other crops are taro, yam (*D. alata*), Chinese taro and *Amorphophallus* taro. Fruit and nut tree crops are particularly important in the vicinity of villages. Fishing is a minor activity. This summary refers to subsystem 1, estimated to cover three quarters of the system. New gardens are made in short woody regrowth, after fallows ranging from 5 to 15 years. Vegetation is cut, dried and burnt. Gardens are divided into sections. Yam (*D. esculenta*) is the major crop planted in new gardens, with other crops usually planted at edges or in separate sections. Yams and sweet potato are planted in small mounds. Yams are not staked. Two crops are typically planted before fallow. More sweet potato, cassava and banana are planted in second year gardens. New gardens are mainly planted between October and December.

Extends across provincial border to System(s) None

Altitude range (m) 0-200 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sago, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Taro (<i>Amorphophallus</i>)
OTHER VEGETABLES	Aibika, Corn, Ferns, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Taro leaves, Chilli leaves
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple
NUTS	Breadfruit, Galip, Pao, Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Fresh food	Minor
3 Pigs	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	Minor
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	Very significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In late January and early February 1994, traverses by road on Misima Island from Bwagaioa town to Hinauta, Boiou, Gulewa, Liak, Sagarai and Eiaus villages (2 days); traverse by work boat from Bwagabwaga village along south coast via Alhoga village (1 day), and from Gulewa village along north coast to Ewena village (half day). Meetings or interviews and surveys at Hinauta, Boiou, Sagarai, Alhoga, Eiaus and Ewana villages.

Boundary definition

The western boundaries with System 0515 was based on interviews at Bwagabwaga, Alhoga and Ewena villages, and offshore observations along both north and south Misima coasts. The boundaries were drawn between Bagilina (0515) and Liak (0516) villages on the north coast, and between Awaibi (0515) and Alhoga (0516) villages on the south coast. The system was distinguished from three systems in the islands to the south: from System 0512 (West Calvados Chain and Engineer Group); from System 0517 (Renard and East Calvados Chain); and from System 0518 (Sudest and Rossel Islands) following field visits to those islands.

Notes

It is difficult to distinguish spatially the considerable variation in population density, fallow vegetation and fallow period which occurs in the central and eastern parts of Misima Island. The solution adopted here has been to distinguish two subsystems, and note some of the variation in their distribution. In general, the northern village of Liak, which is restricted to a narrow strip of cultivable land by the mountainous central range, and the southern villages of Alhoga (which similarly lacks access to land north of the steep coastal ridge) and Narian, appear to have the highest proportion of subsystem 1 (characterised by short woody regrowth with fallow periods typically less than 15 years). Siagara and Eiaus villages have less of this subsystem and conversely more of subsystem 2 (characterised by tall woody regrowth older than 15 years), and other villages least of all.

The availability of sago generally increases from west to east. The two western-most villages, Liak on the north coast and Alhoga on the south, are both relatively short of sago and import sago leaves for thatching. The best endowed villages are Narian, Bwagaioa, Ninauta, Kaubwaga and Gulewa. A myth from Alhoga village (Peter, 1976, 26-28) accounts for regional variation in the staple crop pattern relative to this part of Misima (i.e. an emphasis on *D. esculenta* yams here in contrast to 'no' yam or taro on Rossel Island, taro in West Misima, and variable distribution of *D. alata* and *D. esculenta* yams on Normanby and Fergusson Islands). Prior to the onset of taro blight (probably in the 1970s), taro was more important than it is today. It was usually planted in separate gardens from yam, whereas today it typically occupies only separate sections within a garden. In the past taro cultivation is said to have been carried out without the burning of cut vegetation, as described for System 0515. While most gardens initially planted in yam are replanted with sweet potato and cassava, there is some replanting of yam to produce an early crop prior to the major new yam harvest. New gardens are usually cleared from September, with yam (and taro) planted between October and December (Bruyn 1980, 7; Hyndman 1982, 75). Whiting (1975, 16) reported breadfruit as fruiting mainly in the period October-December, while Bruyn (1980, 6) recorded the harvest time of breadfruit, mango and pineapple as September to November. Fruit, and nut, tree crops are very important, usually grown (both planted and distributed by birds and bats) in a zone known as 'gungun' behind villages. The species of pao nut grown is probably *Barringtonia nova-hiberniae*. Other fruits commonly grown besides those listed include orange, other citrus, mon, rukam, soursop and five corner. Other nuts include Java almond, *Pangium edule* and tulip. Tobacco is a minor crop only. On steep slopes, garden plot dividers of timbers laid along the contours serve to retain soil. Currently most gardens are fenced, usually with purchased pig wire (an obvious effect of the mine). This may either be a recent change, or, and probably more likely, may reflect the fact that fencing varies in relation to pig husbandry strategies. In 1972 at Liak village, Whiting (1975, 11-12) reported no fences as all pigs were enclosed. In 1982 Hyndman (1982, 75) also noted the absence of fencing. However Bruyn (1980, 5) implied the use of fencing.

A major current source of change is the gold mine which has been operating since 1987. However, mining has been influencing the economy of the island since the 1880s. In 1890 village producers were selling yams, coconut, sago and breadfruit to miners (Nelson 1976, 32). In 1940 mining employed nearly 700 people, though only a small minority were from Misima (Nelson 1976, 44). Currently, wages from employment at the mine are a major source of income. In 1991, 80 per cent of the Misima District workforce (total 534, of whom 516 were men) at the mine belonged to villages in East Misima (Willis 1994, 48). Betel nut is grown everywhere, but there is variation between villages in the extent to which a surplus is produced for sale outside the village. On the north coast, Liak is regarded as an betel nut importing village (contrasting with Bagilina and Ewena to the west in System 0515), while Alhoga on the south coast is described as a major producer. In the 1920s, government officers and traders were buying betel nut from Misima (probably the north coast) for use in bartering for yams in the Trobriands and D'Entrecasteaux Islands (Nelson 1976, 45). Currently,

copra is no longer being made, or only in very small quantities. Cocoa is also a very minor crop. Pueraria, and to a less extent

Notes continued

centrosema, have been grown for seed and sold in the past. Some cattle are owned at Eiaus and Gulewa villages, but are a very minor source of income overall. Pigs are produced for sale and trade.

National Nutrition Survey 1982/83

89 families from 2 villages were asked in February 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 97 per cent banana, 83 per cent cassava, 29 per cent sweet potato, 24 per cent sago, 10 per cent yam, 7 per cent Chinese taro and 1 per cent taro. 39 per cent reported eating rice. 13 per cent reported eating fresh fish. This is similar to the crop pattern except for the low yam consumption. Low yam consumption may be expected at this time of year before the new yam harvest.

Main References

Bruyn, H. 1980 Subsistence agriculture on Misima Island. In, Six Studies in Subsistence Agriculture Extension Bulletin No. 11. Port Moresby, Department of Primary Industry, 3-8.

Hughes, P.J. and M. Sullivan 1986 Gardening land and bush land resources. In, Misima Project Environmental Plan. Melbourne, Natural Systems Research, Appendix 10.

Hyndman, D. 1982 Population, settlement and resource use. In, Misima Project Environmental Investigations, Milne Bay, PNG Port Moresby Placer PNG. Port Moresby, Natural Systems Research, 57-97.

Other References

Gerritsen, R. and M. Macintyre 1991 Dilemmas of distribution: the Misima goldmine, Papua New Guinea. In Connell, J. and R. Howitt (eds), Mining and Indigenous Peoples in Australasia. Sydney, Sydney University Press, 35-53.

Hughes, P.J. 1989 The effects of mining on the environment of high islands: a case study of gold mining on Misima Island, Papua New Guinea. South Pacific Study 5, South Pacific Regional Environment Programme, South Pacific Commission and United Nations Environment Programme.

Hughes, P.J. and M. Sullivan 1987 Goldmining or gardening? Potential land use conflict on Misima Island, Papua New Guinea. In Conacher, A. (ed), Readings in Australian Geography. Proceedings of the 21st Institute of Australian Geographers' Conference, Perth, 10-18 May 1986. Perth, Institute of Australian Geographers and Department of Geography, University of Western Australia, 25-32.

Hughes, P.J. and M.E. Sullivan 1988 Population, land use and goldmining in Papua New Guinea. *Yagl-Ambu* 15, 2, 40-62.

Nelson, H.N. 1976 Black, White and Gold: Goldmining in Papua New Guinea 1878-1930. Canberra, Australian National University Press.

Peter, O. 1976 The myths of Misima. *Oral History* 4, 2, 16-52.

Whiting, S. 1975 Death and leadership on Misima: an anthropological history of a Massim village. MA thesis, Monash University, Melbourne.

Willis, D.C. 1994 Report Covering Agriculture, Livestock, Wildlife and Agroforestry in the Misima District. Misima, Misima Mines

System Summary

This summary refer to subsystem 2, covering one quater of the system. New gardens are made in tall woody regrowth, after fallows typically longer than 15 years. Vegetation is cut, dried and burnt. Gardens are divided into sections. Yam (*D. esculenta*) is the major crop planted in new gardens, with other crops usually planted at edges or in separate sections. Yams and sweet potato are planted in small mounds. Yams are not staked. Two crops are typically planted before fallow. More sweet potato, cassava and banana are planted in second year gardens. New gardens are planted between October and December.

Extends across provincial border to System(s) None

Altitude range (m) 0-200 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sago, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot, Taro (<i>Amorphophallus</i>)
OTHER VEGETABLES	Aibika, Corn, Ferns, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Taro leaves, Chilli leaves
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Golden apple,
NUTS	Breadfruit, Galip, Pao, Polynesian chestnut, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Cattle	Minor
3 Cocoa	Minor
4 Fresh food	Minor
5 Pigs	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	Minor
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	Very significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION

Notes

In general, this subsystem mainly occurs inland away from the coast. The construction of the cross-island road between Eiaus and Gulewa villages during the last decade appears to have been associated with a major expansion of cultivation into the central hills.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 17	Subsystem No. 1 of 1
Districts 6 Misima	Subsystem Extent 100 %	Area (sq km) 111
Population 1,475	Population density 13 persons/sq km	Population absent 7 %

System Summary

Located on the eastern islands of the Calvados Chain, to the northwest of Sudest Island. Gardens are mainly made in short woody regrowth, 5-15 years old. Cut vegetation is dried and burnt. Gardens are subdivided into sections. Cassava, sweet potato, sago, banana, yam (*D. esculenta*) and coconut are important crops; other crops are yam (*D. alata*), taro, Queensland arrowroot and Amorphophallus taro. New gardens, in which yam (*D. esculenta*) is usually predominant, are mainly planted between September and January. Two plantings are made before fallow, with sweet potato and cassava predominating in the second planting. Yams are not staked. The dry season (May-November) is pronounced and can pose a threat to food security. Fish is an important source of food. Inter-island trade is important, especially access to sago from Sudest Island.

Extends across provincial border to System(s) None

Altitude range (m) 0-150 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sago, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot, Taro (<i>Amorphophallus</i>)
OTHER VEGETABLES	Aibika, Corn, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Taro leaves, Chilli leaves, Tomato
FRUITS	Bukabuk, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple, Mon
NUTS	Breadfruit, Galip, Java almond, Polynesian chestnut, Terminalia megalocarpa
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fish	Minor
2 Marine produce	Minor
3 Pigs	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	Minor
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	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In late January 1994, by work boat from Misima Island to Nimoa Island via Kimuta Island (1 day); in early February 1994, by work boat from Rambuso village on the north coast of Sudest Island through the East Calvados Chain (one party by dinghy for 1 day), with meetings and surveys on Piron, Nimoa, Sabarl, Hemenae, Grass and Panawina Islands (2 days).

Boundary definition

This system was distinguished from that located immediately to the west in the West Calvados Chain (System 0512) and distinguished from the neighbouring System 0518 (Sudest and Rossel Islands) following visits to these islands.

Notes

There is strong climatic seasonality with Nimowa Island recording an average of about 1800 mm annually, and a marked dry season between June and September when the rainfall is usually considerably less than 100 mm monthly (National Weather Service records for 1979-1993; see Rayner and Rayner 1989, 14 for a shorter data run from 1980-1986). While this is similar to Tagula on the northwest corner of Sudest Island in System 0518, it contrasts with much less seasonal patterns to both the east (Rossel Island, System 0518) and the north (Misima Island, System 0516 and 0515). Drought can be a significant problem. Cyclones are also a hazard during the period December to March. They can result in significant damage to standing crops of banana and cassava (Rayner and Rayner 1989, 36), as well as to tree crops such as coconuts and sago.

No gardens are made on Sabarl Island, which consists of an upraised coral plateau. (This island has been incorrectly identified as agriculturally used by Saunders 1993). Islanders travel by sailing canoe to garden areas on Panatinai, Hemenae and Panawina Islands. Women as well as men sail canoes. Bad weather can prevent garden visits for extended periods (Battaglia 1990, 14-16). Grass Islanders also make some of their gardens on the adjoining large islands. Battaglia (1990, 15-16) emphasised the precarious basis of Sabarl subsistence, describing the period December to April as a time of food shortage during which people may eat only coconut for days. She reported that only in very few cases were Sabarl gardens sufficient to feed households beyond October (even less in 1986 due to pig damage to gardens), after which sago and purchased foods became more important (Battaglia 1990, 92, 94). She also noted the significance of fruit and nut tree crops such as breadfruit, mango, and Polynesian chestnut during this period (1990, 15, 221). Other fruit and nut tree crops used besides those listed include rukam, *Pangium edule*, pao (probably *Barringtonia novae-hiberniae*) and tulip. The limited National Nutrition data from a single village shown below, which came from a March 1983 survey, are qualified by more detailed information collected during several months of 1987-88 by the Rayners. The latter survey indicated higher consumption of yam and lower consumption of both sago and banana (Rayner and Rayner 1989, 76). Much of the sago is acquired by trade. Sweet potato, and wild yam, are said to be particularly important between April and June before the major yam harvest (Rayner and Rayner 1989, 77,79).

Battaglia (1990, 89) estimated that fallow lengths of gardens on Hemenae Island declined from an average of 5 years in 1976, to 3-4 years by 1986. During 1987-88, Rayner and Rayner (1989, 33) reported that fallows were less than 10 years on Hemenae and the western peninsula of Panatinai Island north of Grass Island, but longer than 30 years elsewhere on Panatinai. For Sabarl islanders, Battaglia (1990, 91-3) described two types of gardens, large family ones (known as 'baguya keimana') of about 0.5 ha, and smaller (0.1 ha) early gardens (known as 'kabu') worked by individuals. The latter were usually dominated by sweet potato and cassava; were sometimes used as nurseries to supply planting material for main gardens; and in some cases were the only gardens made by a person during a year.

Small areas of sago are available on Panatinai, Hemenae and Panawina Islands, but more is obtained from Sudest (Rayner and Rayner 1989, 41). Possibly greater availability on the former islands is implied by Battaglia (1983, 450). Traditionally, the major trading involved yams and sago from Sudest, and betel nut and pigs from Piron, Kimuta and Misima, while relatively little trade occurred between the East and West Calvados islands (Battaglia 1983, 450). In recent years, there has been an expansion of trade with Paneati for deepwater sailing canoes, with Brooker and Motorina for pots bartered with sago, and with Paneati for pots bought with money (Battaglia 1990, 451). Traditional valuables in the form of stone axe blades (originally from Woodlark), shell necklaces (mainly from Rossel) and lime spatulas continue to be circulated throughout the region in exchange relationships (Battaglia 1983, Lepowsky 1983).

Copra production diminished during the 1970s and had virtually ceased by 1987 (Battaglia 1983, 451; Rayner and Rayner 1989, 43). At the same time there were increased sales of marine produce (especially trochus and bêche-de-mer) to the Milne Bay Fishing Authority base at Tagula (and other purchasers at earlier dates, Battaglia 1983, 451). By 1994 most sales were to Kiwali Exports. Sabarl Islanders are specialist producers of lime for chewing with betel nut which is traded throughout the neighbouring islands and to Misima.

Notes continued

Fishing and the collection of shellfish are more important activities than in the neighbouring System 0518 on the large islands of Sudest and Rossel (Lepowsky 1979, 8). Pig numbers are very low (0.1 and 0.03 pigs per person in 1976 and 1986 respectively in Maho village (Battaglia 1990, 227), especially by comparison with Sudest Island. Annual average per capita cash income (excluding Government wages) was estimated at only K20 in 1987 (Rayner and Rayner 1989, 24, 27), with 80 per cent received from marine produce, 9 per cent from cash crops, and 11 per cent from market sales. In 1987 sales at a local store showed a clear peak in the February to April period (with rice one of the main items sold), when garden production is thought to be lowest (Rayner and Rayner 1989, 30, 81).

National Nutrition Survey 1982/83

16 families from 1 village were asked in March 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 88 per cent sago, 63 per cent banana, 50 per cent cassava, 31 per cent sweet potato, 25 per cent yam, 13 per cent taro and none Chinese taro. 44 per cent reported eating rice. 69 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

- Battaglia, D. 1990 *On the Bones of the Serpent: Person, Memory and Mortality in Sabarl Island Society*. Chicago, University of Chicago.
- Lepowsky, M. 1979 *A preliminary report on cultural factors affecting health and nutrition: Sudest Island and the Louisiade Archipelago, Milne Bay Province, Papua New Guinea*. Unpublished paper, Department of Anthropology, University of California, Berkeley.
- Rayner, J.P. and M.T. Rayner 1989 *A Report on Subsistence Agriculture, Nutrition and Health in the East Calvados Islands, Milne Bay Province*. Alotau, Department of Milne Bay Province.

Other References

- Battaglia, D. 1983 *Syndromes of ceremonial exchange in the Eastern Calvados: the view from Sabarl Island*. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 445-465.
- Lepowsky, M. 1983 *Sudest Island and the Louisiade Archipelago in Massim exchange*. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 467-501.
- MacGillivray, J. 1967 *Narrative of the Voyage of HMS Rattlesnake...* Adelaide, Libraries Board of South Australia.
- Saunders, J.C. 1993 *Agricultural Land Use of Papua New Guinea (map with explanatory notes)*. Scale 1:1,000,000. PNGRIS Publication No. 1, Commonwealth Scientific and Industrial Research Organization, Brisbane

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 18	Subsystem No. 1 of 1
Districts 6 Misima	Subsystem Extent 100 %	Area (sq km) 454
Population 4,606	Population density 10 persons/sq km	Population absent 20 %

System Summary

Located on Rossel and Sudest Islands. Gardens are typically made in tall woody regrowth more than 25 years old. However there is also some use of primary forest, and fallows near settlements can be shorter. Undergrowth is cleared, trees felled, and the cut vegetation allowed to dry before burning. Gardens are subdivided into sections with light timbers. Sago, cassava, sweet potato, banana, yam (*D. esculenta*) and coconut are important crops; other crops include taro, yam (*D. alata*), Chinese taro and Queensland arrowroot. First year gardens typically have a central planting of yams (*D. esculenta* with some *D. alata*). Sweet potato, cassava, taro and banana are planted separately, either in sections or at garden edges. Two plantings are usually made before fallow. The second planting is usually dominated by sweet potato and cassava. New gardens are mainly planted between September and December. Fruit and nut tree crops (especially breadfruit, coconut and betel nut) are everywhere important. Seafoods, including fish, turtle, dugong, clams and shellfish, are significant.

Extends across provincial border to System(s) None

Altitude range (m) 0-200 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sago, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Taro leaves, Chilli leaves, Tomato
FRUITS	Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple, Mon
NUTS	Breadfruit, Galip, Java almond, Polynesian chestnut, Terminalia megalocarpa
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Coconuts	Minor
3 Fish	Minor
4 Marine produce	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	Minor
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	Significant
STAKING OF CROPS	None
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, travel by work boat from Nimoa Island around the south coast of Sudest Island with surveys at Jelewaga and Rehuwo villages (2 days), along the west and north coasts of Rossel Island with surveys at Pambwa and Jinjo villages (2 days), and along the north coast of Sudest Island with surveys at Rambuso and Piron villages (1 day).

Boundary definition

This system was distinguished from System 0517 (East Calvados Chain) following visits to these islands.

Notes

Two underlying changes have effected this system. One - changes in the crop pattern - beginning as early as 110 years ago but continuing since; the other - forced relocation of settlement and land use to the coast - mainly restricted to the last 50 years. Changes in the crop pattern include: an apparent decline on both islands in the significance of sago related to an increase in the significance of garden crops; on Rossel, a decline in the significance of taro relative to other garden crops. For Sudest, Lepowsky (1991) has argued that there has been a shift from a greater dependence on the collection and processing of wild foods (mainly sago) to increased dependence on gardening. This began in the 1880s with the adoption of new crops, particularly sweet potato and cassava but also including a wide range of others, following the return of labourers from Queensland sugar plantations. She suggests it has continued during the last 50 years since World War II. The relative decline of taro on Rossel appears to have occurred mainly in the last 20 years. In 1921 Armstrong (1928, 18-9) described sago as the main staple on Rossel, banana as the second most important food, and noted that gardens contained mostly taro and banana with lesser amounts of yam and sweet potato. In Liep's view (1983, 114), however, sago and taro were the two main staples, with yam 'quite a recent crop' on most of Rossel (Liep, 1991, 42).

In October 1957, Brass (1959, 58-9), reporting the planting of new gardens at Jinjo, described taro as the major staple, with sweet potato, cassava and banana numerically important. Significantly he saw no yams, whereas at Rambuso village on the north coast of Sudest, he noted that yams were being planted in mid September, and sweet potato, taro, cassava and banana were all available for purchase (Brass, 1959, 55, 59). During the 1970s taro and sago were still described as the two major staples of Rossel (Lepowsky 1979, 14). However during this survey in 1994, taro was not ranked as a current major staple by informants at either Pambwa or Jinjo villages. The decline in the significance of taro on Rossel may be due partly to disease. It was said that disease seriously effected Chinese taro in the 1980s. The crop pattern was also effected by the enforced village planting of coconuts in the 1920s, with expansion continuing during the copra era until probably the 1970s (Liep, 1983; Lepowsky, 1991). Prior to 1943 there was considerable settlement inland on both Sudest and Rossel (Armstrong 1928, 6-8) islands. Under ANGAU orders, inland settlements were relocated to the coast in 1943-44 (Lepowsky 1979, 3; Liep 1983, 127-8). By 1957 near Jinjo village on Rossel, current gardens and recent second growth 'generally extended only 200 to 300 feet above sea level...' and abandoned inland village sites at 1000 feet were associated with second growth only (Brass 1959, 36, 58). By the 1970s when land use was mapped by aerial photography, little trace of inland land use on Rossel was identified (Saunders 1993). On Rossel this change in settlement also ended previous transfers of fish and sago for taro and banana between coastal and inland communities (Liep 1983, 130).

Rainfall varies considerably, declining and becoming more seasonal from east to west. Jinjo on the northeast of Rossel Island receives nearly 3500 mm annually, with no months receiving less than 200 mm; Pambwa on the west of Rossel appears to be broadly similar; while Tagula on the northwestern end of Sudest Island receives only about 1600 mm annually, with 6 months each receiving less than 100 mm. The greater importance of taro on Rossel is presumably related to this difference. In the 1920s Armstrong (1928, 18-19) considered that only one crop was planted before fallow. If this difference with current practice is real, it may be related to the then importance of taro. A small area of generally different fallow type (short woody regrowth) and apparently shorter fallow periods was seen (from the boat) in the vicinity of Damenu village and on the small neighbouring Wula or High Island in the northwest of Rossel. At Rambuso it was noted that initial clearing of large forest was occasionally done several years prior to planned cultivation of a site. This was said to be to allow major timbers to rot down. At Rambuso occasional use of a third planting of sweet potato or cassava before fallowing was reported. Overall garden segregation is minor, with two exceptions. On Rossel taro may be planted in separate gardens from yam, and at Rambuso on the north coast of Sudest, separate gardens of largely sweet potato, and banana, are made on alluvial flats. The latter are triploid bananas and are maintained for several years. The practice is said to be an innovation since the 1970s.

There is variable use of fencing: it was not seen on Rossel Island (but was sometimes used earlier, Armstrong 1928, 19) or at some locations on Sudest (Jelewaga), but it is general at other locations (Rehuwo and Rambuso villages). Lepowsky (1993, 44), whose fieldbase was at Jelewaga, reported no fencing on Sudest in the late 1970s, but it is not

Notes continued

clear if this referred to the whole island. Gardens are usually divided into sections, and section dividers (small logs laid along the contour) on steep slopes held to retain soil. Yam and sweet potato are planted in small mounds. In several gardens, it was observed that mounds made by megapode birds were used by people for growing crops, as has been reported from the Western Province (Dwyer and Minnegal, 1990). January is considered a late date to plant new gardens with yam (*D. esculenta*). The replanting of old gardens may begin as early as the initial harvest of yam (in April or May). Other fruit trees grown besides those listed include bukabuk, guava, orange and soursop. Other nuts include *Pangium edule*, pao (probably *Barringtonia novae-hiberniae*) and tulip. People also collect and process the large seeds of a wild leguminous vine (probably *Entada scandens*) known as 'kaikai', mostly for consumption on special occasions. In the late 1970s, Lepowsky (1982, 334) noted the export of betel nut to other parts of the Louisiade Archipelago, both in trade and in gift exchange. She noted a distinction between wild and cultivated trees, and reported that the cultivated variety was only introduced from Misima (Narian village) to Pamela village on Sudest as recently as 1900 (1982, 337). According to Lepowsky (1979, 6) there is seasonal variation in use of marine food sources on Sudest, with little fishing during the months of August and September (yam harvest), more between December and April, and most during June-July when tides are extremely low. The region is subject to cyclones in the early months of the year, which can cause extensive damage to standing crops of banana and cassava (Rayner and Rayner 1989, 16), and to tree crops such as sago and coconut. This survey noted killing damage by an early 1994 cyclone to many mature sago palms on both islands.

Cash incomes are low. For transport, the two islands are currently serviced by sea. Over the last 100 years, sources of cash income have varied considerably but have never been large. After a brief gold rush in the 1880s (Nelson 1976), small amounts of copal gum (until the 1970s) and marine products (trochus shell, *bêche-de-mer*) have been produced. A few expatriate-owned copra plantations were established but had ceased production by the 1980s. Currently there is still some smallholder copra produced on Rossel, but not on Sudest; marine products (trochus, *bêche-de-mer*) are a general but minor income source; some pigs are both traded and sold (probably more on Sudest than Rossel); minor amounts of fish are produced for sale, both locally and smoked and marketed at Misima, and betel nut is sold both locally and at Misima. Extensive recent plantings of betel nut palms were seen on Rossel Island. Trade relationships between Sudest Island and the islands of the Calvados Chain and Paneati, involving the exchange of products such as sago and yam for clay pots, fish and canoes continue to be significant (Lepowsky 1983, Battaglia 1983). Traditional shell necklaces ('bagi') are made on Rossel for sale throughout the region (Liep 1981, 1983).

National Nutrition Survey 1982/83

59 families from 4 villages were asked in March 1983 what they had eaten the previous day. 98 per cent reported eating coconut, 85 per cent sago, 75 per cent cassava, 69 per cent sweet potato, 66 per cent banana, 22 per cent yam, 15 per cent taro and 8 per cent Chinese taro. 19 per cent reported eating rice. 36 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

- Lepowsky, M. 1979 A preliminary report on cultural factors affecting health and nutrition: Sudest Island and the Louisiade Archipelago, Milne Bay Province, Papua New Guinea. Unpublished paper, Department of Anthropology, University of California, Berkeley.
- Lepowsky, M.A. 1981 Fruit of the motherland: gender and exchange on Vanatinai, Papua New Guinea. PhD thesis, University of California, Berkeley.
- Rayner, J.P. and M.T. Rayner 1989 A Report on Subsistence Agriculture, Nutrition and Health in the East Calvados Islands, Milne Bay Province. Alotau, Department of Milne Bay Province.

Other References

- Armstrong, W.E. 1928 Rossel Island: An Ethnological Study. Cambridge, Cambridge University Press.
- Battaglia, D. 1983 Syndromes of ceremonial exchange in the Eastern Calvados: the view from Sabarl Island. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 445-465.
- Brass, L.J. 1959 Results of the Archbold Expeditions No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bulletin of the American Museum of Natural History* 118, 1, 5-69.
- 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.
- Jack, I. 1984 Traditional dugong fishing with nets in Milne Bay. In Quinn, N.J., B. Kojis and P.R. Warpeha (eds), *Subsistence Fishing Practices of Papua New Guinea*. Traditional Technology Series No. 2. Lae, Appropriate Technology Development Institute, 64-68.

Other References continued

- Jenkins, C. 1986 IFAD Artisanal Fisheries Project Document: Nutritional Assessment of Project Communities, Milne Bay and Gulf Provinces, Papua New Guinea. Unpublished report, Papua New Guinea Institute of Medical Research, Goroka
- Lepowsky, M. 1982 A comparison of alcohol and betelnut use on Vanatinai (Sudest Island). In Marshall, M. (ed), *Through a Glass Darkly: Beer and Modernization in Papua New Guinea*. Port Moresby, Institute of Applied Social and Economic Research, 326-342.
- Lepowsky, M. 1983 Sudest Island and the Louisiade Archipelago in Massim exchange. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 467-501.
- Lepowsky, M.A. 1985 Food taboos, malaria and dietary change: infant feeding and cultural adaptation on a Papua New Guinea island. *Ecology of Food and Nutrition* 16, 105-126.
- Lepowsky, M.A. 1987 Food taboos and child survival: a case study from the Coral Sea. In Scheper-Hughes, N. (ed), *Child Survival: Anthropological Perspectives on the Treatment and Maltreatment of Children*. Dordrecht, D. Reidel, 71-92.
- Lepowsky, M. 1990 Gender in an egalitarian society: a case study from the Coral Sea. In Sanday, P.R. and R.G. Goodenough (eds), *Beyond the Second Sex: New Directions in the Anthropology of Gender*. Philadelphia, University of Pennsylvania, 171-223.
- Lepowsky, M. 1991 The way of the ancestors: custom, innovation and resistance. *Ethnology* 30, 3, 217-235.
- Lepowsky, M. 1993 *Fruit of the Motherland: Gender in an Egalitarian Society*. New York, Columbia University Press.
- Liep, J. 1981 The workshop of the Kula: production and trade of shell necklaces in the Louisiade Archipelago, Papua New Guinea. *Folk* 23, 297-309.
- Liep, J. 1983 'This civilising influence': the colonial transformation of Rossel Island society. *Journal of Pacific History* 18, 1-2, 113-133.
- Liep, J. 1991 Great man, big man, chief: a triangulation of the Massim. In Godelier, M. and M. Strathern (eds), *Big Men and Great Men: Personifications of Power in Melanesia*. Cambridge, Cambridge University Press, 28-47.
- MacGillivray, J. 1967 *Narrative of the Voyage of HMS Rattlesnake...* Adelaide, Libraries Board of South Australia.
- Nelson, H.N. 1976 *Black, White and Gold: Goldmining in Papua New Guinea 1878-1930*. Canberra, Australian National University Press.
- Saunders, J.C. 1993 *Agricultural Land Use of Papua New Guinea (map with explanatory notes)*. Scale 1:1,000,000. PNGRIS Publication No. 1, Commonwealth Scientific and Industrial Research Organization, Brisbane.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 19	Subsystem No. 1 of 1
Districts 2 Alotau, 3 Samarai, 4 Esa'ala	Subsystem Extent 100 %	Area (sq km) 1261
Population 22,730	Population density 18 persons/sq km	Population absent 13 %

System Summary

Located on the Brumer Islands, Samarai Islands, Nuakata, Normanby, central and east Fergusson and the Amphlett Group. Fallows are tall woody regrowth older than 15 years. Fallow vegetation is cut, dried and burnt. Yam (*D. esculenta* and *D. alata*), sweet potato, cassava, banana and coconut are important crops; other crops include taro, sago, *Amorphophallus taro* and *Alocasia taro*. Yam (*D. alata*) is less important in the north of the system. Gardens are usually planted twice before fallowing. Yam, and some taro and banana, are the main crops in the first year; sweet potato, cassava and some banana are the main crops in the second. Yam gardens are mostly planted between October and December. Sticks or logs are laid around the slope to form rectangular plot markers in most yam gardens and these sometimes reduce soil erosion. Yams are usually not staked, except in north and east Fergusson and in the Amphlett Group. Yams and sweet potato are planted in small mounds. In the Amphlett Group, a significant proportion of people's food is obtained from trading clay pots. Fish and other marine foods range from very important to relatively unimportant.

Extends across provincial border to System(s) None

Altitude range (m) 0-500 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sago, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Ferns, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Taro leaves
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Rukam
NUTS	Breadfruit, Java almond, <i>Pangium edule</i> , Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Coconuts	Minor
3 Fish	Minor
4 Fresh food	Minor
5 Marine produce	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	Significant
Mounding Techniques:	
VERY SMALL MOUNDS	Minor
SMALL MOUNDS	Significant
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	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In January, February and March 1994, extensive travel by boat and some by vehicle. Road traverse from Esa'ala to Miadeba village on Normanby Island. Gardens observed from offshore during boat traverses on the east and south coasts of Basilaki Island; north coast of Sideia Island; Bunama mission to Sehulea station, south and east Normanby; Sewa Bay, west Normanby; Goodenough Island to Wadalei village, north Fergusson; and the small islands visited (Sariba, Logea, Nuakata, Gumawana and Nabwageta). Meetings or discussions were held in the following villages; Buiari and Hamama (Basilaki Island); Tegerauna and Lamoasi (Sideia Island); Sidudu (Sariba Island); Dagedagela (Logea Island); Nuakata Island; Magera, Sipupu, Sisiana and Pwanapwana (Normanby Island); Nabulur, Ailuluai and Wadalei (Fergusson Island); Gumawana and Nabwageta Islands (Amphlett group). 125 gardens were visited over 12 days.

Boundary definition

The southern boundaries with Systems 0511 and 0512 were determined by a boat traverse from the Engineer Group through the Samarai and Brumer Islands to the Suau Coast; and visits to these locations. The boundaries with System 0520 on Normanby Island are based on observations from offshore during 3 boat trips along this coast and on the land use intensity boundary in Saunders (1993). The boundary with System 0520 on Fergusson Island is based on interviews near Salamo and Bwaiowa missions. The boundary with System 0521 on Fergusson Island is based on interviews at Nuwefa and Wadalei villages and offshore observations on the south and north coasts of Fergusson Island.

Notes

The following islands are included in this system: Bonarua and Halioea (Brumer Islands), Basilaki, Logea, Sariba, Sideia (Samarai Islands), Nuakata, Normanby, central and east Fergusson and the Amphlett Group (Gumawana, Kwatota, Nabwageta, Wamea, Wawiwa and Yabwaiia Islands). Both fallow vegetation and fallow period vary between locations, with tall woody regrowth older than 15 years being most common. In the Brumer and Samarai Islands, some gardens are made in low woody regrowth, especially near settlements. Low woody regrowth is also used on Nabwageta Island. Gardens in short grasslands were seen on Normanby from offshore in the Sewa Bay area. On Sariba, Sideia, Logea and Nabwageta Islands, fallows tend to be shorter (6-15 years) especially near the coast. On Nuakata Island and parts of Normanby, the range was generally 10 to 20 years. In the Esa'ala to Miadaba area on Normanby, fallows are generally over 25 years. The significance of the important crops also varies. Taro is more significant on Basilaki Island, in southeast Normanby (Bunama and Sehulea areas) and in south Fergusson. Sago is a more important food on Basilaki, Sideia and in central Normanby (Sewa and Awaiara Bays - see Schlesier 1965). In the Amphlett Islands, sago is not produced and sweet potato is not an important crop. Yam (*D. alata*) is not an important crop in east and north Fergusson (Basima to Wadalei area), or in the Amphlett Islands. In these locations yam (*D. esculenta*) dominates the first year gardens.

Yams are planted, harvested and eaten seasonally. Overall, sweet potato and cassava are more important foods than yam. Yam (*D. alata*) is grown principally for competitive feasts on Normanby Island, although it is also used as a household food and at minor feasts. In the Salamo and Wadalei areas on Fergusson, yam (*D. esculenta*), sweet potato and cassava have displaced yam (*D. alata*) and taro as staple foods since the 1930s.

A number of fruits and nuts provide significant amounts of food seasonally, in particular breadfruit (flesh and seed), Polynesian chestnut, Java almond and mango. These fruits and nuts are most abundant between November and February and are thus available as the supply of stored yam dwindles. It is likely that they were more important foods before the adoption of sweet potato and cassava within the last 100 years. Other fruits eaten include guava and golden apple. Only a limited amount of tobacco is grown.

Inter-island subsistence trade is important (Macintyre and Allen, 1990). Basilaki Island is a significant source of food and materials, especially sago and sago leaves, for the people from Ware Island and the Engineer Group. Logea people provide food, fish and sago to those from Dobu, Taulu, Loboda and Guleguleu and receive yams in return. People in the Brumer Islands purchase yams from Normanby and Dobu and sago from the mainland when food is scarce. Insufficient food is produced in the Amphlett Islands and people are partially reliant on trade for their subsistence. Lauer (1970, 169) estimated that 3000-3500 kg of food was imported into the Amphlett Islands each month, that is, about one third of the estimated food supply. Amphlett islanders make pots, using clay transported from north Fergusson, and trade pots and fish for yam and betel nut. Yams come primarily from north and east Fergusson; and also from Goodenough and the Trobriand Islands. The stated rate of exchange (one clay pot for one basket of yams) recorded in 1994 is similar to that recorded in 1968 by Lauer.

Notes continued

Generally all crops are planted in the same garden, with some minor exceptions. On Basilaki and Sideia Islands, taro and yam are usually grown in separate gardens. On Sariba and Logea Islands, sweet potato is sometimes grown in different gardens where the soil is poorer. In south Normanby, taro is occasionally planted in separate gardens; and yam (*D. alata*) is grown as a monocrop in locations further from villages and with longer fallow periods. On north Fergusson, yams (*D. esculenta* and *D. alata*) are generally planted in the same garden, but may also be grown in separate gardens. In first year gardens, yams are usually segregated from sweet potato, cassava and taro. Taro is often planted in poorly drained areas. Yam gardens are mostly planted between October and December, with *D. alata* harvested between May and July and *D. esculenta* harvested between July and September. Yams are planted in small mounds 15-25 cm (and up to 40 cm) high.

There are some minor exceptions to the general crop sequence of yam in the first year, sweet potato and cassava in the second. In the Samarai Islands, first year taro plantings are also said to be followed by sweet potato and cassava. In the Sehulea area on Normanby Island, some Chinese taro is planted in second year gardens. On Logea Island, sweet potato in first year gardens is occasionally followed by cassava in the second year. On Normanby, some gardens near villages are not replanted because people fear pig damage to sweet potato and cassava.

Plot dividers are made in yam gardens. Sticks or logs are laid across and up/down the slope, typically 3-5 m apart. They reduce soil erosion to some degree on Normanby and most of Fergusson. The stated reasons for this practice are to facilitate labour allocation for yam planting and weeding and to enhance the garden's appearance. In the Samarai and Amphlett Islands, and on the Molima coast on Fergusson Island, the logs used are larger and reduce soil erosion to a greater extent. On Basilaki and Logea Islands, logs are laid around the contours with stones placed behind them. On Sideia Island and on the Molima coast, logs are laid around the contour and held in place with stakes. On Gumawama and Nabwageta Islands, logs are pegged around the contour and stones placed behind them to form a bench. On Gumawama, the soil is dug out on the up hill side to make benches. These are 15-40 cm high and 1-1.5 m wide.

In most of this system, yams are usually not staked; or some plants only, particularly *D. esculenta*, are staked. However, most yams are staked in north and east Fergusson and in the Amphlett Islands.

Betel nut is the most important cash source in the system. It is sold in nearby markets from all locations surveyed except the Amphlett Islands. These markets include Samarai, Sideia, Esa'ala and Salamo. People in the Samarai Islands and Normanby sell it in Alotau; Normanby people sell betel nut on Misima; and Fergusson people sell it to buyers from the Trobriand Islands, or take it to Kiriwina for sale. Sales have increased since the 1970s when copra was a more important cash crop.

Sales of fresh food also provide cash income at all locations except in the Amphlett Islands. It is sold in local markets and some distant markets. People from most locations sell some fresh food in Alotau at least occasionally. This was uncommon in 1973 (Jackson et al. 1973). Normanby people sell fresh food on Misima, especially yams, sometimes in significant quantities. For example, people in one village in the Sehulea area on Normanby had sold an estimated K120,000 worth of yams on Misima in 1993. Sago from Sideia is sold to Normanby villagers.

Some copra is still produced in the Samarai Islands and on Normanby. It is no longer made anywhere on Fergusson because of transport costs and low returns. This suggests that Gerritsen's (1985) argument that Milne Bay Province villagers did not reduce copra production as the price fell between 1980 and 1985 was premature. Fish and other marine products (*bêche-de-mer*, trochus shell and black lip coral) are sold in limited quantities from about half of the locations visited. Boat building is an income source on Basilaki, Sideia and Sariba Islands. Logging provides cash income on Sideia and Basilaki Islands. In the Amphlett Islands, clay pots are the most important cash source.

National Nutrition Survey 1982/83

259 families from 9 villages were asked in February, March or August 1983 what they had eaten the previous day. 99 per cent reported eating coconut, 61 per cent cassava, 39 per cent yam, 39 per cent sweet potato, 36 per cent sago, 25 per cent banana, 8 per cent taro and none Chinese taro. 12 per cent reported eating rice. 38 per cent reported eating fresh fish. This is similar to the crop pattern except for the relatively high sago consumption.

Main References

- Alaluku, M. 1970 Oba Hamlet. Rural Digest 11, 4, 21-35.
Lauer, P.K. 1970 Amphlett Islands' pottery trade and the Kula. Mankind 7, 3, 165-176.

Other References

- Brass, L.J. 1959 Results of the Archbold Expeditions No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bulletin of the American Museum of Natural History* 118, 1, 5-69.
- Chowning, A. 1991 Pigs, dogs and children in Molima. In Pawley, A. (ed), *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer*. Auckland, The Polynesian Society, 182-187.
- Gerritsen, R. 1985 The romance of price elasticities of supply: the case of Milne Bay copra. *Yagl-Ambu* 12, 4, 29-42.
- Grose, C.J. 1986 Soil Survey and Land Evaluation of South East Fergusson Island, Milne Bay Province. Report No. 547, Land Use Section, Department of Primary Industry, Port Moresby.
- Hays, T.E. 1991 'No Tobacco, No Hallelujah': missions and the early history of tobacco in eastern Papua. *Pacific Studies* 14, 4, 91-112.
- Huxley, J.S. 1936 T.H. Huxley's Diary of the Voyage of H.M.S. Rattlesnake. New York, Doubleday, Doran and Company.
- Jackson, R.T., D.A.M. Lea, A. O'Neill and A. Richardt 1973 Alotau - a new town in Papua New Guinea. Department of Geography, Occasional Paper No. 7, University of Papua New Guinea, Port Moresby.
- Lasaro, I. 1975 History of Bonarua Island. *Oral History* 3, 7, 162-198.
- Lea, D.A.M. 1969-70 Activities studies in New Guinea villages. *Papua and New Guinea Agricultural Journal* 21, 3-4, 118-126.
- MacGillivray, J. 1967 Narrative of the Voyage of HMS Rattlesnake... Adelaide, Libraries Board of South Australia.
- Macintyre, M. and J. Allen 1990 Trading for subsistence: the case from the southern Massim. In Yen, D.E. and J.M.J. Mummery (eds), *Pacific Production Systems: Approaches to Economic Prehistory*. Canberra, Department of Prehistory, Research School of Pacific Studies, Australian National University, 120-136.
- Moresby, J. 1876 New Guinea and Polynesia: Discoveries and Surveys in New Guinea and the D'Entrecasteaux Islands. London, John Murray.
- Rural Statistics Section 1992 Report on Food Crop Market Survey 1988: Alotau. Port Moresby, Department of Agriculture and Livestock.
- Saunders, J.C. 1993 Agricultural Land Use of Papua New Guinea (map with explanatory notes). Scale 1:1,000,000. PNGRIS Publication No. 1, Commonwealth Scientific and Industrial Research Organization, Brisbane.
- Schlesier, E. 1965 Sagogewinnung auf Normanby Island, Sudost-Neuguinea. *Baessler-Archiv* XIII, 1-39.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 20	Subsystem No. 1 of 1
Districts 4 Esa'ala	Subsystem Extent 100 %	Area (sq km) 46
Population 3,732	Population density 81 persons/sq km	Population absent 21 %

System Summary

Located in east Normanby Island, Dobu Island and the Oiyau peninsula on Fergusson Island. Low woody regrowth is the most common fallow vegetation. Some tall woody regrowth and savanna are used in places on Dobu Island and the Oiyau peninsula respectively. Fallow periods commonly range from 4 to 10 years. Fallow vegetation is cut, dried and burnt. Yam (*D. alata* and *D. esculenta*), cassava, sweet potato, banana and coconut are important crops; other crops are taro and Chinese taro. Gardens are planted twice before fallowing. In the first year yam, and some taro and banana, are the main crops. Sweet potato and cassava are replanted after the yams have been harvested. Yam gardens are usually planted between October and December. Yams are not staked in east Normanby; more than half the yams are staked on Dobu Island; and most yams are staked on the Oiyau peninsula. Yams and sweet potato are planted in small mounds. Only a limited amount of fish is eaten on Dobu Island and the Oiyau peninsula.

Extends across provincial border to System(s) None

Altitude range (m) 0-400 **Slope** Multiple classes

CROPS

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

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
2 Fresh food	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	Minor
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	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In January and February 1994, boat travel from Bunama mission to Sehulea station on Normanby Island; and from Esa'ala to Dobu Island and to the Oiyau peninsula, Fergusson Island. Meetings held in Dotaona and Guleguleu villages, east Normanby (17 gardens visited). Half day visits to Dobu Island by two parties (23 gardens visited) and to the Oiyau peninsula by two parties (20 gardens visited).

Boundary definition

The boundaries with System 0519 on Normanby Island are based on offshore observations during 3 boat trips along this coast and on Saunders (1993). The boundary with System 0519 on Fergusson Island is the limit of the Oiyau peninsula and is based on interviews near Salamo and Bwaiowa missions.

Notes

This system is similar to system 0519, but the fallow periods are shorter and the fallow vegetation is short rather than tall woody regrowth. Villagers in east Normanby claim that fallow periods have been greatly reduced over the past 30 years and that yam yields have declined. On the Oiyau peninsula, a leguminous tree called 'tadodo dobu' is left standing alive when other fallow vegetation is cleared.

On Dobu Island, yams are mainly eaten between June and September. Previously the main foods eaten after the stored yams were finished were taro, banana, Java almond, breadfruit (flesh and seed) and other fruit. Cassava and sweet potato are now the main foods when yams are not available. Sweet potato and cassava are the main crops in replanted gardens, but banana and occasionally yam are also planted in second year gardens. Yam gardens are usually planted between October and December, with yam (*D. alata*) harvested in June and July, yam (*D. esculenta*) between July and September and taro between October and December. Yams are planted in mounds 15-25 cm high and sweet potato in mounds 10-15 cm high. Deep holes, about 1 m deep, are made for one cultivar of yam (*D. alata*) in east Normanby. Some garden fences are made in east Normanby and on the Oiyau peninsula, but they are not common. Sticks are placed around the slope to form plot markers in yam gardens in east Normanby and on Dobu Island. These trap a little soil and reduce erosion as an unintended effect. Some banana plantings on Dobu persist for 6-8 years.

Betel nut is sold locally and some is sold by Dobu people to Trobriand islanders. Fresh food is probably the main source of cash income. Dobu people trade food with Ware islanders who provide pots, turtles and clams; with Woodlark people who provide fish; and with Duau people on Normanby who provide yams. Villagers in east Normanby trade yams for clay pots (East Cape and Ware Island); for fish and turtle (Basilaki Island, Kitai, Koyagau and Ware Island); and for rice and tinned fish (East Cape). Dobu people sell fresh food locally in Esa'ala, Dobu, Budoya and Salamo markets, in Alotau and on Misima Island. Very little copra is now sold. Very small quantities of marine products (bêche-de-mer and shells) are sold in Alotau by Dobu people.

National Nutrition Survey 1982/83

84 families from 2 villages were asked in March 1983 what they had eaten the previous day. 99 per cent reported eating coconut, 70 per cent yam, 58 per cent cassava, 40 per cent sweet potato, 21 per cent taro, 20 per cent banana, 2 per cent Chinese taro and none sago. 20 per cent reported eating rice. 50 per cent reported eating fresh fish. This is similar to the crop pattern except for the relatively high taro consumption.

Main References

None.

Other References

- Brass, L.J. 1959 Results of the Archbold Expeditions No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bulletin of the American Museum of Natural History* 118, 1, 5-69.
- Fortune, R.F. 1963 *Sorcerers of Dobu*. London, Routledge and Kegan Paul.
- Grose, C.J. 1986 Soil Survey and Land Evaluation of South East Fergusson Island, Milne Bay Province. Report No. 547, Land Use Section, Department of Primary Industry, Port Moresby.
- Yamelu, T. 1984 Traditional fishing technology of Bwaiyowa Fergusson Island, Milne Bay Province. In Quinn, N.J., B. Kojis and P.R. Warpeha (eds), *Subsistence Fishing Practices of Papua New Guinea*. Traditional Technology Series No. 2. Lae, Appropriate Technology Development Institute, 52-67.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 21	Subsystem No. 1 of 1
Districts 4 Esa'ala	Subsystem Extent 100 %	Area (sq km) 324
Population 6,778	Population density 21 persons/sq km	Population absent 8 %

System Summary

Located on the western ends of Fergusson and Goodenough Islands. Fallows are tall woody regrowth and are very long (over 30 years), or previously unused forest. Fallow vegetation is cut, dried and burnt. Sweet potato and cassava are the most important crops; banana, yam (*D. esculenta*) and coconut are important crops; other crops are sago (northwest Goodenough), yam (*D. alata*), taro and Chinese taro. Where sweet potato, cassava and banana are planted in first year gardens, no replanting occurs. Where yams are planted in first year gardens, sweet potato and cassava are sometimes replanted in the second year. Yams are planted between August and October. Most yam (*D. esculenta*) and some yam (*D. alata*) are staked. Yams and sweet potato are planted in small mounds. Limited amounts of fish are eaten.

Extends across provincial border to System(s) None

Altitude range (m) 0-500 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Cassava, Sweet potato
STAPLES SUBDOMINANT	Banana, Coconut, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>)
OTHER VEGETABLES	Aibika, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Pineapple, Sugarcane, Watermelon, Rukam
NUTS	Breadfruit, Java almond, <i>Pangium edule</i> , Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

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

OTHER DOCUMENTATION**Survey description**

In February 1994, boat travel from Bolubolu to Waibula village, west Goodenough, meeting at Waibula village and 7 gardens visited (1 day). Boat travel from Bolubolu to Wadalei village, Fergusson Island; meeting in Nawefu village near Didiau and 8 gardens visited (1 day).

Boundary definition

The boundary with System 0519 on Fergusson Island is based on interviews at Nuwefa and Wadalei villages and observations of land use from offshore on the south and north coasts of Fergusson Island. The boundaries with System 0522 on Goodenough Island are based on interviews at Bolubolu Station and Waibula village; and on McBarron (1958). The boundaries with System 0522 are not precise.

Notes

The importance of the various food crops has changed over time. Taro was probably the main staple before sweet potato and cassava were widely adopted. Between August and November 1958, taro was recorded as the main food in southwest Goodenough with sweet potato and a little taro as the main foods in northwest Goodenough (McBarron 1958). The importance of the different staple crops varies somewhat between locations. Sago is eaten in northwest Goodenough. Sago palms suffered extensive cyclone damage in May 1993, and very little sago was available in early 1994. Both the flesh and seed of breadfruit are eaten.

There is little garden segregation. On Fergusson, some separate gardens are made for sweet potato/cassava, others for taro/yam/banana and others for banana only. Within gardens, cassava and sweet potato are generally interplanted; yams are segregated from them. Yams are planted between August and October, with yam (*D. alata*) harvested between April and June and yam (*D. esculenta*) in June and July. Yams are planted in mounds 20-25 cm high and sweet potato in mounds 10-15 cm.

Cash income is very limited. A little betel nut is sold infrequently in Alotau and in the Trobriand Islands. A little fresh food is sold locally, for example, at Wataluma mission and Wapolu Mining Camp. Some potatoes are grown in the mountains east of Iamalele village in west Fergusson for sale in Salamo and Alotau.

National Nutrition Survey 1982/83

87 families from 3 villages were asked in February or March 1983 what they had eaten the previous day. 95 per cent reported eating coconut, 77 per cent cassava, 47 per cent sweet potato, 39 per cent yam, 22 per cent banana, 18 per cent sago, 2 per cent taro and 1 per cent Chinese taro. 10 per cent reported eating rice. 36 per cent reported eating fresh fish. This is similar to the crop pattern except for the relatively high sago consumption.

Main References

Cole, K.S. 1958 Patrol Report 10/51-58, Goodenough Island, File No. 6-2-1. Unpublished report, Department of Agriculture, Stock and Fisheries, Samarai.

Jenness, D. and A. Ballantyne 1920 *The Northern D'Entrecasteaux*. Oxford, Clarendon.

McBarron, B.A. 1958 Patrol Report Goodenough Island, August-November 1958, File No. 3-3-29. Unpublished report, Department of Agriculture, Stock and Fisheries, Samarai.

Other References

Brass, L.J. 1959 Results of the Archbold Expeditions No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bulletin of the American Museum of Natural History* 118, 1, 5-69.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 22	Subsystem No. 1 of 1
Districts 4 Esa'ala	Subsystem Extent 100 %	Area (sq km) 164
Population 8,589	Population density 52 persons/sq km	Population absent 11 %

System Summary

Located in eastern and southern Goodenough Island and Wagifa Island. Tall woody regrowth fallows are most common. Northwest of Bolubolu station, short grasslands are also used. On Wagifa, all fallows are short grasslands. Fallow length is generally 15-25 years, but 5-15 year fallows are also used, especially in the north. Banana, cassava, sweet potato, yam (*D. esculenta* and *D. alata*) and coconut are important crops; other crops are taro, Queensland arrowroot, Chinese taro and *Alocasia* taro. The cropping period is usually two years, with yam planted in the first year and sweet potato and cassava in the second year. Cassava is sometimes planted in the first year on Wagifa. Bananas are planted in either the first or second year. After other crops have been harvested, banana plantings are maintained as a monocrop for 8-10 years on flat land and for 2-4 years on sloping land. Yams are planted between August-October. Soil retention barriers are very common in yam gardens on sloping land and benches are formed in some locations to retard soil erosion. Yams are usually not staked. Yam and sweet potato are usually planted in small mounds. Fish is an important part of the diet on Wagifa Island; elsewhere it is of minor to moderate importance.

Extends across provincial border to System(s) None

Altitude range (m) 0-600 **Slope** Multiple classes

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Banana, Cassava, Coconut, Sweet potato, Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake)
FRUITS	Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple, Rukam
NUTS	Breadfruit, Java almond, <i>Pangium edule</i> , Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Minor
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	Very significant
TILLAGE	Minor
MECHANIZATION	None
DEEP HOLING	None
MULCHING	None
SOIL RETENTION BARRIERS	Significant
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	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, boat travel from Fergusson Island to Faiava village, Wailagi mission, Bwaidoga peninsula, Wagifa Island, Waidamala village, Bolubolu station and Waibula village; road traverse from Bolubolu to Kalauna village, Vivigani airstrip and Wakonai village (4 days). Meetings held in five villages (Faiava, Waidamala, Wagifa, Kalauna and Wakonai) and 56 gardens visited.

Boundary definition

The boundaries with System 0521 are based on interviews at Bolubolu station and Waibula village; and on McBarron (1958). They are not precise.

Notes

This system is similar to System 0519, but it is distinguished from 0519 because of the presence of long term triploid banana gardens and the use of some short grassland fallows. Tall woody regrowth fallows are used in southern Goodenough. In northern Goodenough, this is the most common fallow type; however, some banana gardens are made in the short grasslands on flat land; and some yam and cassava gardens are made in short grasslands on both gently sloping and steep land. On Wagifa Island, fallow vegetation is Imperata, Themeda and other short grass species; on some sites short woody vegetation grows in the grasslands. On Wagifa a cycle of very short fallows (2-3 years) and gardens sometimes occurs within the longer garden and fallow cycle.

Food gardens on Wagifa Island provide only a proportion of the islanders' food supply. Most people also have gardens on nearby Goodenough Island where tall woody regrowth fallows are used. Wagifa islanders sell significant quantities of fish and some fresh food at local markets, especially at Faiava market. This income is used to purchase bananas, root crops and other garden food from Goodenough islanders, particularly from inland people. Published information on the important foods on Goodenough Island at different periods indicates the increasing importance of sweet potato and later cassava over the past 70 years. Jenness and Ballantyne (1920), writing on the previous decade, reported the staple foods as yam, taro, banana and the recently introduced sweet potato. Cassava, maize and other crops had been successfully introduced, but had not been adopted by then. They noted a sequence of yam followed by sweet potato and taro; that yams were planted in about September and October and harvested in June and July; and sweet potato was not planted seasonally (Jenness and Ballantyne 1920, 28-36, 123).

In 1958, staff of the Department of Agriculture, Stock and Fisheries investigated the poor food supply on Goodenough which was associated with high rates of male absenteeism for wage employment (Anon 1958; Cole 1958; McBarron 1958). Cole estimated that bananas provided 70 per cent of the diet, yams 15 per cent and other vegetables the remaining 15 per cent. He considered that yam had been more important in the recent past. Banana had been adopted as the main staple food because of the absence of men who would have previously prepared yam gardens. He reported cassava, taro and sweet potato as minor foods only. McBarron reported that the staple foods between August and November 1958 were one or more of banana, sweet potato, taro and cassava. Yam gardens were again being prepared by late 1958 as men returned to the island. McBarron noted that, as well as yam, sweet potato was grown in significant quantities in northern and eastern Goodenough and taro in the western villages. Cassava was the standby crop in all areas when other foods were unavailable; coconuts were everywhere important.

In June 1967, M. Young recorded the diet in 9 households in Bwaidoga village over a two week period. His unpublished data indicated that the most commonly eaten foods were cassava, yam (*D. esculenta* and *D. alata*), banana and coconut. Fish were also commonly eaten. Young's account of Kalauna village described the principal foods as yam, especially *D. alata*, banana and taro; sweet potato was planted as a second crop after the yam harvest (Young 1971, 146-149).

There is little garden segregation in the south of the system. It is significant in the north where separate, long term, banana gardens are common. At Kalauna village, grassland gardens on slopes are usually planted with yam and cassava; gardens made from woody regrowth are devoted to sweet potato and taro. At Wakonai village, yams and cassava are planted in separate first year gardens. For the entire system, crops are generally interplanted within gardens; but yams are segregated from sweet potato/cassava where they occur in the same garden. After yams have been harvested, sweet potato and cassava are planted. Where cassava and bananas are the first crops after a fallow, a second planting is not made. Bananas are planted as a monocrop or under coconut on flat land near the coast on Wagifa Island.

Major food shortages occur irregularly on Goodenough (Young 1971, 1986). Pueraria roots and other emergency foods have been eaten as recently as November 1993. Only a limited amount of tobacco is grown. Both the flesh and seed of breadfruit are eaten. Yams are planted between August and October (and as late as December), with yam (*D. alata*)

Notes continued

harvested in April and May, yam (*D. esculenta*) in June and July. Yam and sweet potato are usually planted in small mounds 10-35 cm high (and up to 60 cm). On Wagifa, some yams are grown on short stakes about 1 m high.

In some villages in northern Goodenough and on Wagifa Island, the soil is tilled completely in grassland yam gardens, especially on flat or gently sloping land. Logs are laid around the slope and pegged into position at intervals of 1-4 m in yam gardens. This is done to reduce soil erosion and to form plots to help regulate planting and weeding. At Wakonai village, benches are formed to reduce soil erosion in some hillside yam gardens. This is done by digging the soil on the upslope side and placing it a little lower downslope with stones placed on this edge. Benches are 1-1.2 m wide and 50-100 cm high. This technique is also used in the Amphlett Islands and in the Goodenough Bay area (System 0508), but is uncommon elsewhere in Papua New Guinea.

Betel nut is sold to Trobriand people who visit the island to buy it. Occasionally some people travel to the Trobriands to sell it. Fresh food is sold in local markets at Faiava village, Bolubolu station, Vivigani airstrip and Wataluma mission, and very occasionally in Alotau market. Markets at Faiava and Vivigani were previously barter markets where inland people exchanged garden produce and betel nut with coastal and island people who traded fish. A little tobacco is sold and pigs are a cash source for some people. Very few villagers now make copra because of the low price. A little cocoa is grown but it is not harvested because there are no operating fermentaries.

National Nutrition Survey 1982/83

196 families from 4 villages were asked in February 1983 what they had eaten the previous day. 98 per cent reported eating coconut, 90 per cent cassava, 74 per cent banana, 34 per cent sweet potato, 16 per cent yam, 5 per cent sago, 3 per cent taro and none Chinese taro. 5 per cent reported eating rice. 22 per cent reported eating fresh fish. This is similar to the crop pattern except for the consumption of sago which was not recorded as a food crop.

Main References

- Jenness, D. and A. Ballantyne 1920 *The Northern D'Entrecasteaux*. Oxford, Clarendon.
McBarron, B.A. 1958 *Patrol Report Goodenough Island, August-November 1958*, File No. 3-3-29. Unpublished report, Department of Agriculture, Stock and Fisheries, Samarai.
Young, M.W. 1971 *Fighting With Food: Leadership, Values and Social Control in a Massim Society*. Cambridge, Cambridge University Press.

Other References

- Anon 1958 *Hunger in the Papuan Islands*. *Pacific Islands Monthly* 29, 2, 77-78.
Cole, K.S. 1958 *Patrol Report 10/51-58, Goodenough Island*, File No. 6-2-1. Unpublished report, Department of Agriculture, Stock and Fisheries, Samarai.
Hays, T.E. 1991 'No Tobacco, No Hallelujah': missions and the early history of tobacco in eastern Papua. *Pacific Studies* 14, 4, 91-112.
Young, M.W. 1986 'The worst disease?' The cultural definition of hunger in Kalauna. In Manderson, L. (ed), *Shared Wealth and Symbol: Food, Culture and Society in Oceania and Southeast Asia*. Cambridge, Cambridge University Press, 111-126

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 23	Subsystem No. 1 of 1
Districts 5 Losuia	Subsystem Extent 100 %	Area (sq km) 26
Population 1,117	Population density 43 persons/sq km	Population absent 2 %

System Summary

Located on a number of very small islands: Simsim Group (Konia and Wagalasu Islands); Lusancay Group (Kawa, Mwatagina, Nauria Islands); Kadai Island; islands west of Kaileuna (Ioana, Kibu, Kuiawa, Labi and Munuwata Islands); Egom Lagoon (Ianaba and Egom Islands); Boagis peninsula, Madau Island and Nusam Island; Alcester and Tokona Islands; and the Budibudi Group (Budelun, Wabomat, Wabulak and Wasimu Islands). The most important foods are coconut and fish. These are supplemented by some root crops, fruit and nuts. Sweet potato and cassava are important crops; other crops are banana, yam (*D. esculenta*) and taro. The fallow vegetation is generally low woody regrowth; tall woody regrowth is used on Ianaba Island and some grass fallows are used on Egom. Fallow lengths are very short, 1-2 years being typical. Two plantings are made before fallowing on some islands (Boagis, Ianaba and Munuwata) and one planting on others (Alcester and Egom). Where yams are grown, they are planted seasonally, usually between September and November, but in July on Ianaba. Yams are planted in small mounds.

Extends across provincial border to System(s) None

Altitude range (m) 0-40 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Coconut
STAPLES SUBDOMINANT	Cassava, Sweet potato
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>)
OTHER VEGETABLES	Aibika, Pumpkin fruit, Pumpkin tips
FRUITS	Bukabuk, Mango, Pawpaw, Sugarcane, Watermelon
NUTS	Breadfruit, Java almond, Polynesian chestnut
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	2 plantings
R VALUE	40 (medium)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Marine produce	Minor
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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	Minor
SMALL MOUNDS	Significant
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**Survey description**

In February 1994, half day visits to each of Munuwata, Ianaba and Egom Islands; and to Boagis village on Madau Island. Meetings were held in each of the four islands; 11, 16 and 10 gardens were visited on Munuwata, Ianaba and Egom/Mua Islands respectively.

Boundary definition

Islands were included in this system after visits to Munuwata, Ianaba and Egom Islands; and the Boagis peninsula, Madau Island. Information on the Budibudi, Alcester and Simsim Island Groups is from Tyrie (1985), Smith (1984, 1985a, 1985b), Anang et al. (1988) and Jenkins (1986). The villagers on Munuwata Island provided information on the other islands west of Kaileuna Island.

Notes

Food gardening on these islands is variable. Agriculture on Munuwata Island is under considerable stress. Crop yields are very low with sweet potato and cassava tubers small (<100 g). Each year about one third of the garden land is planted to the main gardens ('kaimata'), about one third to second year gardens ('leegaba') and one third is fallowed. Fallow vegetation consist of herbs, vines, shrubs and small trees 2 to 4 m high. People protect a self-sown, fast-growing, leguminous tree in the gardens which they believe improves soil fertility. The tree is known as 'liga' (probably *Schleinitzia novoguineensis*). Munuwata people say that agriculture on Ioana, Kibu, Labi and Simsim Islands is very similar to that on Munuwata. Land is said to be more plentiful on Kuiuwa Island and fallow periods somewhat longer.

On Egom Island cassava plants are stunted and tubers are very small. Soil erosion is a serious problem on the steeper parts of the island and in places cassava grows in the subsoil. Wind shelters are constructed for some plots near the sea. Green vegetables are not grown on the island, except for pumpkin tips. Greens are brought to Egom from Ianaba Island (Smith 1984). On the Boagis peninsula of Madau Island, soil fertility is low and crop yields are said to be poor. Villagers say that sweet potato weevil is a problem and there are insect pests on cassava. On Alcester Island, gardens are small. Land is cropped for one year only and then fallowed for 1 to 3 years. The main crop is cassava with some sweet potato (Tyrie 1985).

In the Budibudi Islands, coconuts are extremely important in the diet. In September 1985, it was estimated that they provided some 75 per cent of calories (Smith 1985a). Pigs are numerous and large (Anang et al. 1988; Smith 1985b). Budibudi people barter coconuts, pigs, leaf skirts, sleeping mats and canoes to Woodlark islanders in return for sago and other food. Woodlark islanders also provide food in exchanges with people from Alcester Island and the Boagis peninsula (Damon 1990, 231-234).

Both the flesh and seed of breadfruit are eaten. Tobacco is only grown in some locations, including Ianaba Island and the Boagis peninsula. On Ianaba and Egom Islands, pigs are kept in pens made from coconut logs.

Cash income is extremely limited. Most inter-island transport is still by large sailing canoes. Marine products (trochus shell, giant snail, black lip coral, shark fins, bêche-de-mer and sand fish) are sold irregularly from most islands to dealers from Alotau. Munuwata people sell dried fish in Losuia, but the demand for dried fish is not great. Division of Agriculture and Livestock staff sometimes buy fresh fish; and very occasional sales of artifacts are made to tourists. Ebony wood was previously sold from Madau Island, but there is no longer a market outlet. Ebony was cut for sale on Alcester Island but it was not sold. Copra used to be produced on Alcester, and probably on other islands, but is no longer made.

National Nutrition Survey 1982/83

13 families from 1 village were asked in March 1983 what they had eaten the previous day. 85 per cent reported eating coconut, 15 per cent yam, 8 per cent cassava, 8 per cent banana and none sweet potato, sago, taro or Chinese taro. 100 per cent reported eating rice. 69 per cent reported eating fresh fish. The low cassava consumption and the absence of sweet potato consumption for this one village differ from the crop pattern.

Main References

Anang, J.K., S. Banige, G. Eremu and E. Kuli 1988 Food Situation in the Trobriand Group of Islands, Losuia District, Milne Bay Province. Alotau, Department of Milne Bay.
Tyrie, G.R. 1985 Marshall Bennet Island land use survey: interim report. Report No. 522, Land Use Section, Department of Primary Industry, Port Moresby.

Other References

- Bleeker, P. 1984 Field Notes: Woodlark-Trobriand Island trip, September, 1984. Unpublished field notes, Commonwealth Scientific and Industrial Research Organization, Canberra.
- Damon, F.H. 1990 From Muyuw to the Trobriands: Transformations Along the Northern Side of the Kula Ring. Tucson, University of Arizona Press.
- Jenkins, C. 1986 IFAD Artisanal Fisheries Project Document: Nutritional Assessment of Project Communities, Milne Bay and Gulf Provinces, Papua New Guinea. Unpublished report, Papua New Guinea Institute of Medical Research, Goroka.
- Macfarlane, M., G. Tyrie and G. Humphreys 1990 Mineralogical studies of high phosphate soils from coral atolls of Milne Bay Province, Papua New Guinea. Technical Report 90/3, Department of Agriculture and Livestock, Port Moresby.
- Smith, D. 1984 Nutrition Patrol Report. Offshore Woodlark Islands, Alcester, Egom, Ianabe, Gawa, Kwaiwatta and Iwa Islands 22/9/84-29/9/84. Unpublished patrol report, Losuia Health Centre, Trobriand Islands.
- Smith, D. 1985 Nutrition Patrol Report. Woodlark District 1/9/85-10/9/85. Visiting Budibudi, Iwa, Kwaiwatta, Gawa, Ianaba, Egom, Nasikwabu and Madau Islands. Unpublished patrol report, Losuia Health Centre, Trobriand Islands.
- Smith, D. 1985 Nutrition Patrol Report. Woodlark District 27/2/85-12/3/85 Visiting Budibudi, Iwa, Kwaiwatta, Gawa, Ianaba, Egom, Alcester, Madau and Woodlark Island. Unpublished patrol report, Losuia Health Centre, Trobriand Islands.
- Woruba, M. and W. Humphrey 1993 A survey report of cropping practices on atolls in Papua New Guinea. Sustainable Agriculture Series Workshop Paper 1/93, Lowlands Agricultural Experiment Station, Department of Agriculture and Livestock, Keravat

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 24	Subsystem No. 1 of 2
Districts 5 Losuia	Subsystem Extent 75 %	Area (sq km) 95
Population 2,896	Population density 30 persons/sq km	Population absent 8 %

System Summary

Located on Kaileuna, south Kiriwina and Vakuta Islands. There are two main garden types. These are the larger main gardens which provide yams for ordinary consumption, gifts and ceremonial use (subsystem 1); and the smaller early gardens which provide food for household use only (subsystem 2). For the entire system, the yam (*D. esculenta*), sweet potato, taro, cassava and coconut are important crops; other crops are banana, taro (*Alocasia*), Queensland arrowroot and yam (*D. alata*). In the main gardens (this subsystem), fallow vegetation is tall woody regrowth, typically 7-14 years old. Two plantings are made before fallowing. After clearing and burning, yam (*D. esculenta*) are planted. Taro (*Colocasia* and *Alocasia*) and banana are then interplanted. Gardens are planted mainly between October and December. After the yam and taro have been harvested, sweet potato and cassava are planted. Sweet potato is planted in very small mounds. Yams are staked. Fish is an important part of the diet.

Extends across provincial border to System(s) None

Altitude range (m) 0-40 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Bean (winged), Corn, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Eggplant
FRUITS	Bukabuk, Malay apple, Mango, Orange, Pawpaw, Sugarcane, Watermelon, Golden apple
NUTS	Breadfruit, Polynesian chestnut, Java almond, Terminalia megalocarpa
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fish	Significant
2 Betel nut	Minor
3 Fresh food	Minor
4 Carving timber	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	Significant
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, road traverse from Losuia station to Okaiaula village, meeting at Sinaketa village, 10 gardens visited (1 day). Brief visit to Bulakwa village, south Kaileuna Island, 4 large gardens visited. Land use seen on boat travel from Losuia to the passage between Kiriwina and Vakuta Islands.

Boundary definition

This system was distinguished from System 0525 in north Kiriwina and Kitava; and from System 0523 on the very small islands nearby after visits to these islands. The boundary on Kiriwina was determined from a road traverse between Losuia station and Okaiaula village.

Notes

Fallow periods are typically 7 to 14 years but are sometimes longer (over 25 years). Kiriwina Island is divided into 5 major economic regions, each of which has some advantages for production of certain crops (Leach 1983). The southern region ('Kaibwagina') coincides with the southern part of this system. Extensive areas of fallow vegetation are cleared for gardens by an entire community, or by many households within a community. Hence contiguous garden areas of up to 8 ha occur.

Fruit and nuts are important foods seasonally, including breadfruit (flesh and seed), Polynesian chestnut, Java almond and *Terminalia megalocarpa*. Only a limited amount of tobacco is grown. Gardens are planted mainly between October and December and yam are harvested in June and July. Pigs are more common in south Kiriwina than in north Kiriwina. This is said to be because commoners in the north should not own more pigs than the chiefs, but these restrictions are no longer observed in the south. Symptoms of a virus or a mycoplasma-like organism were noted on yam (*D. esculenta*). This is said to cause severe yield depression when the symptoms are severe. Potassium deficiency symptoms are very common on coconut and betel nut palms.

Betel nut is the main cash earning activity on Kaileuna and provides some income on south Kiriwina. The demand for betel nut in Losuia market and north Kiriwina is very high, particularly during the season of low production (August to April). Fresh fish is the most important cash source in south Kiriwina and is also important on Kaileuna. The demand for yams in Losuia market is not great, despite their importance in the social system. Trobriand islanders say that this is because it is considered shameful for them to admit that they cannot produce sufficient yams and have to purchase them in the market. Some timber is sold from south Kiriwina to north Kiriwina villagers for carving. Remittances from relatives in urban areas are a significant source of cash. Some pigs are sold locally.

National Nutrition Survey 1982/83

41 families from 2 villages were asked in February 1983 what they had eaten the previous day. 66 per cent sweet potato, 63 per cent taro, 49 per cent yam, 46 per cent cassava, 44 per cent coconut, 10 per cent banana, 2 per cent Chinese taro and none sago. 15 per cent reported eating rice. 17 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

Leach, J.W. 1983 Trobriand territorial categories and the problem of who is not in the Kula. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 121-146.
Malinowski, B. 1965 (Original 1935) *Coral Gardens and Their Magic, Volume 1: Soil-tilling and Agricultural Rites in the Trobriand Islands*. Bloomington, Indiana University Press.

Other References

Anang, J.K., S. Banige, G. Eremu and E. Kuli 1988 Food Situation in the Trobriand Group of Islands, Losuia District, Milne Bay Province. Alotau, Department of Milne Bay.
Austen, L. 1939 The seasonal gardening calendar of Kiriwina, Trobriand Islands. *Oceania* 9, 3, 237-253.
Austen, L. 1945-46 Cultural changes in Kiriwina. *Oceania* 15, 15-61.
Bell-Krannhals, I. 1990 Haben um zu geben: eigentum und besitz auf den Trobriand-Inseln, Papua New Guinea. *Basler Beiträge zur Ethnologie, Band 31, Ethnologische Seminar der Universität und Museum für Völkerkunde, Basel*.
Bell-Krannhals, I. and W. Schiefenhovel 1986 Repu et de bonne reputation: système de partage du yam aux Îles de Trobriand, Nouvelle Guinée, Papou. *Bulletin d'Ecologie et Ethologie Humaines* 5, 1-2, 128-140.
Damon, F.H. 1982 Calendars and calendrical rites on the northern side of the Kula Ring. *Oceania* 52, 3, 221-239.
Jenkins, C. 1986 IFAD Artisanal Fisheries Project Document: Nutritional Assessment of Project Communities, Milne Bay and Gulf Provinces, Papua New Guinea. Unpublished report, Papua New Guinea Institute of Medical Research, Goroka.

Leach, E.R. 1950 Primitive calendars. *Oceania* 20, 4, 245-262.

Other References continued

Sullivan, M. 1990 The effect of sea level rise on raised coral and high islands. In Pernetta, J.C. and P.J. Hughes (eds), Implications of Expected Climate Changes in the South Pacific Region: An Overview. UNEP Regional Seas Reports and Studies 128. Nairobi, United Nations Environment Program, 218-223.

Weiner, A. 1988 The Trobrianders of Papua New Guinea. New York, Holt, Rinehart and Winston.

System Summary

In the smaller early gardens (this subsystem), fallow vegetation is tall woody regrowth over 25 years old. The crops grown are the same as for the main gardens (subsystem 1). Gardens are planted between June and July. Two plantings are made before fallowing. After yam and taro have been harvested, sweet potato and cassava are planted. Some separate gardens are made for taro (*Colocasia* and *Alocasia*) and these are not replanted. Yam (*D. alata*) are sometimes planted using deep holes.

Extends across provincial border to System(s) None

Altitude range (m) 0-40 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Bean (winged), Corn, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Eggplant
FRUITS	Bukabuk, Malay apple, Mango, Orange, Pawpaw, Sugarcane, Watermelon, Golden apple
NUTS	Breadfruit, Polynesian chestnut, Java almond, Terminalia megalocarpa
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fish	Significant
2 Betel nut	Minor
3 Fresh food	Minor
4 Carving timber	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	Minor
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	Significant
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Significant
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION

Notes

Gardens are planted in June and July and harvested between March and June.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 25	Subsystem No. 1 of 1
Districts 5 Losuia	Subsystem Extent 100 %	Area (sq km) 169
Population 13,221	Population density 78 persons/sq km	Population absent 9 %

System Summary

Located on north Kiriwina and Kitava Islands. Fallow vegetation of short woody regrowth, occasionally with some short grass, is cut, dried and burnt. Fallow periods are typically 5-8 years; taro gardens in northwest Kiriwina have somewhat longer fallows (10-15 years). Sweet potato, yam (*D. esculenta*), cassava, taro and coconut are important crops; other crops are banana, yam (*D. alata*), taro (*Alocasia*) and Queensland arrowroot. Gardens are planted twice before fallowing. Yam (*D. esculenta*) are planted in the first year, together with taro (*Colocasia* and *Alocasia*) and banana; sweet potato and cassava are planted in the second year. A number of garden types are used. These are early yam, main yam, taro (Kiriwina only), giant yam (Kitava only) and second year gardens. The early gardens are planted between July and August; the main gardens are planted between September and December. Second year gardens are replanted after the yam harvest. Yams are staked. Sweet potato is planted in very small mounds; and occasionally yam is planted in small mounds. The importance of fish in the diet varies on Kiriwina, being more important in coastal locations.

Extends across provincial border to System(s) None

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

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Cassava, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Bean (winged), Corn, Ferns, Kumu musong, Pumpkin tips, Tulip, Bean (snake), Taro leaves, Eggplant
FRUITS	Bukabuk, Malay apple, Mango, Pawpaw, Sugarcane, Watermelon, Golden apple, Guava
NUTS	Breadfruit, Java almond, Polynesian chestnut, Pangium edule, Terminalia megalocarpa
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Betel nut	Significant
2 Fish	Minor
3 Fresh food	Minor
4 Carvings	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	Minor
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	Significant
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, road traverses from Losuia station to Omarakana village and from Losuia to Kuruvitu village; walking traverse from Kuruvitu to Kalieakua village; and road traverse from Losuia to Okaiaula village. Boat travel from Losuia to Kitava Island via Vakuta passage. Meetings in Omarakana, Kuruvitu and Kumwagea (Kitava Island) villages. 42 gardens visited (5 days).

Boundary definition

This system was distinguished from System 0524 in south Kiriwina, Kaileuna and Vakuta; from System 0523 on very small nearby islands; and from System 0526 on Iwa Island following visits to those islands. The boundary on Kiriwina was determined from a road traverse between Losuia and Okaiaula village.

Notes

Agriculture in the Trobriand Islands has been well described over the last 80 years. These accounts include Malinowski (1935, 3-12, 30-32, 50-60, 80-83, 159-164, 176-181, 228-239, 290-316 and 452-462), Austen (1945-46), the New Guinea Nutrition Survey in 1947 (Julius, 1950; Langley 1950), an SPC study in 1950 by S. Malcolm (Massal 1951) and a DAL report in 1993 (Woruba and Humphrey 1993). The most important changes during this century are: the adoption of and increasing reliance on introduced crops, particularly sweet potato; the universal adoption of a second planting before fallowing; and the increasing significance of betel nut and coconut palm plantings.

Yam (*D. esculenta*), supplemented by taro and banana, were the most important foods in Malinowski's time and this remained the situation until at least 1950. Sweet potato was introduced to the Trobriand Islands by Europeans (Malinowski 1935, 161), probably in the late 1800s. Adoption of sweet potato was sufficiently widespread by 1915 so that severe famines no longer occurred. The role of introduced crops, including sweet potato, cassava, maize and pumpkin in improving food supply during the traditional hungry season, was noted for the 1930s by Austen (1945-1946, 44). By 1947 sweet potato was a supplementary food to yam in Kavataria village (Langley 1950, 96). In 1994, sweet potato and yam (*D. esculenta*) are the most important foods, with cassava and taro of lesser significance.

Malinowski reported that sweet potato was planted together with first year gardens, but some was also replanted after the main harvest (Malinowski 1935, 180-181). By the 1930s, parts of yam gardens were being replanted with taro, Queensland arrowroot and sometimes with sweet potato before the land was fallowed (Austen 1945-46, 43). The practice of planting sweet potato and some cassava after yams have been harvested is now universal.

There are marked ecological differences on Kiriwina. This is reflected in variation in the relative importance of the traditional staple crops, yam, taro and banana and also in the relative significance of agriculture and fishing. These ecological zones were described by Malinowski (1935, 12-20) and by Leach (1983). Trading of fish by coastal villagers for yams from inland people was described by Malinowski and Austen and continued until at least the late 1960s on Kiriwina. By 1994, cash sales appeared to have displaced barter.

There are four named garden types on Kiriwina:

1. Early small gardens ('kaimuga') which provide food for household consumption.
2. Main gardens ('kaimata') in which yam (*D. esculenta*) is the main crop.
3. Taro gardens ('tapopu').
4. Second year gardens ('leegaba') where sweet potato and cassava are the main crops.

Fruit and nuts are important foods seasonally, including breadfruit (flesh and seed), Polynesian chestnut, Java almond and *Terminalia megalocarpa*. Only a limited amount of tobacco is grown. The early gardens are planted in July and August; and harvested between February and April. The main gardens are planted between September and December and harvested in May and June. Austen (1945-46, 40) gives the harvest period as May and June in coastal and Kubona district, a few weeks later in Kiriwina district and a little later on Vakuta Island. Taro and yam are usually interplanted in the early and main gardens, but they are sometimes segregated within gardens. Queensland arrowroot and cassava are planted on the edge of plots. Deep holes are dug under the planting position of some giant yams (*D. alata*) on Kiriwina and Kitava. Most coconut palms on Kiriwina are very old and show potassium deficiency symptoms. Taro is attacked by hawkmoth, but it is generally healthy; taro beetle is not a major pest. Taro blight is not yet present in the Trobriand, Marshall Bennett and Woodlark Islands.

Notes continued

There are four named garden types on Kitava:

1. Early small gardens ('tawali') which provide food for household use only. Fallows tend to be shorter than in the main gardens (2 years).
2. Main gardens ('kaimata') where the most important crop is yam (*D. esculenta*) interplanted with taro, banana and *Alocasia taro*.
3. Very small plots used for giant yam production ('laebwage'). These are located in pockets of soil amongst the limestone outcrops on the rim of the island. Fallows tend to be longer than in the main gardens.
4. Second year gardens ('leegaba'). These follow the early and main yam gardens; sweet potato is the main crop.

A number of changes have occurred on Kitava since the 1930s. Fallow periods are much shorter now. Sweet potato was eaten before the war, but is now more important. Cassava has been adopted since the early 1960s. Fruit trees are becoming scarce because people remove them to use the land for gardens. On Kitava competitions are still held for yams (*D. esculenta* and *D. alata*). In February 1994, yams (*D. alata*) were on display in one village prior to judging. Scoditti (1990, 15) stated that seafood was eaten only rarely on Kitava and was associated mainly with ceremonial occasions. He noted the transfer of yams, tobacco and other items from Kitava to Iwa Island (Scoditti 1990, 20-25).

In north Kiriwina, people sell betel nut in Losuia and to other villagers. Fresh food, including taro, yams, sweet potato and banana, is sold in Losuia. Some taro is sold in Alotau; limited quantities of taro and mud crabs are air freighted to Port Moresby. In the 1890s, yams were purchased in the Trobriand Islands by Germans from New Britain (Weiner 1977, 32). Remittances from relatives working in urban areas are a major source of cash income. Some villagers in north Kiriwina make a little income from selling carvings. Fish is sold in Losuia market from certain villages. An overview of the development of the cash economy in north Kiriwina until the mid 1970s was given by Gerritsen (1979, 109-122). There is very little cash income on Kitava; remittances are the main source with some very limited sales of artifacts to tourists.

National Nutrition Survey 1982/83

148 families from 4 villages were asked in February 1983 what they had eaten the previous day. 95 per cent reported eating sweet potato, 42 per cent cassava, 41 per cent taro, 28 per cent coconut, 18 per cent yam, 11 per cent banana, 1 per cent Chinese taro and 1 per cent sago. 22 per cent reported eating rice. 24 per cent reported eating fresh fish. This is similar to the crop pattern.

Main References

- Austen, L. 1945-46 Cultural changes in Kiriwina. *Oceania* 15, 15-61.
 Malinowski, B. 1965 (Original 1935) *Coral Gardens and Their Magic*, Volume 1: Soil-tilling and Agricultural Rites in the Trobriand Islands. Bloomington, Indiana University Press.

Other References

- Anang, J.K., S. Banige, G. Eremu and E. Kuli 1988 Food Situation in the Trobriand Group of Islands, Losuia District, Milne Bay Province. Alotau, Department of Milne Bay.
 Austen, L. 1939 The seasonal gardening calendar of Kiriwina, Trobriand Islands. *Oceania* 9, 3, 237-253.
 Austen, L. 1949-50 A note on Dr Leach's 'Primitive calendars'. *Oceania* 20, 333-335.
 Damon, F.H. 1982 Calendars and calendrical rites on the northern side of the Kula Ring. *Oceania* 52, 3, 221-239.
 Gerritsen, R. 1979 Groups, classes and peasant politics in Ghana and Papua New Guinea. PhD thesis, Australian National University, Canberra.
 Julius, C. 1950 Anthropologist's Report. In Hipsley, E.H. and F.W. Clements (eds), Report of the New Guinea Nutrition Survey Expedition 1947. Canberra, Department of External Territories, 31-71.
 Langley, D. 1950 Food consumption and dietary levels. In Hipsley, E.H. and F.W. Clements (eds), Report of the New Guinea Nutrition Survey Expedition 1947. Canberra, Department of External Territories, 92-142.
 Leach, E.R. 1950 Primitive calendars. *Oceania* 20, 4, 245-262.
 Leach, J.W. 1983 Trobriand territorial categories and the problem of who is not in the Kula. In Leach, J.W. and E. Leach (eds), *The Kula: New Perspectives on Massim Exchange*. Cambridge, Cambridge University Press, 121-146.
 Massal, E.L. 1951 Researches into nutrition and alimentation: report on investigations carried out by Miss S. Malcolm in 1950, prepared from the preliminary reports. Research Projects H.2-H.5, South Pacific Commission, Noumea.
 Scoditti, G.M.G. 1990 *Kitawa: A Linguistic and Aesthetic Analysis of Visual Art in Melanesia*. Berlin, Mouton de Gruyter.
 Sullivan, M. 1990 The effect of sea level rise on raised coral and high islands. In Pernetta, J.C. and P.J. Hughes (eds), *Implications of Expected Climate Changes in the South Pacific Region: An Overview*. UNEP Regional Seas Reports and Studies 128. Nairobi, United Nations Environment Program, 218-223.

Other References continued

Weiner, A. 1988 *The Trobrianders of Papua New Guinea*. New York, Holt, Rinehart and Winston.

Weiner, A.B. 1977 *Women of Value, Men of Renown: New Perspectives on Trobriand Exchange*. Brisbane, University of Queensland.

Woruba, M. and W. Humphrey 1993 *A survey report of cropping practices on atolls in Papua New Guinea*. Sustainable Agriculture Series Workshop Paper 1/93, Lowlands Agricultural Experiment Station, Department of Agriculture and Livestock, Keravat.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 26	Subsystem No. 1 of 1
Districts 5 Losuia	Subsystem Extent 100 %	Area (sq km) 2
Population 591	Population density 296 persons/sq km	Population absent 2 %

System Summary

Located on Iwa Island only. Fallow vegetation of very low woody and herbaceous regrowth, 1-2 m high, is cut, dried and burnt. Land is fallowed for 1-2 years only. Two tree species are said to be planted to increase soil fertility. Some gardens are made under mature coconuts. Sweet potato, yam (*D. esculenta*), cassava and coconut are important crops; other crops are banana, Chinese taro, taro, Queensland arrowroot and yam (*D. alata*). Java almond, *Terminalia megalocarpa* nuts and breadfruit (flesh and seed) are important foods seasonally. Gardens are planted twice before fallowing. Yams (mostly *D. esculenta*) are planted in the first year, together with some banana and cassava. After the yams have been harvested, sweet potato and cassava are planted. Household gardens are common. Yams are staked. Sweet potato is grown in very small mounds, and occasionally in small mounds. Four named garden types are used. These are early yam, main yam, sweet potato and second year gardens. Early yam gardens are planted in June and July; main yam gardens in August and September; sweet potato and second year gardens are not planted seasonally. Limited amounts of fish are eaten.

Extends across provincial border to System(s) None

Altitude range (m) 0-100 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	None
STAPLES SUBDOMINANT	Cassava, Coconut, Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES PRESENT	Banana, Cassava, Chinese taro, Coconut, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Amaranthus spp., Corn, Pumpkin fruit, Pumpkin tips, Bean (snake)
FRUITS	Bukabuk, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Golden apple
NUTS	Breadfruit, Java almond, <i>Terminalia megalocarpa</i>
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	1-4 years
CROPPING PERIOD	2 plantings
R VALUE	40 (medium)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Marine produce	Minor
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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	Significant
SMALL MOUNDS	Minor
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Minor
STAKING OF CROPS	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, travel by boat to Iwa Island, meeting in Obomatu village, 11 gardens visited (half day).

Boundary definition

The system on Iwa Island is distinguished from Systems 0524, 0525 and 0527; and from System 0523 following visits to neighbouring islands.

Notes

In terms of garden area, the important crops are sweet potato, yam (*D. esculenta*) and cassava, but cassava and coconut are said to be the most important foods in the diet. Sweet potato tuber size is small to medium. Cassava is affected by a fungal disease which attacks the stem. This is said to have first become a serious problem some three years ago. Drought is a hazard for sweet potato production but not for cassava. According to Scoditti (1990, 22-25), Iwa is deficient in yam supply. He noted that Iwa people make numerous trips to Kitava Island to obtain yams; and that Kitava people take small and large yams, tobacco, betel nut, piglets and bananas to Iwa on kula trading expeditions. Both the flesh and seed of breadfruit are eaten. Java almond on Iwa have a large kernel and a soft shell. Nuts are preserved by smoking and some are sold to other islands.

Two tree species said to be planted after the yam harvest to increase soil fertility are 'nega' (*Schleinitzia novoguineensis*) and 'gweda' (*Rhus taitensis*). When the fallow vegetation is cleared the trees are burnt, yams are planted at the base and yam vines are trailed up the dead tree. Before 1970, fallow periods are said to have been much longer, woody regrowth was allowed to grow to 5-6 m in height before land was reused for food gardens.

There are four named garden types:

1. Early gardens ('kamgai') which provide food for household use only. The main crop is yam (*D. esculenta*). They are planted in June and July and harvested from November onwards.
2. Main gardens ('kaimata') which provide food for gifts, household consumption and seed supply. The main crop is yam (*D. esculenta*) with some banana and cassava. They are planted in August and September and the yams are harvested in April and May.
3. Sweet potato gardens. These are planted on poorer soils and are not planted seasonally.
4. Second year gardens ('leegaba') which are planted after the harvest of the main gardens. The main crops are sweet potato and cassava.

Cash income is very limited because of transport constraints. Some shark fins and bêche-de-mer are sold irregularly to traders from Alotau.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

- Anang, J.K., S. Banige, G. Eremu and E. Kuli 1988 Food Situation in the Trobriand Group of Islands, Losuia District, Milne Bay Province. Alotau, Department of Milne Bay.
- Macfarlane, M., G. Tyrie and G. Humphreys 1990 Mineralogical studies of high phosphate soils from coral atolls of Milne Bay Province, Papua New Guinea. Technical Report 90/3, Department of Agriculture and Livestock, Port Moresby.
- Scoditti, G.M.G. 1990 Kitawa: A Linguistic and Aesthetic Analysis of Visual Art in Melanesia. Berlin, Mouton de Gruyter.
- Smith, D. 1984 Nutrition Patrol Report. Offshore Woodlark Islands, Alcester, Egom, Ianabe, Gawa, Kwaiwatta and Iwa Islands 22/9/84-29/9/84. Unpublished patrol report, Losuia Health Centre, Trobriand Islands.
- Tyrie, G.R. 1985 Marshall Bennet Island land use survey: interim report. Report No. 522, Land Use Section, Department of Primary Industry, Port Moresby.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 27	Subsystem No. 1 of 1
Districts 5 Losuia	Subsystem Extent 100 %	Area (sq km) 21
Population 798	Population density 38 persons/sq km	Population absent 2 %

System Summary

Located on Gawa, Dugumenu and Kwaiwatta Islands. Food is produced in six named garden types, each differing in land use. These are small yam, small taro, main yam, main taro, second year and sweet potato gardens. Fallow vegetation is low woody regrowth, except for the main taro gardens where tall woody regrowth is used. It is cut, dried and burnt. Fallow periods are 4-8 years (main yam gardens), over 15 years (main taro gardens) and 2-4 years (small yam, small taro and sweet potato gardens). For the entire system, sweet potato and yam (*D. esculenta*) are the most important crops; taro and coconut are important crops; other crops are cassava, banana, yam (*D. alata*), Queensland arrowroot and taro (*Alocasia*). Sweet potato is the main food for household consumption; yam and taro are more important for visitors and feasts. After yam and taro gardens are harvested, they are replanted with sweet potato. Yams are planted in September and October; taro and sweet potato are not planted seasonally. Yam (*D. esculenta* and *D. alata*) are staked. Sweet potato is planted in very small mounds. Limited amounts of fish are eaten.

Extends across provincial border to System(s) None

Altitude range (m) 0-100 **Slope** Flat (<2 degrees)

CROPS

STAPLES DOMINANT	Sweet potato, Yam (<i>D. esculenta</i>)
STAPLES SUBDOMINANT	Coconut, Taro (<i>Colocasia</i>)
STAPLES PRESENT	Banana, Cassava, Coconut, Sweet potato, Taro (<i>Alocasia</i>), Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>), Yam (<i>D. esculenta</i>), Queensland arrowroot
OTHER VEGETABLES	Aibika, Corn, Kumu musong, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Taro leaves
FRUITS	Bukabuk, Mango, Pawpaw, Sugarcane, Lovi-lovi, Rukam
NUTS	Breadfruit, Polynesian chestnut, <i>Terminalia megalocarpa</i> , Java almond
NARCOTICS	Betel nut (lowland), Betel pepper (lowland), Tobacco

FALLOW & CROPPING PERIOD

FALLOW TYPE	Short woody regrowth
SHORT FALLOW	None
LONG FALLOW PERIOD	5-15 years
CROPPING PERIOD	2 plantings
R VALUE	17 (low)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Marine produce	Minor
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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	Minor
MULCHING	None
SOIL RETENTION BARRIERS	None
Mounding Techniques:	
VERY SMALL MOUNDS	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	Significant
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, boat travel from Iwa Island to Gawa Island, and then to Madau Island; Kwaiwatta Island viewed from offshore, but not visited. Village meeting on Gawa and 13 gardens visited (half day).

Boundary definition

Gawa, Kwaiwatta and Dumenu Islands were assigned to a separate system from those on nearby islands (Systems 0523, 0524, 0525, 0526) following field visits. Villagers on Gawa provided information for Kwaiwatta Island. Dugumenu Island is not inhabited, but is used for coconut production and probably fishing by Kwaiwatta and Gawa people.

Notes

Villagers claim that taro was previously their main food rather than yam. Sweet potato has now displaced taro as the most important food for household consumption. Tyrie (1985) stated that Chinese taro was the most important crop on Gawa, but in 1994 it was a very minor food. He reported a similar situation on Kwaiwatta Island, except that sweet potato and cassava were not grown. On Gawa, yam (*D. esculenta*) and taro are reserved for feasts and visitors, although small yam and taro tubers are eaten within the household. According to legend, people once lived on taro and two types of inferior yam. The yam types were named 'botkusa' (*D. pentaphylla*) and 'kwananda' (*D. hispida* or *D. pentaphylla*). A European sailing ship came to the island (in the early-mid 1800s?) and the sailors slept with some village women, paying for their favours with yam (*D. alata*) tubers. Villagers planted some of the tubers and recognized the new species to be superior to the existing ones. The legend relates that the new species of yam (*D. alata*) displaced the existing species. Later yam (*D. esculenta*) was obtained from the Trobriand and Iwa Islands. Only very limited amounts of the older species are now grown.

Both the flesh and seed of breadfruit are eaten. Yams are planted in September and October with yam (*D. alata*) harvested in March and yam (*D. esculenta*) in April. Holes up to 2 m deep are dug under the planting position for some long yam (*D. alata*). Most gardens are fenced. Gawa people obtained betel nut and sago from Woodlark Island and additional coconuts from Ianaba Island (Munn 1986, 25). The food supply is said to be best in the November to February period and poorest in June and July. Munn (1986, 29) attributed this to the availability of breadfruit, *Terminalia megalocarpa* nuts and other fruits and nuts in the November to February period.

There are six named garden types on Gawa Island:

1. Small yam gardens ('kalimomo') located adjacent to hamlets and producing food for household consumption. Yam (*D. esculenta*) and vegetables are the main crops. Fallows are low woody regrowth (2-10 m) and the fallow period is 2 to 4 years. They are planted in September and October.
2. Small taro gardens ('kwaega') producing food for household consumption. Fallows are low woody regrowth (2-10 m) and the fallow period is 2 to 4 years. They are not planted seasonally.
3. Main yam gardens ('bwaigutau') producing yams (*D. esculenta* and some *D. alata*) for feasts, visitors, planting material and some household consumption. Fallows are low woody regrowth (6-8 m) and the fallow period is 4-8 years. They are planted in September and October.
4. Main taro gardens ('bwaigutau') producing large taro for feasts and visitors. Fallows are tall woody regrowth (>15 m) and the fallow period is >15 years. They are not planted seasonally.
5. Second year gardens ('daldal') producing sweet potato for household consumption. These are planted after the harvest of the small and main yam and taro gardens. They are not planted seasonally.
6. Sweet potato gardens producing sweet potato for household consumption. Fallows are low woody regrowth (2-3 m) and the fallow period is 2 to 4 years. They are not planted seasonally.

Cash income is very limited. Shark fins and trochus shells are sold irregularly; and a very limited number of artifacts are purchased by the occasional visitor. Gawa people make large ocean going canoes which are exported to Woodlark, Ianaba and other islands.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Munn, N.D. 1986 *The Fame of Gawa: A Symbolic Study of Value Transformation in a Massim (Papua New Guinea) Society*. Cambridge, Cambridge University Press.

Other References

Anang, J.K., S. Banige, G. Eremu and E. Kuli 1988 Food Situation in the Trobriand Group of Islands, Losuia District, Milne Bay Province. Alotau, Department of Milne Bay.

Macfarlane, M., G. Tyrie and G. Humphreys 1990 Mineralogical studies of high phosphate soils from coral atolls of Milne Bay Province, Papua New Guinea. Technical Report 90/3, Department of Agriculture and Livestock, Port Moresby.

Scoditti, G.M.G. 1990 Kitawa: A Linguistic and Aesthetic Analysis of Visual Art in Melanesia. Berlin, Mouton de Gruyter.

Smith, D. 1984 Nutrition Patrol Report. Offshore Woodlark Islands, Alcester, Egom, Ianabe, Gawa, Kwaiwatta and Iwa Islands 22/9/84-29/9/84. Unpublished patrol report, Losuia Health Centre, Trobriand Islands.

Tyrie, G.R. 1985 Marshall Bennet Island land use survey: interim report. Report No. 522, Land Use Section, Department of Primary Industry, Port Moresby.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 28	Subsystem No. 1 of 1
Districts 5 Losuia	Subsystem Extent 100 %	Area (sq km) 178
Population 1,499	Population density 8 persons/sq km	Population absent 4 %

System Summary

Located on Woodlark Island and north Madau Island. Fallow vegetation of tall woody regrowth more than 20 years old is cut, dried and burnt. Some shorter fallows (10-15 years) are used, especially for sweet potato gardens. Taro, sago, yam (*D. esculenta*), sweet potato and coconut are important crops; other crops are banana, yam (*D. alata*), cassava and Chinese taro. Taro, yam and sweet potato are segregated within gardens; bananas are interplanted with taro. After yams have been harvested, sweet potato is planted in the yam section. There is no replanting after taro and sweet potato. Sweet potato is also planted in separate gardens. Yams are planted between September and November. More sago is eaten between December and April. Yams are staked. Sweet potato and yam are planted in small mounds. The importance of fish varies between locations, being more important in coastal villages.

Extends across provincial border to System(s) None

Altitude range (m) 0-100 **Slope** Flat (<2 degrees)

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fresh food	Minor
2 Carving timber	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	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	Significant
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In February 1994, travel by boat from Gawa Island to Boagis peninsula, Madau Island; then to Boiboi Forestry Camp on Woodlark Island. Road traverse from Boiboi to Loani Plantation, Kauwai, Lidau, Dikoias and Kulumadau villages; and from Boiboi to Guasopa station. Meeting at Dikoias village and 20 gardens visited (2 days).

Boundary definition

Woodlark and Madau Islands were assigned to a separate system following visits to nearby islands. The boundary with System 0523 on Madau Island is based on interviews at Boagis village.

Notes

Damon (1985) stated that in the 1970s fallow periods in central Woodlark were in the lower end of the 15 to 40 year range, and in the higher end of this range in eastern Woodlark. This contrasts with 1994 observations where fallows were longer in central Woodlark (sometimes over 50 years) and shorter (15-25 years) in eastern Woodlark.

There is some evidence for changes in the importance of different crops over time. In the 1850s, an Italian missionary reported that taro was the most important food in eastern Woodlark with yam, banana and coconut of lesser significance (Affleck 1983, 68). After the 1920s, yam became the dominant staple in eastern Woodlark (Damon 1983, 46). In central Woodlark, yam was as important as taro in the past, although by the 1970s more taro was planted (Damon 1983, 44). Damon's statements differ from those recorded in 1994 for central Woodlark. Villagers claimed that taro was the most important food until the late 1960s when yam (*D. esculenta*) increased in importance. Villagers credit the introduction of cassava and other crops to South Sea island missionaries and not to Catholic missionaries who resided at Guasopa between 1847 and 1855 (Laracy 1973). This supports the observations that villagers in the 1850s did not adopt introduced beans, pumpkin and maize (Affleck 1983, 66).

Coconuts are commonly used in cooking in coastal villages, but less often inland. Similarly, Java almond and Polynesian chestnut are more common in coastal villages. Fruit and nut trees are less important on Woodlark than on nearby smaller islands. Madau islanders trade fish for sago from central Woodlark. Most gardens have stout fences. People believe that the climate is changing. They say that the wettest period is now commonly February to March, when it was July to August until recent years.

There are three named garden types:

1. Early small gardens ('taunatan') producing food for household use only.
2. Main large gardens ('keiked') where taro and yam are the main crops grown. Yams are planted seasonally (September to November; harvested between May and July). Taro is said not to be planted seasonally, but it appears to be planted at the same time as the yams.
3. Sweet potato gardens which are not planted seasonally.

Some fresh food is sold by east Woodlark people in Guasopa market. The timber industry on Woodlark provides some cash income through royalty payments, wage labour with Milne Bay Logging Company, and dividends from the Woodlark Island Development Corporation. Ebony wood has been sold overseas and to buyers from other nearby islands, although there have been few recent sales.

National Nutrition Survey 1982/83

32 families from 2 villages were asked in March 1983 what they had eaten the previous day. 81 per cent reported eating coconut, 53 per cent sweet potato, 34 per cent banana, 16 per cent taro, 13 per cent yam, 3 per cent cassava, and none Chinese taro or sago. 75 per cent reported eating rice. 28 per cent reported eating fresh fish. This survey indicated more consumption of banana and less of sago than the crop pattern. The low yam consumption is expected at this time of year.

Main References

Damon, F.H. 1990 From Muyuw to the Trobriands: Transformations Along the Northern Side of the Kula Ring. Tucson, University of Arizona Press.

Other References

- Affleck, D. 1983 Manuscript XVIII. Information on customs and practices of the people of Woodlark Island: a translation of 'Ragguagli sugli usi e costumi del popolo Woodlarkese' by the Reverend Father Carlo Salerio, P.I.M.E., with notes by David Lithgow. *Journal of Pacific History* 18, 1-2, 57-72.
- Brass, L.J. 1959 Results of the Archbold Expeditions No. 79. Summary of the Fifth Archbold Expedition to New Guinea (1956-1957). *Bulletin of the American Museum of Natural History* 118, 1, 5-69.
- Damon, F.H. 1979 Woodlark Island megalithic structure and trenches: towards an interpretation. *Archaeology and Physical Anthropology in Oceania* XIV, 3, 195-226.
- Damon, F.H. 1980 The problem of the Kula on Woodlark: expansion, accumulation, and over-production. *Ethnos* 45, 176-201.
- Damon, F.H. 1982 Calendars and calendrical rites on the northern side of the Kula Ring. *Oceania* 52, 3, 221-239.
- Damon, F.H. 1983 On the transformation of Muyuw into Woodlark Island. Two minutes in December, 1974. *Journal of Pacific History* 18, 1-2, 35-56.
- Damon, F.H. 1985 Muyuw (Woodlark Island) native soil and garden classifications. In Tyrie, G.R. (ed), *Woodlark Island: Soils and Evaluation*. Report No. 521. Port Moresby, Land Utilisation Section, Department of Agriculture and Livestock, Appendix 2.
- Laracy, H.M. 1973 Xavier Montrouzier: a missionary in Melanesia. In Davidson, J.W. and D. Scarr (eds), *Pacific Islands Portraits*. Canberra, Australian National University Press, 127-145.
- Tyrie, G.R. 1985 Woodlark Island: soils and land evaluation. Report No. 521, Land Utilisation Section, Department of Agriculture and Livestock, Port Moresby.

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 29	Subsystem No. 1 of 1
Districts 3 Samarai	Subsystem Extent 100 %	Area (sq km) 232
Population 702	Population density 3 persons/sq km	Population absent 8 %

System Summary

Located along the coast of Table Bay and Amazon Bay and inland in the Liba, Bouna and Bailebo River valleys and extending a short distance into Milne Bay Province. Woody regrowth, more than 10 m tall and 15-30 years old, is cut, dried and burnt. Sweet potato, taro, cassava, banana and coconut are important crops; other crops are Chinese taro, yam (*D. esculenta* and *D. alata*), *Amorphophallus* taro and sago. Two plantings are made before fallowing. The first planting is dominated by taro and the second by sweet potato and cassava. New gardens are planted between October and January. Fruit and nut trees are significant sources of food. Sweet potato is planted on small mounds. Banana and yam are planted separately from taro in the same gardens.

Extends across provincial border to System(s) 0321

Altitude range (m) 10-300 **Slope** Multiple classes

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

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

OTHER AGRONOMIC PRACTICES

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	Minor
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	Minor
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Very significant
SEASONAL SEC'DARY CROPS	Significant

OTHER DOCUMENTATION**Survey description**

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

Boundary definition

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

Notes

This description is based on field surveys in Milne Bay Province in System 0511 and on a review of literature on the Amazon Bay part of the system. The system was distinguished from 0511 on the basis of the extensive oil palm developments in that system. It is distinguished from System 0320, where the fallow vegetation is short grass and the fallow period is 1-4 years, and from System 0322 where sweet potato is the most important crop.

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

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

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

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

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

Abbi (1975, 7) in 1960-62 added little to this picture. He thought taro was the most important food, followed by banana,

Notes continued

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

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

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

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

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

National Nutrition Survey 1982/83

20 families from 2 villages were asked in February 1983 what they had eaten the previous day. 100 per cent reported eating coconut, 75 per cent sweet potato, 50 per cent banana, 50 per cent sago, 10 per cent taro, 5 per cent cassava and none Chinese taro or yam. 15 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the high consumption of sago and low consumption of taro and cassava.

Main References

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

Other References

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

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

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

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

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

PROVINCE 5 Milne Bay	AGRICULTURAL SYSTEM No. 30	Subsystem No. 1 of 1
Districts 1 Rabaraba	Subsystem Extent 100 %	Area (sq km) 33
Population 377	Population density 11 persons/sq km	Population absent 7 %

System Summary

Located immediately inland of extensive mangrove swamps along the coast of Collingwood Bay, south of Wanigela and extending into Milne Bay Province at Biniguni mission. Tall woody regrowth, more than 25 years old, is cleared and burnt. The most important crop is sweet potato; important crops are coconut, taro and banana; other crops are cassava, Alocasia taro, sago and yam (*D. esculenta*). About six plantings are made before a long fallow. Land is fallowed for short periods between plantings. Banana are planted in separate gardens from all other crops. Taro, sweet potato and yam are planted on separate blocks within gardens. Taro and yam are planted in first year gardens, taro is usually replanted after harvest. After the second planting of taro, up to five plantings of sweet potato may be made. Banana are maintained for at least 10 years. Sweet potato is planted in small mounds. Taro gardens are cleared from January to May each year, but sweet potato is planted throughout the year. Many gardens are flooded for short periods each year, resulting in significant deposition of silt. All gardens are fenced.

Extends across provincial border to System(s) 0611

Altitude range (m) 0-40 **Slope** Flat (<2 degrees)

CROPS

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

FALLOW & CROPPING PERIOD

FALLOW TYPE	Tall woody regrowth
SHORT FALLOW	Very significant
LONG FALLOW PERIOD	>15 years
CROPPING PERIOD	6-14 plantings
R VALUE	33 (medium)

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

1 Fish	Minor
2 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	Very significant
MOUNDS	None
LARGE MOUNDS	None
Garden Bed Techniques:	
BEDS SQUARE	None
BEDS LONG	None
Other Features:	
FENCES	Very significant
STAKING OF CROPS	Minor
FALLOW CUT ONTO CROPS	None
SEASONAL MAIN CROPS	Minor
SEASONAL SEC'DARY CROPS	Minor

OTHER DOCUMENTATION**Survey description**

In January 1994, by air from Port Moresby to Wanigela mission; garden observations at Wanigela (1 day); a boat traverse from Wanigela to Sinapa village (1 day); garden observations at Sinapa on the Beria and Garandi Rivers (half day); from Sinapa to Midina mission in Milne Bay Province (half day).

Boundary definition

The boundary with Systems 0612 and Milne Bay System 0505 were determined by fieldwork at Wanigela mission and a boat traverse from Wanigela to Midina mission in Milne Bay Province, and a flight from Pumani airstrip to Biniguni mission. The boundaries with Systems 0609 and 0610 were determined by fieldwork between Tufi station and Sinapa village, and interviews at Safia station and Namudi mission.

Notes

This system is distinguished from nearby systems because about 6 plantings are made before a long fallow here. Settlements are situated along the coast on sandy beach ridges, among dense stands of coconuts and casuarina trees. Behind the villages are mangrove and sago swamps. Gardens are made on narrow alluvial floodplains above the tidal limit along rivers and streams; inland of a strip of mangrove forest (15-25 m tall and 1-2 km wide) and a strip of sago swamp. People travel in outrigger canoes, upstream along channels through the mangrove forest from the villages to the gardens. Substantial garden houses are built and many families spend long periods living in the gardens.

This system has unusually long cropping periods for a lowland PNG agricultural system with a long fallow period. The excellent alluvial soils and annual flooding which deposits new silt probably enable many plantings before a long fallow. The most important reason given by people for the final abandonment of the garden to a long fallow was the breaking down of fences by bush dwelling pigs. After fallows are cleared and burnt and the garden is fenced, taro is interplanted with aibika, sugarcane, cucumber, snake bean and corn. Cassava is planted around the garden edges. Small areas of yam (*D. esculenta*) are planted in separate parts of the garden. A second planting of taro is common. Up to five plantings of sweet potato are made after the second taro harvest and after the first yam harvest. Short fallows of up to 3 months occur between all plantings. Weeds and grasses that grow during the short fallow are pulled up, heaped and burnt.

Triploid bananas, introduced since 1945, are now planted as a monocrop in separate gardens to taro and sweet potato, and are maintained for at least 10 years before a long fallow. This banana is said to have an origin somewhere on the southern side of the Cape Vogel peninsular. Alocasia taro is an even more recent introduction, being first planted in the 1980s. Alocasia is planted at low densities in the corners of taro and sweet potato gardens, and often in small patches in banana gardens. Chinese taro was not observed here. Yam (*D. esculenta*) and sugarcane are staked. Village sites are densely planted with coconut which is an important food.

Fishing is a very important activity. Most families fish every night when weather allows using lines, spears and pressure lamps. Hunting is also important. The main prey are pigs; less important are wallaby and cassowary. There is a large area of unoccupied land inland of this system. This area is relatively isolated. All travel is by canoe along the coast to Waingela mission and airstrip. Small amounts of cash are earned locally from the sale of fish and fresh food. The main source of cash appears to be remittances from wage earners in towns. Local schools have produced a large number of well educated people. Outboard motors, pressure lamps and radios are common possessions in the villages, suggesting that significant amounts of cash are remitted to the area.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

Ruxton, B.P., H.A. Haantjens, K. Paijmans and J.C. Saunders 1967 Lands of the Safia-Pongani area, Territory of Papua and New Guinea. Land Research Series No. 17, Commonwealth Scientific and Industrial Research Organisation, Melbourne.

Tietjen, A.M. 1985 Infant care and feeding practices and the beginnings of socialization among the Maisin of Papua New Guinea. In Marshall, L.B. (ed), *Infant Care and Feeding in the South Pacific*. London, Gordon and Breach, 121-135.

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.

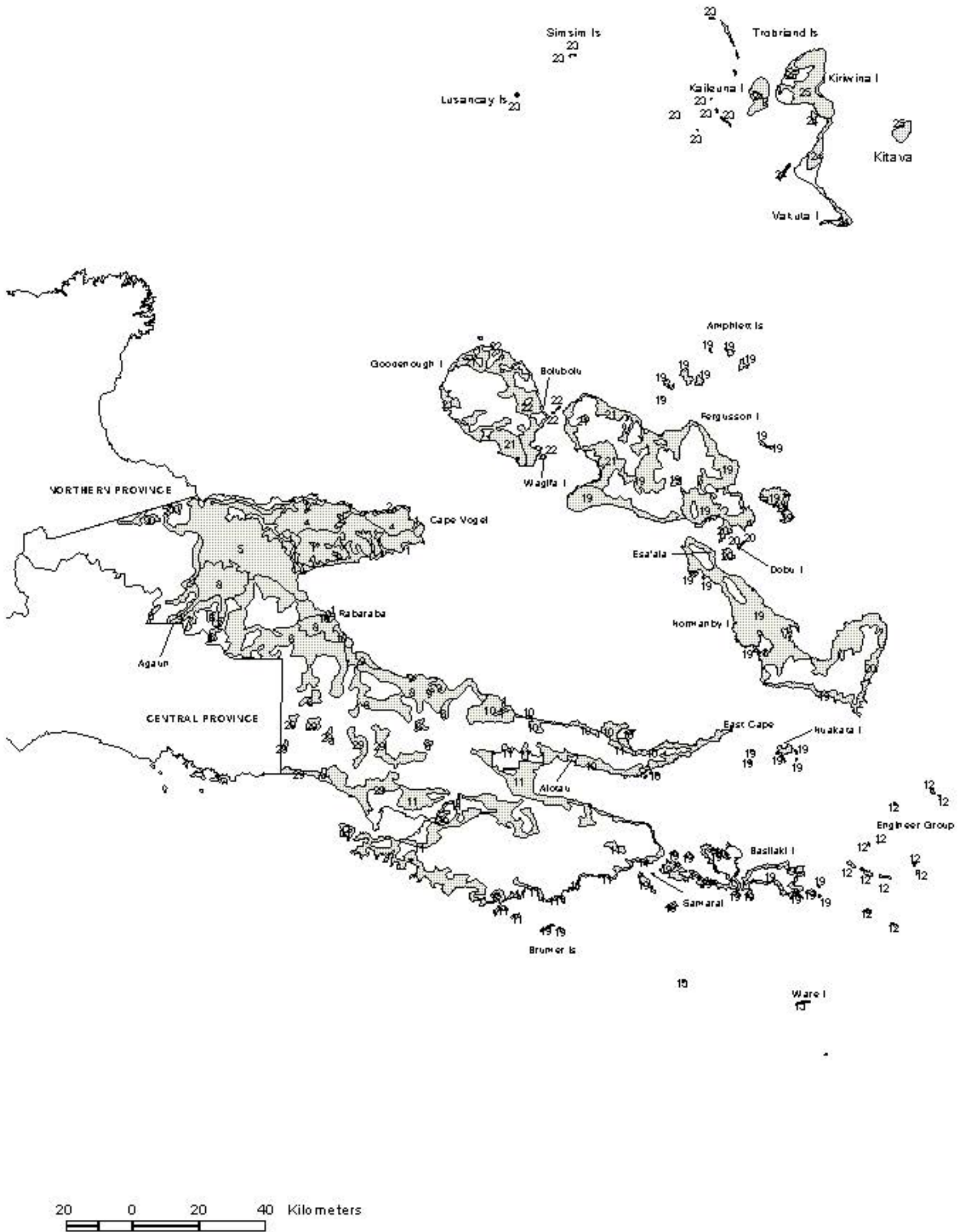
¹ $R = (\text{Number of years of cultivation} \times 100) / (\text{Number of years of cultivation} + \text{Number of years of long fallow})$, (Ruthenberg 1980, 15)

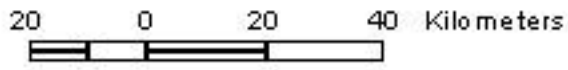
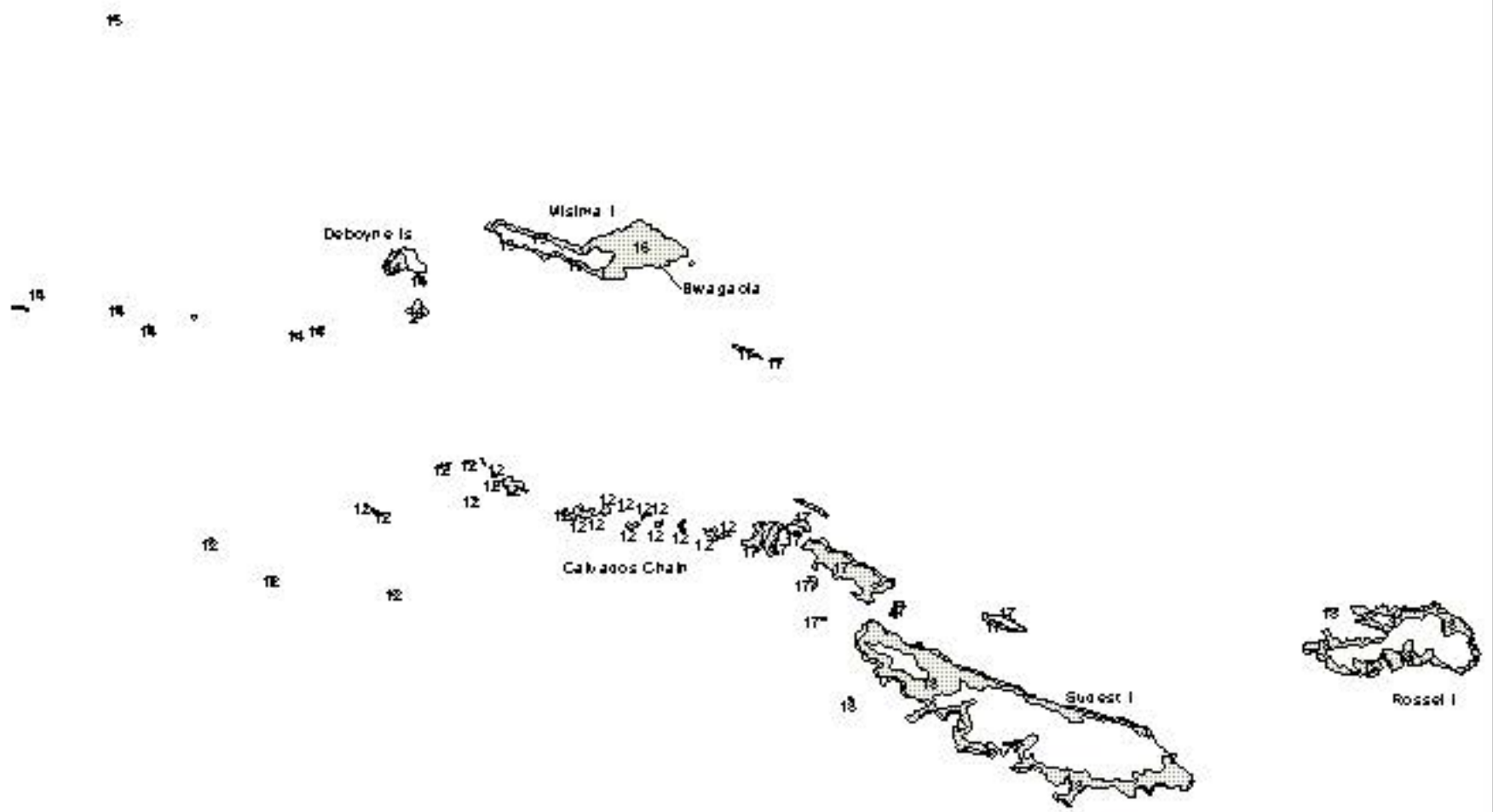
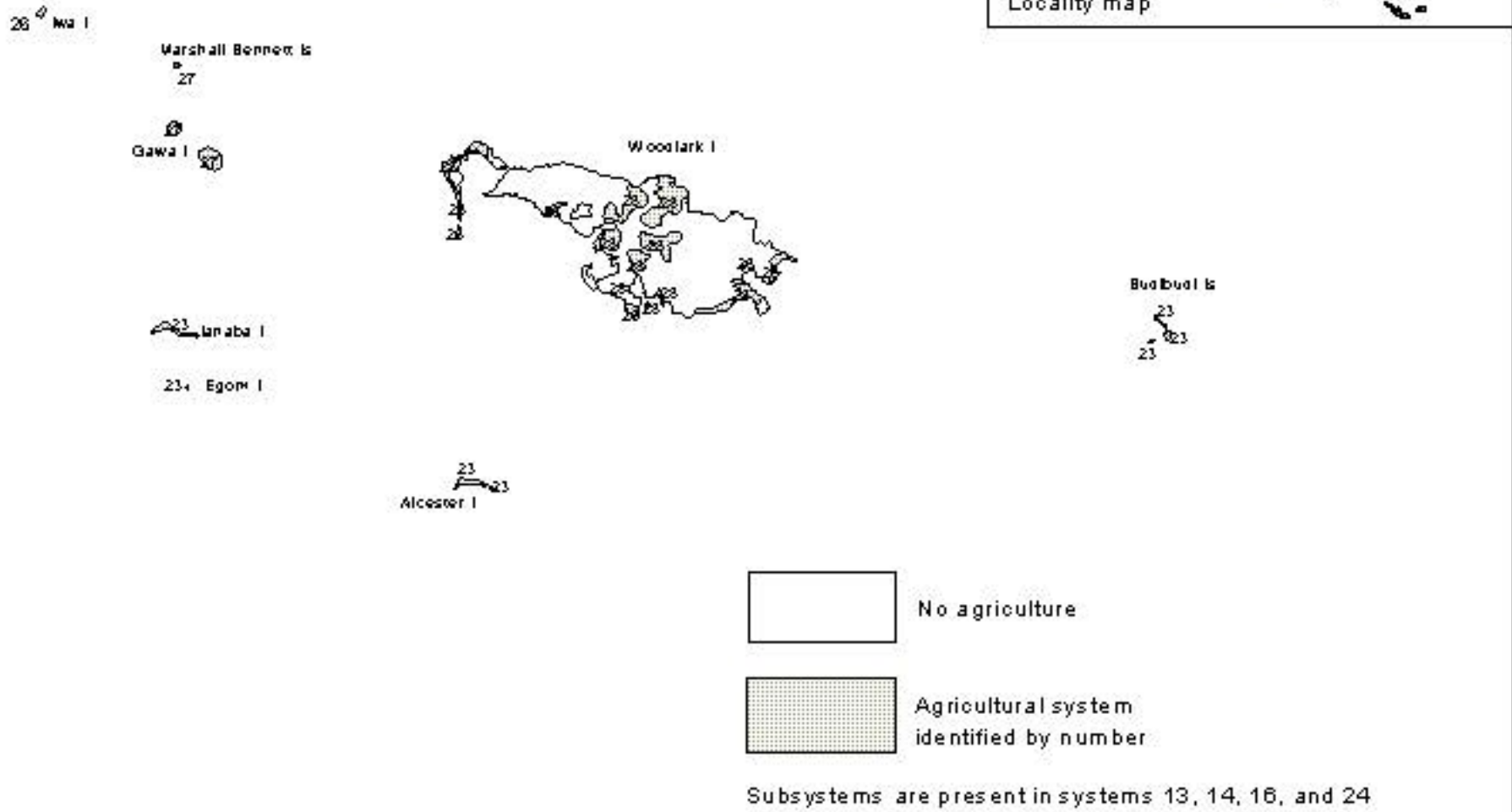
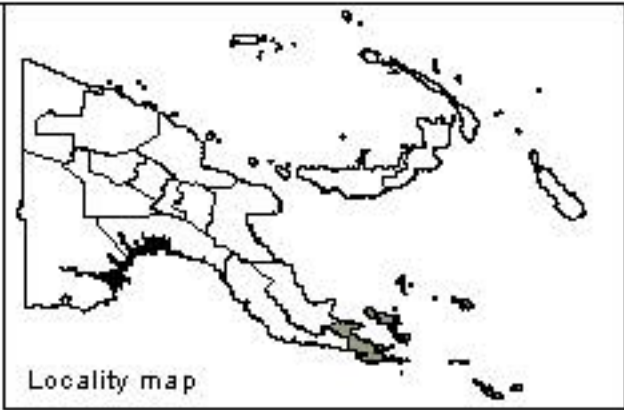
Map title	Notes
7. Garden and crop segregation	Separation of crops into different gardens or into different plots within a garden (4 classes). A combination of Fields 28 and 29. For both fields, 'nil' and 'minor or insignificant' are defined as 'absent'; and 'significant' and 'very significant' as 'present'.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

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

MILNE BAY PROVINCE

Agricultural systems









MILNE BAY PROVINCE



20 0 20 40 Kilometers

Fallow vegetation

-  Short grass
-  Grass and woody regrowth
-  Short woody regrowth
-  Tall woody regrowth







MILNE BAY PROVINCE



20 0 20 40 Kilometers

Long fallow period

-  Greater than 15 years
-  5-15 years
-  1-4 years
-  Long fallow not used







MILNE BAY PROVINCE



20 0 20 40 Kilometers

Number of plantings before fallow

-  1 planting only
-  2 plantings
-  3 to 5 plantings
-  6 to 14 plantings







MILNE BAY PROVINCE



20 0 20 40 Kilometers

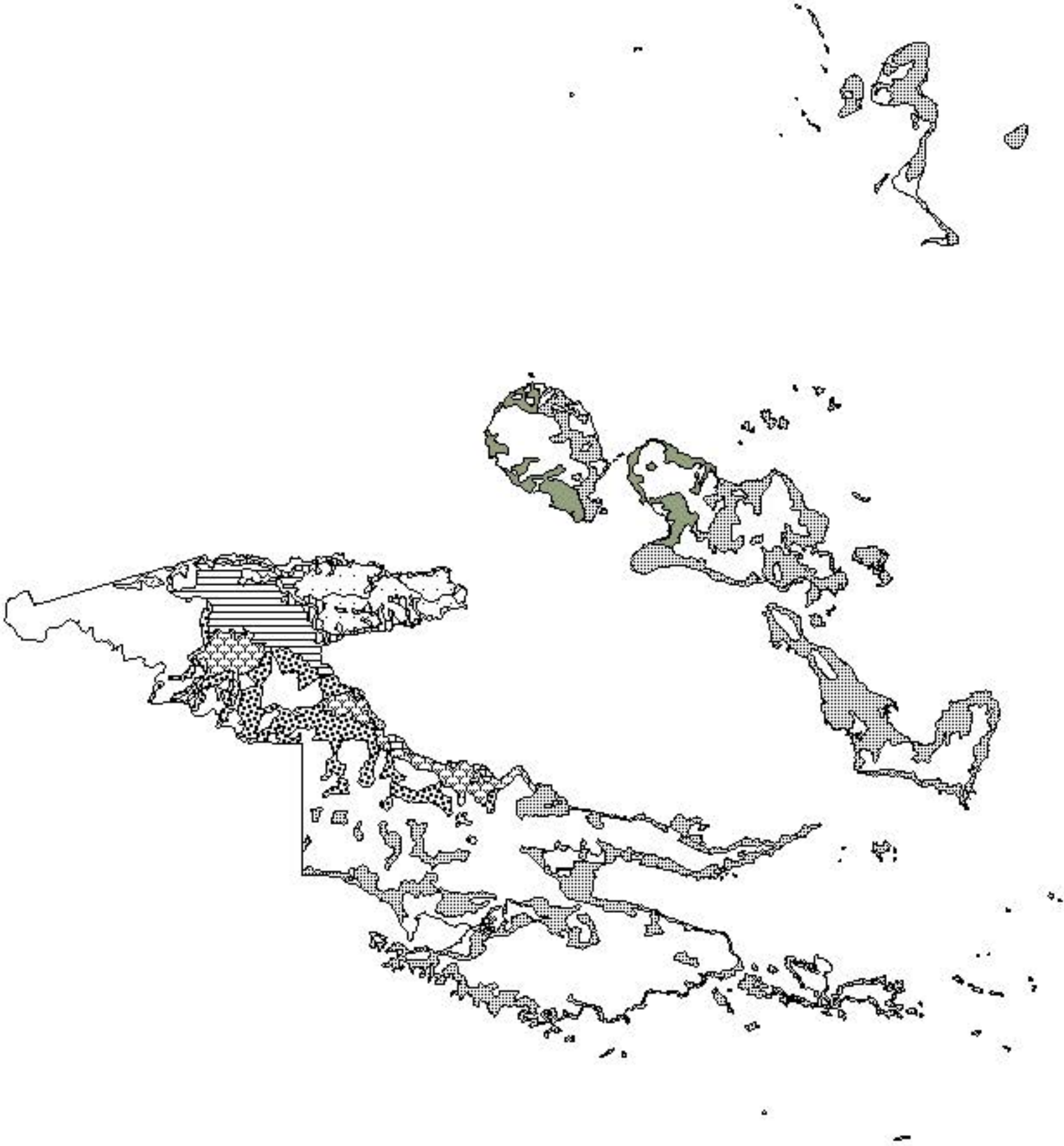
Intensity of land use

Ratio of cropping period to fallow period

-  Very low
-  Low
-  Medium
-  High



MILNE BAY PROVINCE



20 0 20 40 Kilometers

Crop combinations


Legend on next page



MILNE BAY PROVINCE

Crop combinations

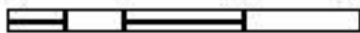
Most important crops Important crops

	None	Banana/cassava/coconut/sweet potato/yam (D. esculenta)
	None	Cassava/coconut/sweet potato/taro/yam (D. esculenta)
	None	Coconut/sago/sweet potato/taro/yam (D. esculenta)
	None	Banana/cassava/coconut/sweet potato/taro
	Banana	Coconut
	Cassava/sweet potato	Banana/coconut/yam (D. esculenta)
	Cassava/sweet potato	Yam (D. esculenta)
	Coconut	Cassava/sweet potato
	Sweet potato	Taro
	Sweet potato	Banana/cassava/yam (D. esculenta)
	Sweet potato	Banana/coconut/taro
	Sweet potato/taro	Banana/cassava/coconut
	Sweet potato/taro	Banana
	Sweet potato/taro	None
	Sweet potato/yam	Coconut/taro





MILNE BAY PROVINCE



20 0 20 40 Kilometers



Garden and crop segregation

-  No segregation
-  Garden segregation
-  Crop segregation
-  Garden and crop segregation





MILNE BAY PROVINCE



20 0 20 40 Kilometers



Soil fertility maintenance

-  No technique
-  Planted tree fallow






MILNE BAY PROVINCE



20 0 20 40 Kilometers

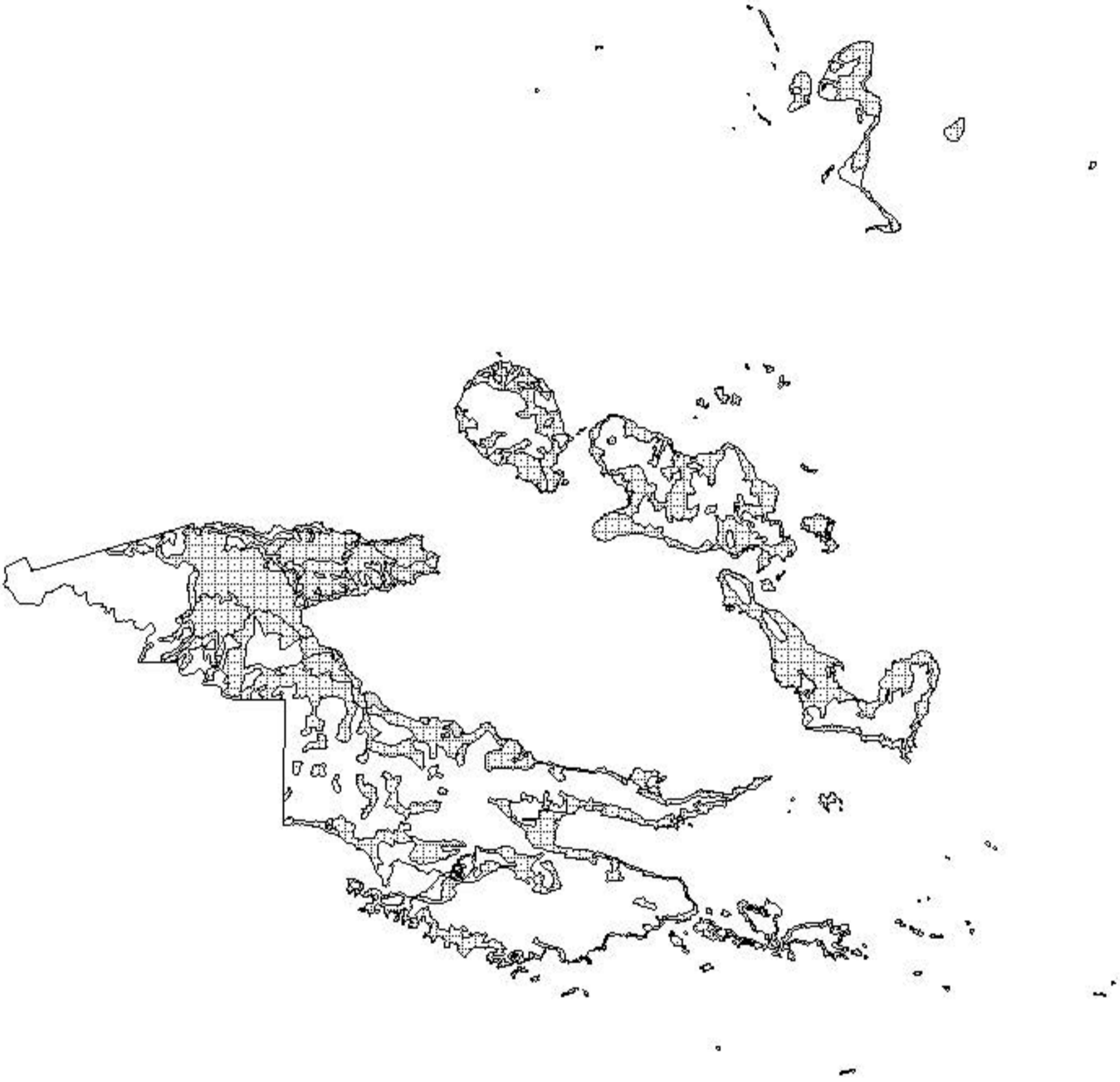


Soil tillage

-  None
-  Minor/insignificant
-  Very significant





MILNE BAY PROVINCE



20 0 20 40 Kilometers



Fallow clearing practices

-  Fallow cut and not burnt
-  Fallow cut and burnt





MILNE BAY PROVINCE



20 0 20 40 Kilometers

Soil mounds and beds

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






MILNE BAY PROVINCE



20 0 20 40 Kilometers

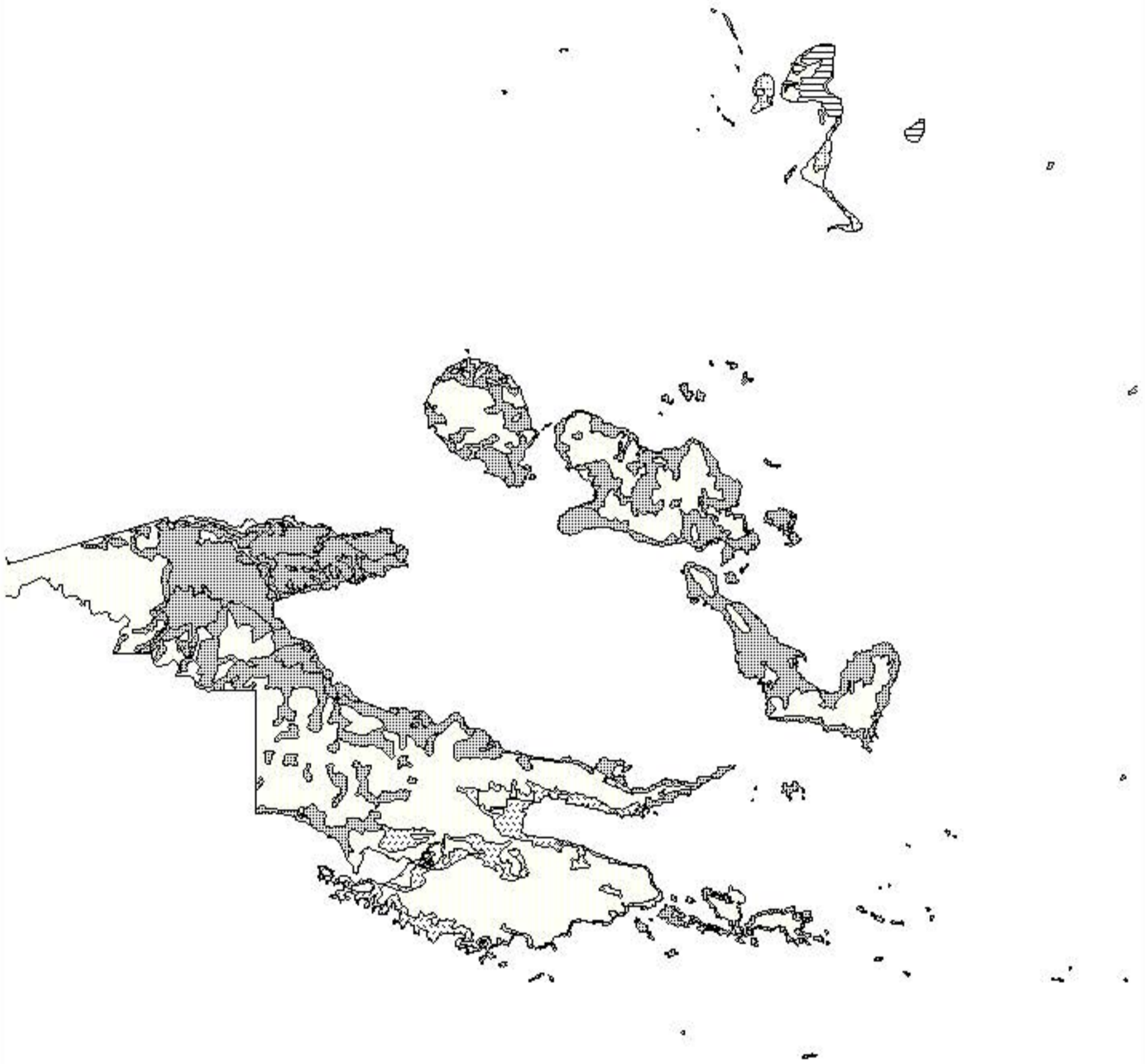


Water management techniques

-  No water control
-  Soil retention barriers
-  Irrigation







MILNE BAY PROVINCE



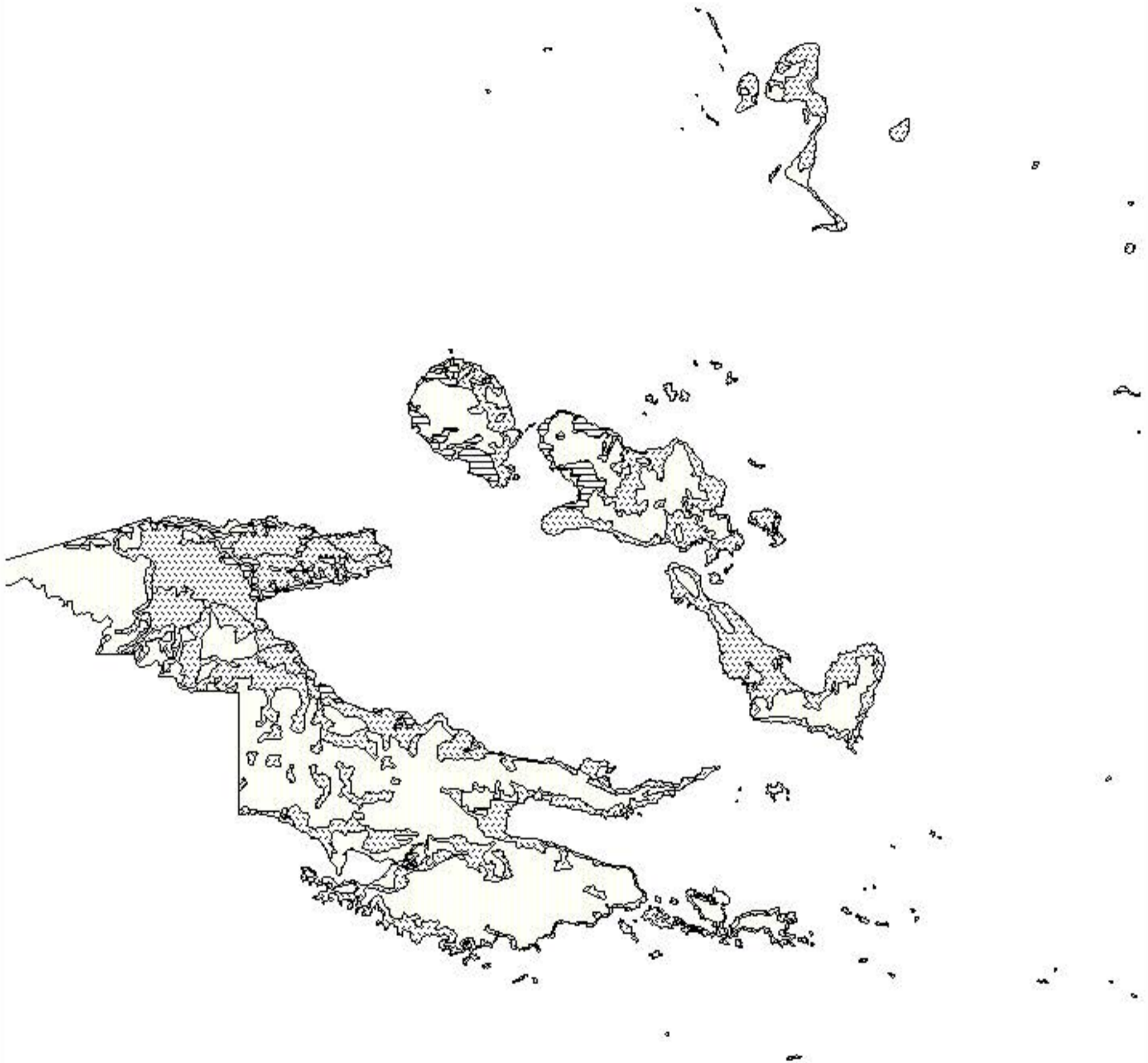
20 0 20 40 Kilometers

Cash income activities

-  No significant cash income
-  Betel nut
-  Fish
-  Fresh food





MILNE BAY PROVINCE



20 0 20 40 Kilometers

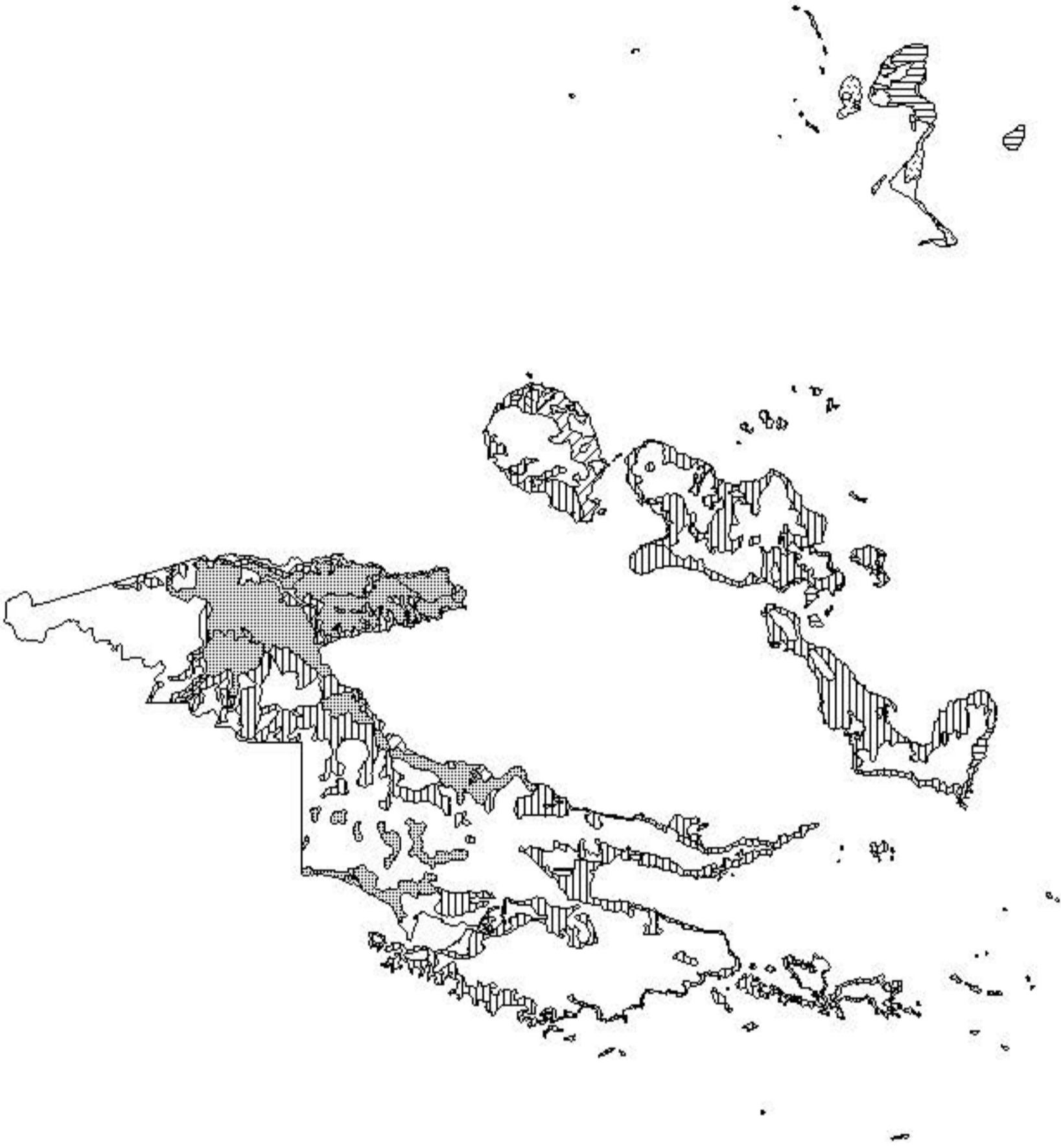


Seasonality of main food crops

-  No seasonal planting
-  Planted seasonally



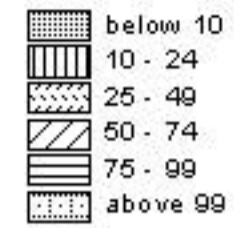
MILNE BAY PROVINCE



20 0 20 40 Kilometers

Population density

Persons per square kilometre



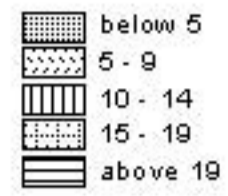
MILNE BAY PROVINCE



20 0 20 40 Kilometers

Population absent

Percentage



5. AGRICULTURAL SYSTEMS: DATA LISTING BY CODES

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

AGRICULTURAL SYSTEM DATA LISTING - CODES Province: 05 Milne Bay

System	Sub sys	No. of subsys	Subsys extent	Same sys oth prov	Districts	Census Divisions
501	1	1	4		1-2	01-03-05
502	1	1	4		1	01
503	1	1	4		1	01
504	1	1	4		1	01-02
505	1	1	4		1	01-03
506	1	1	4	0322	1	02-04
507	1	1	4		1	02
508	1	1	4		1	01-02-03-04-05
509	1	1	4		1	03
510	1	1	4		1-2	03-05-06
511	1	1	4		2-3	05-06-07-08-09-10
512	1	1	4		3-6	09-26
513	1	2	2		3	09
513	2	2	2		6	09
514	1	2	3		6	24
514	2	2	1		6	24
515	1	1	4		6	23
516	1	2	3		6	23
516	2	2	1		6	23
517	1	1	4		6	24-27-28
518	1	1	4		6	25-28
519	1	1	4		2-3-4	05-09-10-12-13-14-15-16
520	1	1	4		4	13-15-16
521	1	1	4		4	11-12
522	1	1	4		4	11
523	1	1	4		5	17-22
524	1	2	3		5	17-19-20
524	2	2	1		5	17-19-20
525	1	1	4		5	18-19-21
526	1	1	4		5	22
527	1	1	4		5	22
528	1	1	4		5	22
529	1	1	4	0321	3	10
530	1	1	4	0611	1	01

KEY

Subsys Subsystem
 Same sys Same system in
 oth prov other province

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Area km ²	Population			Altitude range m		Slope	Fallows		
			Total	Abs	Den	Low	High		Veg	Sht	Per
501	1	124	2148	15	17	0	20	1	5	0	3
502	1	62	933	23	15	0	20	1	3	0	2
503	1	246	0	0	9	0	100	3	5	0	3
504	1	226	599	18	7	0	80	3	3	0	2
505	1	516	1401	8	3	20	150	2	5	0	3
506	1	677	6929	9	12	600	1400	3	5	0	3
507	1	9	1320	10	75	900	1200	2	3	0	2
508	1	388	3065	15	8	400	1000	4	1	0	3
509	1	33	1739	29	53	10	40	2	3	0	2
510	1	221	4524	16	20	0	150	3	5	0	3
511	1	723	12414	19	17	10	300	5	5	0	3
512	1	52	1601	17	31	0	150	3	4	0	2
513	1	3	498	16	166	0	30	2	4	0	2
513	2	0	0	0	0	0	100	3	1	0	2
514	1	23	1292	19	56	0	100	5	4	0	2
514	2	0	0	0	0	0	100	2	5	0	3
515	1	36	2165	16	60	0	200	3	5	0	3
516	1	122	4930	18	40	0	200	5	4	0	2
516	2	0	0	0	0	0	200	5	5	0	3
517	1	111	1475	7	13	0	150	5	4	0	2
518	1	454	4606	20	10	0	200	5	5	0	3
519	1	1261	22730	13	18	0	500	5	5	0	3
520	1	46	3732	21	81	0	400	5	4	0	2
521	1	324	6778	8	21	0	500	1	5	0	3
522	1	164	8589	11	52	0	600	5	5	0	3
523	1	26	1117	2	43	0	40	1	4	0	1
524	1	95	2896	8	30	0	40	1	5	0	2
524	2	0	0	0	0	0	40	1	5	0	3
525	1	169	13221	9	78	0	80	1	4	0	2
526	1	2	591	2	296	0	100	1	4	0	1
527	1	21	798	2	38	0	100	1	4	0	2
528	1	178	1499	4	8	0	100	1	5	0	3
529	1	232	702	8	3	10	300	5	5	0	3
530	1	33	377	7	11	0	40	1	5	3	3

KEY

Subsys Subsystem
 Area km² Area of System

Population

Total Resident population 1980
 Abs Absent population (%)
 Den Population density (persons/km²)

Fallows

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

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Staple crops			Narcotic crops
		Most import	Important	Present	
501	1	02	06	02-04-05-06-11-12-13-14-15-18	2-4-5
502	1	02	06	02-04-05-06-11-12-13-14-15-18	2-4-5
503	1	04-11	15	02-04-05-11-12-13-14-15-18	2-4-5
504	1	04-11	15	02-04-05-11-12-13-14-15-19	2-4-5
505	1	11	02-04-15	02-04-05-09-11-13-14-15	2-4-5
506	1	11	13	02-04-05-08-11-13-14-15-20	1-2-3-4-5
507	1	11-13	02	02-04-05-08-11-13-15-20	1-2-3-4-5
508	1	11-13	00	02-04-11-13-14-15	1-2-3-4-5
509	1	11-13	02-04-06	02-04-06-11-13-14-15-18-19-21	5
510	1	00	04-06-11-13-15	02-04-05-06-11-12-13-14-15-21	2-4-5
511	1	00	02-04-06-11-13	02-04-05-06-09-11-13-14-15-19	2-4-5
512	1	00	02-04-06-11-15	02-04-06-11-13-14-15-19-18	2-4-5
513	1	00	02-04-06-11-14	02-04-05-06-11-13-14-15-18-19	2-4-5
513	2	04-11-14	00	02-04-11-14-15	2-4-5
514	1	00	02-04-06-11-15	02-04-05-06-11-12-13-15-19-18	2-4-5
514	2	02	00	02-05-12-13-14-15-18-19	2-4-5
515	1	00	02-04-06-11-13-15	02-04-05-06-11-12-13-14-15-18	2-4-5
516	1	00	02-04-06-09-11-15	02-04-05-06-09-11-13-14-15-19	2-4-5
516	2	00	02-04-06-09-11-15	02-04-05-06-09-11-13-15-18-19	2-4-5
517	1	00	02-04-06-09-11-15	02-04-06-09-11-13-14-15-18-19	2-4-5
518	1	00	02-04-06-09-11-15	02-04-05-06-09-11-13-14-15-18	2-4-5
519	1	00	02-04-06-11-14-15	02-04-06-09-11-12-13-14-15-18	2-4-5
520	1	00	02-04-06-11-14-15	02-04-05-06-11-13-14-15	2-4-5
521	1	04-11	02-06-15	02-04-05-06-09-11-13-14-15	2-4-5
522	1	00	02-04-06-11-14-15	02-04-05-06-11-12-13-14-15-18	2-4-5
523	1	06	04-11	02-04-06-11-13-15	2-4-5
524	1	00	04-06-11-13-15	02-04-06-11-12-13-14-15-18	2-4-5
524	2	00	04-06-11-13-15	02-04-06-11-12-13-14-15-18	2-4-5
525	1	00	04-06-11-13-15	02-04-06-11-12-13-14-15-18	2-4-5
526	1	00	04-06-11-15	02-04-05-06-11-13-14-15-18	2-4-5
527	1	11-15	06-13	02-04-06-11-12-13-14-15-18	2-4-5
528	1	00	06-09-11-13-15	02-04-05-06-09-11-13-14-15	2-4-5
529	1	00	02-04-06-11-13	02-04-05-06-09-11-13-14-15-19	2-4-5
530	1	11	02-06-13	02-04-06-09-11-12-13-14-15	2-4-5

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Vegetable crops	Fruit crops	Nutcrops
501	1	01-09-16-19-20-21-23-27	05-07-08-09-12-13-15-17	01-07-13-15
502	1	01-09-16-19-20-21-23-27	05-07-08-09-12-13-15-17	01-07-13-15
503	1	01-09-10-16-19-20-21-23-27	05-07-08-09-12-13-15-17	01-04-07-13-15
504	1	01-02-09-10-16-20-21-27	05-07-08-09-12-13-15-17	01-04-07-13-15
505	1	01-04-09-10-15-16-20-21-27	07-08-12-13-15-17	01-04-13-15
506	1	01-04-09-10-13-15-16-20-23-27	05-07-08-12-13-15-17	01-03-09-10-13
507	1	01-02-04-05-09-13-16-20-32	01-05-08-09-13-15-17	02-05-06-09-10
508	1	01-04-05-09-16-43	01-05-07-08-12-13-17	01-05-06-09-10
509	1	01-04-09-16-20-21-27-28-32-43	05-07-12-13-15-17	01-07-15
510	1	01-09-16-20-21-23-27	05-07-08-09-12-13-15-17	01-07-15
511	1	01-09-10-15-16-20-21-23-27-28	05-07-08-12-13-15-17-36	01-07-13-15-18
512	1	01-09-15-16-20-21-23-27-41-44	03-05-07-12-13-15-17-35	01-06-07-15-18
513	1	01-02-09-12-20-21-27-41-44	03-07-09-12-13-15-17	01-07-15
513	2	01-02-09-12-20-21-27-41-44	03-07-09-12-13-15-17	01-07-15
514	1	01-09-15-20-21-23-30-41	05-07-12-13-15-17-20-35	01-07-11-15-18
514	2	09-21	05-07-12-13-15-17-20-35	01-07-11-15-18
515	1	01-09-15-20-21-23-27-28-30-41	03-05-07-12-13-15-20-32	01-11-12-15-18
516	1	01-09-11-15-16-20-21-23-30-41	03-05-07-12-13-15-17-20	01-06-12-15-18
516	2	01-09-11-15-16-20-21-23-30-41	03-05-07-12-13-15-20-39	01-06-12-15-18
517	1	01-09-16-20-21-23-27-30-41-44	03-07-12-13-15-17-20-35	01-06-07-15-18
518	1	01-09-16-20-21-23-27-30-41-44	05-07-12-13-15-17-20-35	01-06-07-15-18
519	1	01-09-11-15-16-20-21-23-27-30	03-05-07-12-13-15-17-36	01-07-11-15
520	1	01-09-15-16-20-21-23-27-30	03-07-12-13-15-17-20-36	01-06-07-15
521	1	01-15-16-20-21-23-27	03-05-07-12-13-15-17-36	01-07-11-15
522	1	01-09-16-20-21-23-27	07-09-12-13-15-17-20-36	01-07-11-15
523	1	01-20-21	03-07-12-15-17	01-07-15
524	1	01-05-09-15-16-20-21-23-42	03-05-07-09-12-15-17-20	01-15-07-18
524	2	01-05-09-15-16-20-21-23-42	03-05-07-09-12-15-17-20	01-15-07-18
525	1	01-05-09-11-15-21-23-27-30-42	03-05-07-12-15-17-20-23	01-07-15-11-18
526	1	01-02-09-20-21-27	03-07-09-12-13-15-17-20	01-07-18
527	1	01-09-15-20-21-23-27-30	03-07-12-15-34-36	01-15-18-07
528	1	01-09-15-16-20-21-23-27	07-12-13-15-23	07-15
529	1	01-09-10-15-16-20-21-23-27-28	05-07-08-12-13-15-17-36	01-07-13-15-18
530	1	01-02-09-10-16-21-23-27	05-07-12-13-15-16-17	01-06-10

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Segregation		Crop Seq	Gard types		Soil fertility maintenance techniques							
		Gar	Crp		Mix	H'ld	Leg	Tre	Com	Man	Isl	Sil	Fer	
501	1	0	2	2	0	0	0	0	0	0	0	0	1	0
502	1	0	2	2	0	0	0	0	0	0	0	0	1	0
503	1	0	2	1	0	0	0	0	0	0	0	0	0	0
504	1	0	2	1	0	0	0	0	0	0	0	0	0	0
505	1	0	2	2	0	0	0	0	0	0	0	0	1	0
506	1	0	2	2	0	2	0	0	0	0	0	0	0	0
507	1	2	1	2	0	2	0	0	0	0	0	0	0	0
508	1	0	1	3	0	3	0	0	0	0	0	0	0	0
509	1	1	1	3	0	0	0	0	0	0	0	0	0	0
510	1	0	2	2	0	1	0	0	0	0	0	0	0	0
511	1	0	2	3	0	1	0	0	0	0	0	0	0	0
512	1	1	2	2	0	0	0	0	0	0	0	0	0	0
513	1	2	2	1	0	2	0	0	0	0	0	0	0	0
513	2	2	2	1	0	2	0	0	0	0	0	0	0	0
514	1	1	2	2	0	1	0	0	0	0	0	0	0	0
514	2	0	1	0	0	1	0	0	0	0	0	0	0	0
515	1	2	2	2	0	0	0	0	0	0	0	0	0	0
516	1	1	2	2	0	1	0	0	0	0	0	0	0	0
516	2	1	2	2	0	1	0	0	0	0	0	0	0	0
517	1	1	2	2	0	1	0	0	0	0	0	0	0	0
518	1	1	2	2	0	0	0	0	0	0	0	0	0	0
519	1	1	2	2	0	0	0	0	0	0	0	0	0	0
520	1	0	2	3	0	0	0	0	0	0	0	0	0	0
521	1	1	1	1	0	0	0	0	0	0	0	0	0	0
522	1	2	2	2	0	1	0	0	0	0	0	0	0	0
523	1	1	1	1	0	0	0	0	0	0	0	0	0	0
524	1	0	1	3	0	0	0	0	0	0	0	0	0	0
524	2	1	1	3	0	0	0	0	0	0	0	0	0	0
525	1	1	1	3	0	0	0	0	0	0	0	0	0	0
526	1	2	1	3	0	2	0	2	0	0	0	0	0	0
527	1	3	1	3	0	0	0	0	0	0	0	0	0	0
528	1	1	3	1	0	0	0	0	0	0	0	0	0	0
529	1	0	2	3	0	1	0	0	0	0	0	0	0	0
530	1	1	3	2	0	0	0	0	0	0	0	0	3	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: 05 Milne Bay

System	Sub sys	Management techniques											
		Water		Soil						Fallow		Other	
		Irr	Drn	Pig	Till	Hol	Bar	Mul	Me c	Brn	Cut	Fen	Stk
501	1	0	0	0	0	0	0	1	0	3	0	1	0
502	1	0	0	0	0	0	0	1	0	3	0	2	0
503	1	0	0	0	0	0	0	0	0	3	0	3	2
504	1	0	0	0	1	0	0	0	0	3	0	3	2
505	1	0	0	0	0	0	0	0	0	3	0	2	1
506	1	0	0	0	0	0	3	0	0	3	0	2	1
507	1	0	0	0	0	0	0	0	0	3	0	2	1
508	1	0	0	0	3	0	3	0	0	3	0	0	0
509	1	3	0	0	3	0	0	0	0	1	0	1	1
510	1	0	0	0	0	0	3	0	0	3	0	1	2
511	1	0	0	0	0	0	1	0	0	3	0	1	1
512	1	0	0	0	0	0	1	0	0	3	0	2	0
513	1	0	0	0	0	0	0	0	0	3	0	0	2
513	2	0	0	0	3	0	0	1	0	3	0	0	2
514	1	0	0	0	0	0	0	0	0	3	0	3	1
514	2	0	0	0	0	0	0	0	0	3	0	3	0
515	1	0	0	0	0	0	1	0	0	3	0	2	0
516	1	0	0	0	0	0	1	0	0	3	0	3	0
516	2	0	0	0	0	0	1	0	0	3	0	3	0
517	1	0	0	0	0	0	1	0	0	3	0	0	0
518	1	0	0	0	0	0	1	0	0	3	0	2	0
519	1	0	0	0	0	0	2	0	0	3	0	1	1
520	1	0	0	0	0	0	1	0	0	3	0	1	2
521	1	0	0	0	0	0	1	0	0	3	0	0	1
522	1	0	0	0	1	0	2	0	0	3	0	1	1
523	1	0	0	0	0	0	0	0	0	3	0	0	1
524	1	0	0	0	0	0	0	0	0	3	0	1	2
524	2	0	0	0	0	1	0	0	0	3	0	2	2
525	1	0	0	0	0	1	0	0	0	3	0	1	2
526	1	0	0	0	0	0	0	0	0	3	0	1	2
527	1	0	0	0	0	1	0	0	0	3	0	3	2
528	1	0	0	0	0	0	0	0	0	3	0	3	2
529	1	0	0	0	0	0	1	0	0	3	0	1	1
530	1	0	0	0	0	0	0	0	0	2	0	3	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: 05 Milne Bay

System	Sub sys	Management techniques						Crop planting seasonality		Cropping intensity	R value
		Soil mounds				Garden beds		Maj	Min		
		Vsm	Sm	Md	Lge	Sq	Lg				
501	1	1	0	0	0	0	0	0	2	2	29
502	1	1	0	0	0	0	0	0	2	2	23
503	1	2	0	0	0	0	0	2	1	2	9
504	1	2	0	0	0	0	0	2	1	2	17
505	1	0	2	0	0	0	0	3	3	2	9
506	1	0	2	0	0	0	0	2	1	2	9
507	1	2	0	0	0	0	0	3	3	2	17
508	1	0	0	0	0	0	0	2	0	3	17
509	1	2	0	0	0	0	0	0	1	2	17
510	1	0	2	0	0	0	0	3	3	2	9
511	1	0	2	0	0	0	0	3	1	2	9
512	1	1	2	0	0	0	0	2	1	2	17
513	1	0	2	0	0	0	0	2	1	2	17
513	2	0	3	0	0	0	0	2	1	2	17
514	1	1	0	0	0	0	0	2	1	2	17
514	2	1	0	0	0	0	0	1	1	1	5
515	1	0	2	0	0	0	0	2	1	2	9
516	1	0	2	0	0	0	0	2	1	2	17
516	2	0	2	0	0	0	0	2	1	2	9
517	1	0	2	0	0	0	0	2	1	2	17
518	1	0	2	0	0	0	0	2	1	2	9
519	1	1	2	0	0	0	0	2	1	2	9
520	1	0	2	0	0	0	0	2	1	2	17
521	1	0	2	0	0	0	0	1	1	1	5
522	1	0	2	0	0	0	0	2	1	2	9
523	1	1	2	0	0	0	0	0	2	2	40
524	1	2	1	0	0	0	0	2	1	2	17
524	2	2	1	0	0	0	0	2	1	2	9
525	1	2	1	0	0	0	0	2	1	2	17
526	1	2	1	0	0	0	0	2	1	2	40
527	1	2	0	0	0	0	0	2	1	2	17
528	1	0	2	0	0	0	0	2	1	1	5
529	1	0	2	0	0	0	0	3	2	2	9
530	1	0	3	0	0	0	0	1	1	4	33

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: 05 Milne Bay

System	Sub sys	Cash income sources											
		An	Bet	Crd	Cat	Chi	Coc	Cnt	CfA	CfR	Crc	Fwd	Fsh
501	1	0	0	0	0	0	0	1	0	0	0	0	0
502	1	0	0	0	0	0	0	1	0	0	1	0	0
503	1	0	0	0	0	0	0	1	0	0	0	0	0
504	1	0	0	0	0	0	0	1	0	0	0	0	0
505	1	0	0	0	0	0	0	1	0	0	0	0	0
506	1	0	0	0	0	0	0	0	1	1	0	0	0
507	1	0	0	0	0	0	0	0	1	0	0	0	0
508	1	0	0	0	0	0	0	0	1	0	0	0	0
509	1	0	0	0	0	0	0	1	0	0	0	0	1
510	1	0	0	0	0	0	1	1	0	0	0	0	0
511	1	0	1	0	0	0	0	1	0	0	0	0	1
512	1	0	0	0	0	0	0	1	0	0	0	0	1
513	1	0	0	0	0	0	0	0	0	0	0	0	1
513	2	0	0	0	0	0	0	0	0	0	0	0	1
514	1	0	0	0	0	0	0	1	0	0	0	0	1
514	2	0	0	0	0	0	0	1	0	0	0	0	1
515	1	0	2	0	0	0	0	0	0	0	0	0	0
516	1	0	1	0	0	0	0	0	0	0	0	0	0
516	2	0	1	0	1	0	1	0	0	0	0	0	0
517	1	0	0	0	0	0	0	0	0	0	0	0	1
518	1	0	1	0	0	0	0	1	0	0	0	0	1
519	1	0	1	0	0	0	0	1	0	0	0	0	1
520	1	0	1	0	0	0	0	0	0	0	0	0	0
521	1	0	1	0	0	0	0	0	0	0	0	0	0
522	1	0	1	0	0	0	0	0	0	0	0	0	1
523	1	0	0	0	0	0	0	0	0	0	0	0	0
524	1	0	1	0	0	0	0	0	0	0	0	0	2
524	2	0	1	0	0	0	0	0	0	0	0	0	2
525	1	0	2	0	0	0	0	0	0	0	0	0	1
526	1	0	0	0	0	0	0	0	0	0	0	0	0
527	1	0	0	0	0	0	0	0	0	0	0	0	0
528	1	0	0	0	0	0	0	0	0	0	0	0	0
529	1	0	1	0	0	0	0	1	0	0	0	0	1
530	1	0	0	0	0	0	0	0	0	0	0	0	1

KEY

Subsys Subsystem

Cash Income Sources

An Animal skins
 Bet Betel nut
 Crd Cardamom
 Cat Cattle

Chi Chillie
 Coc Cocoa
 Cnt Coconut
 CfA Coffee Arabica

CfR Coffee Robusta
 Crc Crocodile
 Fwd Firewood
 Fsh Fish

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Cash income sources										
		Fod	Op	Pot	Pyr	Ric	Rub	Shp	Tea	Tob	Ot1	Ot2
501	1	1	0	0	0	0	0	0	0	0	0	0
502	1	1	0	0	0	0	0	0	0	0	0	0
503	1	1	0	0	0	0	0	0	0	0	0	0
504	1	1	0	0	0	0	0	0	0	0	0	0
505	1	1	0	0	0	0	0	0	0	0	0	0
506	1	1	0	1	0	0	0	0	0	0	0	0
507	1	1	0	1	0	0	0	0	0	0	0	0
508	1	1	0	0	0	0	0	0	0	0	0	0
509	1	1	0	0	0	0	0	0	0	0	0	0
510	1	1	0	0	0	0	0	0	0	0	0	0
511	1	2	1	0	0	0	0	0	0	0	0	0
512	1	0	0	0	0	0	0	0	0	0	1	1
513	1	0	0	0	0	0	0	0	0	0	1	1
513	2	0	0	0	0	0	0	0	0	0	1	1
514	1	0	0	0	0	0	0	0	0	0	1	1
514	2	0	0	0	0	0	0	0	0	0	1	1
515	1	1	0	0	0	0	0	0	0	0	0	1
516	1	1	0	0	0	0	0	0	0	0	0	1
516	2	1	0	0	0	0	0	0	0	0	0	1
517	1	0	0	0	0	0	0	0	0	0	1	1
518	1	0	0	0	0	0	0	0	0	0	1	0
519	1	1	0	0	0	0	0	0	0	0	1	0
520	1	1	0	0	0	0	0	0	0	0	0	0
521	1	1	0	0	0	0	0	0	0	0	0	0
522	1	1	0	0	0	0	0	0	0	0	0	0
523	1	0	0	0	0	0	0	0	0	0	1	0
524	1	1	0	0	0	0	0	0	0	0	0	1
524	2	1	0	0	0	0	0	0	0	0	0	1
525	1	1	0	0	0	0	0	0	0	0	0	1
526	1	0	0	0	0	0	0	0	0	0	1	0
527	1	0	0	0	0	0	0	0	0	0	1	0
528	1	1	0	0	0	0	0	0	0	0	0	1
529	1	1	0	0	0	0	0	0	0	0	0	0
530	1	1	0	0	0	0	0	0	0	0	0	0

KEY

Subsys Subsystem

Cash Income Sources

Fod Fresh food

Op Oil Palm

Pot Potato

Pyr Pyrethrum

Ric Rice

Rub Rubber

Shp Sheep

Tea Tea

Tob Tobacco

Ot1 Other 1

Ot2 Other 2

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 05 Milne Bay

System	Sub sys	Survey 1				Survey 2				Survey 3			
		Date	Period	S v	Sv	Date	Period	S v	Sv	Date	Period	S v	Sv
		mth yr	yrs	tp in		mth yr	yrs	tp in		mth yr	yrs	tp in	
501	1	01 94	-	4	A/S	--	-	-	--	-	-	-	
502	1	01 94	-	4	A/S	--	-	-	--	-	-	-	
503	1	01 94	-	3	A/S	--	-	-	--	-	-	-	
504	1	01 94	-	3	A/S	--	-	-	--	-	-	-	
505	1	01 94	-	3	A/S	--	-	-	--	-	-	-	
506	1	01 94	-	4	A/S	--	-	-	--	-	-	-	
507	1	01 94	-	2	A/S	--	-	-	--	-	-	-	
508	1	01 94	-	3	A/S	--	-	-	--	-	-	-	
509	1	01 94	-	3	A/S	--	-	-	--	-	-	-	
510	1	01 94	-	4	BJA	--	-	-	--	-	-	-	
511	1	01 94	-	4	A/H	--	-	-	--	-	-	-	
512	1	02 94	-	3	H/S	03 94	-	2	DKM	--	-	-	
513	1	02 94	-	3	H/S	--	-	-	--	-	-	-	
513	2	02 94	-	3	H/S	--	-	-	--	-	-	-	
514	1	02 94	-	2	H/S	--	-	-	--	-	-	-	
514	2	02 94	-	2	H/S	--	-	-	--	-	-	-	
515	1	02 94	-	3	H/S	--	-	-	--	-	-	-	
516	1	02 94	-	3	H/S	--	-	-	--	-	-	-	
516	2	02 94	-	3	H/S	--	-	-	--	-	-	-	
517	1	02 94	-	3	H/S	--	-	-	--	-	-	-	
518	1	02 94	-	4	H/S	--	-	-	--	-	-	-	
519	1	02 94	-	4	BBM	--	-	-	--	-	-	-	
520	1	02 94	-	3	BBM	--	-	-	--	-	-	-	
521	1	02 94	-	3	BBM	--	-	-	--	-	-	-	
522	1	02 94	-	3	BBM	--	-	-	--	-	-	-	
523	1	02 94	-	3	RMB	--	-	-	--	-	-	-	
524	1	02 94	-	3	RMB	--	-	-	--	-	-	-	
524	2	02 94	-	3	RMB	--	-	-	--	-	-	-	
525	1	02 94	-	3	RMB	--	-	-	--	-	-	-	
526	1	02 94	-	2	RMB	--	-	-	--	-	-	-	
527	1	02 94	-	2	RMB	--	-	-	--	-	-	-	
528	1	02 94	-	3	RMB	--	-	-	--	-	-	-	
529	1	--	-	-	-	--	-	-	--	-	-	-	
530	1	01 94	-	3	A/S	--	-	-	--	-	-	-	

KEY

Subsys	Subsystem	BJA	B.J. Allen
Sv tp	Survey type	BBM	R.M. Bourke/T. Betitis/D. Mitchell
Sv in	Surveyor initials	DKM	D. K. Mitchell
		H/S	R.L. Hide/M. Sakiasi
		RMB	R.M. Bourke
		A/H	B.J. Allen/R.L. Hide
		A/S	B.J. Allen/G. Sem

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: 5 Milne Bay

	Village	Population	System	Village	Population	System
DISTRICT	1 Rabaraba			5 BOWADI	256	0506
Division	1 Cape Vogel			6 DANOBU	201	0506
	1 ABUARO	144	0501	7 DIDIA	316	0506
	2 BAI'AWA	92	0505	8 DOMBASAINA	242	0506
	3 BAKO	123	0501	9 OPANAMBU	246	0506
	4 BANAPA	126	0501	10 GADOVISU	356	0506
	5 BEMBERI	182	0508	11 BAUWA	217	0506
	6 BINIGUNI	320	0530	13 GWIRORO	312	0506
	7 BOGABOGA	225	0502	14 IKARA	344	0506
	8 BOROVIA	103	0505	15 KANATURU	155	0506
	9 DABORA	134	0501	16 KARAGAUTU	418	0506
	10 GINADA	102	0504	17 MAINAWA	164	0506
	11 GIWA	314	0501	18 POVA	175	0508
	12 IARAME	106	0502	19 TARAMUGU	162	0506
	13 KOIABAGIRA	338	0501	20 TAUBADI	549	0506
	14 KWAGILA	57	0530	21 WANAMA	419	0506
	15 MAPONA	148	0501	22 WARAWADIDI	336	0506
	16 MENAPI	375	0501			
	17 MIDINO	147	0502	DISTRICT	2 Alotau	
	18 MONARI	252	0505	Division	5 Maramatana	
	19 MUKAWA	301	0502	1 AWAIAMA	209	0510
	20 PEM	261	0504	2 BIWA	132	0510
	21 PUMANI	419	0505	3 EAST CAPE	227	0510
	22 TAPIO	154	0502	4 GARUahi	251	0510
	23 WABUBU	130	0504	5 GUGA	382	0510
	24 WAKWAPU	106	0504	6 HUHUNA	319	0511
	25 WAPON	183	0505	7 IABAM-PAHILELE	71	0519
Division	2 Daga			8 IAPOA NO 1	113	0510
	1 BIBITAN	212	0506	9 IAPOA NO 2	299	0510
	2 BIMAN	193	0508	10 KEIA	242	0510
	3 BIRAT	276	0506	11 LAVORA	240	0508
	4 BONENAU	512	0506	12 NUAKATA	286	0519
	5 DANAWAN	360	0508	13 POLOTONA	183	0511
	6 EVIAUWA	212	0506	14 RONANA	313	0510
	7 GAUNANI	250	0506	15 TAUPOTA NO 1	197	0510
	8 GWADEDE	301	0508	16 TAUPOTA NO 2	188	0510
	9 GWAGUT	204	0508	17 TOPURA	299	0501
	10 KAKAIA	474	0507	18 WAGAHUHU	191	0510
	11 ILAKAE-MODENI	248	0507	19 WAMAWAMANA	231	0510
	12 PARAM	167	0507	Division	6 Tavara	
	13 PAYAWA	431	0507	1 AHIOMA	521	0511
	14 UNI	352	0508	2 BOU	438	0510
Division	3 G/enough Bay Coastal			3 BUBULETA	472	0511
	1 AUGWANA	114	0508	4 DIVINAI	383	0510
	2 DIVARI	165	0508	5 GABUGABUNA	493	0511
	3 GADOA	216	0509	6 IANIANINI	251	0511
	4 KWABUNAKI	133	0508	7 LELEHUDI	173	0510
	5 MANUBADA	335	0508	8 MAIWARA (NTH/STH)	402	0511
	6 NAKARA	237	0510	9 MUTIUWA	436	0511
	7 RADAVA	436	0509	10 NAURA	539	0511
	8 SIRISIRI	352	0505	11 NIGILA	258	0511
	9 UGA	147	0501	12 RABE	398	0511
	10 VIDIA	344	0509	13 WAEMA	447	0511
	11 WADOBUNA	311	0508	14 WALALAIA	318	0510
	12 WAMIRA	431	0509	15 WATUNOU	169	0511
	13 WEDAUI	312	0509			
Division	4 G/enough Bay Inland			Division	7 Buhutu	
	1 ARITAPU	94	0506	1 GELEMALAIA	203	0511
	2 BIDIESI	152	0506	2 IPOULI	120	0511
	3 BOIABOIA	372	0506	3 MILA	135	0511
	4 BONENEPI	156	0506	4 SIASIADA	184	0511

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 5 Milne Bay

	Village	Population	System		Village	Population	System
Division	8 Ealeba				28 WADAUDA	72	0529
	1 DAIO	288	0511		29 TAKWATAKWAI	84	0511
	2 DAWADAWA	198	0511				
	3 GAMADOUDOU	228	0511	DISTRICT	4 Esa'ala		
	4 GIBARA	256	0511	Division	11 Goodenough Island		
	5 GWAWILI	375	0511		1 ABOLU	357	0522
	6 LAMHAGA	308	0511		2 AWALE	292	0521
	7 WAGAWAGA	345	0511		3 BELEBELE	451	0522
DISTRICT	3 Samarai				4 BWAIDOGA	1239	0522
Division	9 Samari Islands				5 DIODIO	639	0521
	1 ANAGUSA IS	70	0512		6 EWELI	456	0522
	2 BEDAUNA	123	0519		7 FAIAVA	552	0522
	3 BUIARI IS	207	0519		8 IAUIAULA	117	0521
	4 DAWSON IS	118	0512		9 IDAKAMENAI	373	0522
	5 DUIAUNA	111	0519		10 KALAUNA	514	0522
	6 GADOGADOWA	221	0519		11 KALIMTABUTABU	821	0522
	7 HABANI	95	0519		12 KILIA	658	0521
	8 HAMAMA	135	0519		13 LAUWELA	694	0521
	9 KITAI ISLAND	99	0519		14 MATAITA	773	0522
	10 KWARAIWA	218	0512		15 UFAUFA	590	0521
	11 LOANI	281	0511		16 UFUFU	749	0522
	12 LOGEA	641	0519		17 UTALO	470	0521
	13 SAUASAUAGA	274	0519		18 VIVIGANI	431	0522
	14 SEKUKU	78	0519		19 WAGIFA	864	0522
	15 SIDUDU	602	0519		20 WAIBULA	120	0521
	16 SIMAGAI	152	0511		21 WAKONAI	347	0522
	17 SKELETON IS	132	0512		22 WATULUMA -LOWER	188	0522
	18 TANUBUIBUINA	350	0519		23 WATULUMA - UPPER	474	0522
	19 TEGERAUNA	146	0519	Division	12 West & Inland Fergusson		
	20 TEWATEWA	59	0512		1 AGIALUMA	216	0521
	21 TUBETUBE	104	0512		2 AILULUAI	523	0519
	22 WARE IS	498	0513		3 ATUGAMANA	124	0521
Division	10 Suau Coast				4 DIDIAU	329	0521
	1 ALOALO	266	0511		5 EBADIDI	157	0519
	2 AUNIERI	96	0511		6 FAGALULU	441	0521
	3 BAIBAISIGA	75	0511		7 FAIAIANA	359	0519
	4 BONABONA	154	0511		8 GEWATA	282	0521
	5 BONARUA	109	0519		9 GWABEGWABE	172	0521
	6 BOROWAI	82	0511		10 IAMALELE NO1	407	0521
	7 DAHUNI	202	0511		11 IAMALELE NO2	124	0521
	8 GADAI SU	92	0529		12 IBWANANIU	364	0519
	9 ILOILO	317	0511		13 IGWAGETA	198	0519
	10 IO SOLOLO	117	0529		14 KALOKALO	791	0521
	11 IPULAI	230	0511		15 KUKUIA	273	0519
	12 ISUAI	133	0511		16 MAPAMOIWA	338	0519
	13 ISUDAU	185	0511		17 MASIMASI	238	0519
	14 ISUISU	214	0511		18 NIUBUO	124	0519
	15 BALA'A	80	0529		19 SAIBUTU	312	0521
	16 KWAI'OA	176	0529		20 TOAGESI	245	0519
	17 LEILEIAFA	142	0511		21 TUTUBEA	477	0519
	18 MODEWA	134	0511		22 UKEOKEO	531	0519
	19 NAUABU	323	0511	Division	13 East Fergusson		
	20 OYAMAMANIA	116	0511		1 BASIMA	510	0519
	21 SAGA' AHO	261	0511		2 BOSALEWA	386	0519
	22 SAVAIA	334	0511		3 BWAIOWA	405	0520
	23 SAVALALA	182	0511		4 DAGUIARA	101	0519
	24 SEASEA/AVALOLO	346	0511		5 DEIDEI	153	0520
	25 SIBALAI	262	0511		6 DUDUNA	231	0519
	26 SUAIBINA/LAIMODO	165	0529		7 DU'UNA	276	0519
	27 SUAU ISLAND	315	0511		8 GALUBWA	601	0519
					9 GAMETA	170	0519

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 5 Milne Bay

	Village	Population	System		Village	Population	System
	10 GAREA	214	0519		2 GIVA	84	0524
	11 GOMWA/BEGASI	395	0519		3 KADUWAGA	421	0524
	12 NADE	379	0519		4 KAISIGA	100	0524
	13 NUMANUMA	613	0520		5 KOMA	220	0524
	14 SAWA'EDI	375	0520		6 KONIA	74	0523
	15 SEBUTUIA	522	0519		7 KUYAWA	224	0523
	16 SI'LUGU	376	0519		8 LEBOLA	64	0524
	17 URUA	176	0519		9 MUNUWATA	128	0523
	18 WADALEI	498	0519		10 OGIGIKU	97	0523
	19 WAGARA	110	0519		11 TAWEMA	210	0524
Division	14 Amphletts and Sanaroa			Division	18 Kilivila		
	1 ETANA	204	0519		1 BWETAVAYA	188	0525
	2 DILIA	63	0519		2 DAIAGULA	202	0525
	3 GUMAWANA	83	0519		3 GILIGALI	94	0525
	4 MWADOGA	26	0519		4 IALUMGWA	235	0525
	5 NABWAGETA	95	0519		5 IDALEKA	28	0525
	6 SIAWAWA	132	0519		6 IOULAOTU	116	0525
	7 TEWARRA	16	0519		7 IUWADA	142	0525
	8 UDAUDANA	39	0519		8 KABULULA	153	0525
Division	15 North Normanby				9 KABWAKU	388	0525
	1 BWAKERA	634	0519		10 KAIBOLA	155	0525
	2 DARUBIA	270	0519		11 KEMWAMWALA	101	0525
	3 DOBU	819	0520		12 KAPWANI	95	0525
	4 IO'O	249	0519		13 KAULAGU	25	0525
	5 KORUWEA	334	0519		14 KAULIKWAU	138	0525
	6 MAIABARI	82	0519		15 KUDUKABILIA	124	0525
	7 MIADEBA	180	0519		16 KURUVITU	179	0525
	8 SISIANA	234	0519		17 KWAIBWAGA	379	0525
	9 TAULU	367	0519		18 LABAI	108	0525
Division	16 South Normanby				19 LIBUTUMA	163	0525
	1 BARABARA	271	0519		20 LILUTA	230	0525
	2 BIAUWA	433	0520		21 LUWEBILA	95	0525
	3 BUNAMA	407	0519		22 MOLIGILAGI	133	0525
	4 BWASIYAIYAI	189	0519		23 MUTAWA	286	0525
	5 DAWADA	170	0519		24 MWATAWA	302	0525
	6 GUDUMULI	383	0519		25 OBOWADA	181	0525
	7 GULEGULEU	687	0520		26 OBWELIA	277	0525
	8 ISUMAIMAIAU	385	0519		27 OKAIBOBWA	49	0525
	9 KASIKASI	515	0519		28 OKAIKODA	268	0525
	10 KELOLOGEA	433	0519		29 OMARAKANA	223	0525
	11 KUMWARAU	84	0519		30 TILAKEWA	143	0525
	12 KURADA	438	0519		31 TUBOWADA	259	0525
	13 KWANAULA	263	0519		32 WAIAKIKI	69	0525
	14 LOBODA	285	0519		33 WAKAILUVA	98	0525
	15 LOMITAWA	327	0519		34 WAKESA	123	0525
	16 MEUDANA	523	0519		35 WASAPOLA	105	0525
	17 MWALAKASIA	135	0519	Division	19 Kuboma		
	18 MWATEBU	162	0519		1 BOITALU	249	0525
	19 PWANAPWANA	334	0519		2 BUDUWAILAKA	80	0525
	20 SAWATUPWA	355	0519		3 GUMILABABA	300	0525
	21 SEWATAITAI	175	0519		4 ILALIMA	204	0525
	22 SIAUSI	211	0519		5 KAITUVI	148	0525
	23 SIBONAI	360	0519		6 KAPWAPU	264	0525
	24 SIGASIGA	379	0519		7 KAVATARIA	508	0525
	25 SIPUPU	387	0519		8 KUDUKWAIKELA	133	0525
	26 SOMWADINA	247	0520		9 KULUA	107	0525
	27 WEYOKO	231	0519		10 KWABULA	52	0525
					11 LOBUA	173	0525
DISTRICT	5 Losuia				12 LUYA	196	0525
Division	17 Luscancaiy				13 MULO SAIDA	243	0525
	1 BULAKWA	76	0524		14 OBULAKU	172	0524

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 5 Milne Bay

	Village	Population	System		Village	Population	System
	15 OIVEYOVA	355	0525		3 BAGILINA	616	0515
	16 OKAIBOMA	432	0525		4 BOIOU	315	0516
	17 OKOPUKOPU	308	0525		5 BWAGABWAGA	418	0515
	18 OSAPOLA	115	0525		6 BWAGAOIA	340	0516
	19 SIVIAGILA	118	0525		7 EAUS	829	0516
	20 TEYAVA	166	0525		8 EBORA	304	0515
	21 TOKWAWUKWA	615	0525		9 EWENA	339	0515
	22 WABUTUMA	209	0525		10 GULEWA	438	0516
	23 WASAISUIA	125	0525		11 HINAUTA	383	0516
	24 WAWELA	85	0524		12 KAUBWAGA	502	0516
	25 YALAKA	387	0525		13 LIAK	717	0516
	26 KWEMENTULA	141	0525		14 NARIAN	406	0516
Division	20 South Kiriwina				15 SIAGARA	686	0516
	1 BWADELA	50	0524	Division	24 Deboyne & Renard Is		
	2 GILIBWA	51	0524		1 KIMUTA	370	0517
	3 KAULAKA	190	0524		2 EAST PANAEATI	540	0514
	4 KAWOLA	58	0524		3 WEST PANAEATI	463	0514
	5 KOPILA	48	0524		4 PANAPOMPOM	289	0514
	6 KUMILABWAGA	27	0524	Division	25 Rossel Island		
	7 LOYA	158	0524		1 ABELETI	170	0518
	8 OKAIAULA	123	0524		2 DAMUNU	365	0518
	9 OKINAI	70	0524		3 EAST POINT	195	0518
	10 SINAKETA	320	0524		4 IONGA BAY	109	0518
	11 VAKUTA	369	0524		5 JINJO	514	0518
Division	21 Kitava				6 MORPA	258	0518
	1 KUDEULI	171	0525		7 NJARU	328	0518
	2 KUMWAGEA	347	0525		8 PAMBWA	52	0518
	3 LALELA NO1	303	0525		9 SAMAN	259	0518
	4 LALELA NO2	304	0525		10 WULANGA BAY	312	0518
	5 OKABULULA NO.1	454	0525	Division	26 West Calvados Chain		
	6 OKABALULA NO2	160	0525		1 BAGAMAN	178	0512
Division	22 Woodlark Island				2 BROOKER	246	0512
	1 ALCESTER	80	0523		3 KUANAK	80	0512
	2 BOAGIS	94	0523		4 MOTORINA	332	0512
	3 DIKOIAS	110	0528		5 PANAUMARA	64	0512
	4 EGOM ISLAND	91	0523	Division	27 East Calvados Chain		
	5 GAWA ISLAND	546	0527		1 BWAILAHINA	104	0517
	6 GUASOPA	122	0528		2 DADAHAI	30	0517
	7 IANABA	120	0523		3 GRASS ISLAND	178	0517
	8 IWA	591	0526		4 NIGAHAU	154	0517
	9 KAURAI	185	0528		5 NIMOA	71	0517
	10 KAUWAI	75	0528		6 PANAWINA	191	0517
	11 KAVATANA	111	0528		7 SABRA	377	0517
	12 KROPAN	22	0528	Division	28 Sudest Island		
	13 KWAIWATTA ISLAND	252	0527		1 EAST POINT	94	0518
	14 BUDIBUDI ISLAND	209	0523		2 EMBABALIA	91	0518
	15 MADAU	171	0528		3 GESILA	87	0518
	16 MAPAS	32	0528		4 JELEWAGA	205	0518
	17 MUNEIVEYOVA	140	0528		5 JOLANDAN	157	0518
	18 SINAMATA	41	0528		6 JURU	50	0518
	19 TOBU	19	0528		7 MADAU	99	0518
	20 UNUMATANA	71	0528		8 NANHIL	173	0518
	21 UNGONAM	67	0528		9 PAMELA	110	0518
	22 WABUNUNA	196	0528		10 PANAMAN	11	0518
	23 WAIAWATA	103	0528		11 PANTAVA	82	0518
	24 OVIAI	34	0528		12 PIRON ISLAND	67	0518
					13 RAMBUSO	258	0518
DISTRICT	6 Misima				14 REHUWO	319	0518
Division	23 Misima Island				15 TARANGIA	79	0518
	1 ALHOGA	314	0516		16 WESTERN POINT	162	0518
	2 AWAIBI	488	0515				

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 5 Milne Bay

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
ABELETI	6	25	1	0518	BWAGABWAGA	6	23	5	0515
ABOLU	4	11	1	0522	BWAGAOIA	6	23	6	0516
ABUARO	1	1	1	0501	BWAIDOGA	4	11	4	0522
AGIALUMA	4	12	1	0521	BWAILAHINA	6	27	1	0517
AHIOMA	2	6	1	0511	BWAIOWA	4	13	3	0520
AILULUAI	4	12	2	0519	BWAKERA	4	15	1	0519
ALCESTER	5	22	1	0523	BWASIYAIYAI	4	16	4	0519
ALHOGA	6	23	1	0516	BWETAVAYA	5	18	1	0525
ALOALO	3	10	1	0511					
ANAGUSA IS	3	9	1	0512	DABORA	1	1	9	0501
ARITAPU	1	4	1	0506	DADAHAI	6	27	2	0517
ATUGAMANA	4	12	3	0521	DAGUIARA	4	13	4	0519
AUGWANA	1	3	1	0508	DAHUNI	3	10	7	0511
AUNIERI	3	10	2	0511	DAIAGULA	5	18	2	0525
AWAIAMA	2	5	1	0510	DAIO	2	8	1	0511
AWAIBI	6	23	2	0515	DAMUNU	6	25	2	0518
AWALE	4	11	2	0521	DANAWAN	1	2	5	0508
					DANOBU	1	4	6	0506
BAGAMAN	6	26	1	0512	DARUBIA	4	15	2	0519
BAGILINA	6	23	3	0515	DAWADA	4	16	5	0519
BAI'AWA	1	1	2	0505	DAWADAWA	2	8	2	0511
BAIBAISIGA	3	10	3	0511	DAWSON IS	3	9	4	0512
BAKO	1	1	3	0501	DEIDEI	4	13	5	0520
BALA'A	3	10	15	0529	DIDIA	1	4	7	0506
BANAPA	1	1	4	0501	DIDIAU	4	12	4	0521
BARABARA	4	16	1	0519	DIKOIAS	5	22	3	0528
BASIMA	4	13	1	0519	DILIA	4	14	2	0519
BAUWA	1	4	11	0506	DIODIO	4	11	5	0521
BEDAUNA	3	9	2	0519	DIVARI	1	3	2	0508
BELEBELE	4	11	3	0522	DIVINAI	2	6	4	0510
BEMBERI	1	1	5	0508	DOBU	4	15	3	0520
BIAUWA	4	16	2	0520	DOMBASAINA	1	4	8	0506
BIBITAN	1	2	1	0506	DU'UNA	4	13	7	0519
BIDIESI	1	4	2	0506	DUDUNA	4	13	6	0519
BIMAN	1	2	2	0508	DUIAUNA	3	9	5	0519
BINIGUNI	1	1	6	0530					
BIRAT	1	2	3	0506	EAST CAPE	2	5	3	0510
BIWA	2	5	2	0510	EAST PANAEATI	6	24	2	0514
BOAGIS	5	22	2	0523	EAST POINT	6	25	3	0518
BOGABOGA	1	1	7	0502	EAST POINT	6	28	1	0518
BOIABOIA	1	4	3	0506	EAUS	6	23	7	0516
BOIOU	6	23	4	0516	EBADIDI	4	12	5	0519
BOITALU	5	19	1	0525	EBORA	6	23	8	0515
BONABONA	3	10	4	0511	EGOM ISLAND	5	22	4	0523
BONARUA	3	10	5	0519	EMBABALIA	6	28	2	0518
BONENAU	1	2	4	0506	ETANA	4	14	1	0519
BONENEPI	1	4	4	0506	EVIUWA	1	2	6	0506
BOROVIA	1	1	8	0505	EWELI	4	11	6	0522
BOROWAI	3	10	6	0511	EWENA	6	23	9	0515
BOSALEWA	4	13	2	0519					
BOU	2	6	2	0510	FAGALULU	4	12	6	0521
BOWADI	1	4	5	0506	FAIAIANA	4	12	7	0519
BROOKER	6	26	2	0512	FAIAVA	4	11	7	0522
BUBULETA	2	6	3	0511					
BUDIBUDI ISLAND	5	22	14	0523	GABUGABUNA	2	6	5	0511
BUDUWAILAKA	5	19	2	0525	GADAISU	3	10	8	0529
BUIARI IS	3	9	3	0519	GADOA	1	3	3	0509
BULAKWA	5	17	1	0524	GADOGADOWA	3	9	6	0519
BUNAMA	4	16	3	0519	GADOVISU	1	4	10	0506
BWADELA	5	20	1	0524	GALUBWA	4	13	8	0519

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER
Province: 5 Milne Bay

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
GAMADOUDOU	2	8	3	0511	ISUDAU	3	10	13	0511
GAMETA	4	13	9	0519	ISUISU	3	10	14	0511
GAREA	4	13	10	0519	ISUMAIMAIAU	4	16	8	0519
GARUAHI	2	5	4	0510	IUWADA	5	18	7	0525
GAUNANI	1	2	7	0506	IWA	5	22	8	0526
GAWA ISLAND	5	22	5	0527					
GELEMALAI	2	7	1	0511	JELEWAGA	6	28	4	0518
GESILA	6	28	3	0518	JINJO	6	25	5	0518
GEWATA	4	12	8	0521	JOLANDAN	6	28	5	0518
GIBARA	2	8	4	0511	JURU	6	28	6	0518
GILIBWA	5	20	2	0524					
GILIGALI	5	18	3	0525	KABULULA	5	18	8	0525
GINADA	1	1	10	0504	KABWAKU	5	18	9	0525
GIVA	5	17	2	0524	KADUWAGA	5	17	3	0524
GIWA	1	1	11	0501	KAIBOLA	5	18	10	0525
GOMWA/BEGASI	4	13	11	0519	KAISIGA	5	17	4	0524
GRASS ISLAND	6	27	3	0517	KAITUVI	5	19	5	0525
GUASOPA	5	22	6	0528	KAKAIA	1	2	10	0507
GUDUMULI	4	16	6	0519	KALAUNA	4	11	10	0522
GUGA	2	5	5	0510	KALIMTABUTABU	4	11	11	0522
GULEGULEU	4	16	7	0520	KALOKALO	4	12	14	0521
GULEWA	6	23	10	0516	KANATURU	1	4	15	0506
GUMAWANA	4	14	3	0519	KAPWANI	5	18	12	0525
GUMILABABA	5	19	3	0525	KAPWAPU	5	19	6	0525
GWABEGWABE	4	12	9	0521	KARAGAUTU	1	4	16	0506
GWAEDEDE	1	2	8	0508	KASIKASI	4	16	9	0519
GWAGUT	1	2	9	0508	KAUBWAGA	6	23	12	0516
GWAWILI	2	8	5	0511	KAULAGU	5	18	13	0525
GWIRORO	1	4	13	0506	KAULAKA	5	20	3	0524
					KAULIKWAU	5	18	14	0525
HABANI	3	9	7	0519	KAURAI	5	22	9	0528
HAMAMA	3	9	8	0519	KAUWAI	5	22	10	0528
HINAUTA	6	23	11	0516	KAVATANA	5	22	11	0528
HUHUNA	2	5	6	0511	KAVATARIA	5	19	7	0525
					KAWOLA	5	20	4	0524
IABAM-PAHILELE	2	5	7	0519	KEIA	2	5	10	0510
IALUMGWA	5	18	4	0525	KELOLOGEA	4	16	10	0519
IAMALELE NO1	4	12	10	0521	KEMWAMWALA	5	18	11	0525
IAMALELE NO2	4	12	11	0521	KILIA	4	11	12	0521
IANABA	5	22	7	0523	KIMUTA	6	24	1	0517
IANIANINI	2	6	6	0511	KITAI ISLAND	3	9	9	0519
IAPOA NO 1	2	5	8	0510	KOIABAGIRA	1	1	13	0501
IAPOA NO 2	2	5	9	0510	KOMA	5	17	5	0524
IARAME	1	1	12	0502	KONIA	5	17	6	0523
IAUIAULA	4	11	8	0521	KOPILA	5	20	5	0524
IBWANANIU	4	12	12	0519	KORUWEA	4	15	5	0519
IDAKAMENAI	4	11	9	0522	KROPAN	5	22	12	0528
IDALEKA	5	18	5	0525	KUANAK	6	26	3	0512
IGWAGETA	4	12	13	0519	KUDEULI	5	21	1	0525
IKARA	1	4	14	0506	KUDUKABILIA	5	18	15	0525
ILAKAE-MODENI	1	2	11	0507	KUDUKWAIKELA	5	19	8	0525
ILALIMA	5	19	4	0525	KUKUIA	4	12	15	0519
ILOILO	3	10	9	0511	KULUA	5	19	9	0525
IO SOLOLO	3	10	10	0529	KUMILABWAGA	5	20	6	0524
IO'O	4	15	4	0519	KUMWAGEA	5	21	2	0525
IONGA BAY	6	25	4	0518	KUMWARAU	4	16	11	0519
IOULAOTU	5	18	6	0525	KURADA	4	16	12	0519
IPOULI	2	7	2	0511	KURUVITU	5	18	16	0525
IPULAI	3	10	11	0511	KUYAWA	5	17	7	0523
ISUAI	3	10	12	0511	KWABULA	5	19	10	0525

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 5 Milne Bay

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
KWABUNAKI	1	3	4	0508	MWATEBU	4	16	18	0519
KWAGILA	1	1	14	0530					
KWAI'OA	3	10	16	0529	NABWAGETA	4	14	5	0519
KWAIBWAGA	5	18	17	0525	NADE	4	13	12	0519
KWAIWATTA ISLAND	5	22	13	0527	NAKARA	1	3	6	0510
KWANAULA	4	16	13	0519	NANHIL	6	28	8	0518
KWARAIWA	3	9	10	0512	NARIAN	6	23	14	0516
KWEMTULA	5	19	26	0525	NAUABU	3	10	19	0511
					NAURA	2	6	10	0511
LABAI	5	18	18	0525	NIGAHAU	6	27	4	0517
LALELA NO1	5	21	3	0525	NIGILA	2	6	11	0511
LALELA NO2	5	21	4	0525	NIMOA	6	27	5	0517
LAMHAGA	2	8	6	0511	NIUBUO	4	12	18	0519
LAUWELA	4	11	13	0521	NJARU	6	25	7	0518
LAVORA	2	5	11	0508	NUAKATA	2	5	12	0519
LEBOLA	5	17	8	0524	NUMANUMA	4	13	13	0520
LEILEIAFA	3	10	17	0511					
LELEHUDI	2	6	7	0510	OBOWADA	5	18	25	0525
LIAK	6	23	13	0516	OBULAKU	5	19	14	0524
LIBUTUMA	5	18	19	0525	OBWELIA	5	18	26	0525
LILUTA	5	18	20	0525	OGIGIKU	5	17	10	0523
LOANI	3	9	11	0511	OIVEYOVA	5	19	15	0525
LOBODA	4	16	14	0519	OKABALULA NO2	5	21	6	0525
LOBUA	5	19	11	0525	OKABULULA NO.1	5	21	5	0525
LOGEA	3	9	12	0519	OKAIAULA	5	20	8	0524
LOMITAWA	4	16	15	0519	OKAIBOBWA	5	18	27	0525
LOYA	5	20	7	0524	OKAIBOMA	5	19	16	0525
LUWEBILA	5	18	21	0525	OKAIKODA	5	18	28	0525
LUYA	5	19	12	0525	OKINAI	5	20	9	0524
					OKOPUKOPU	5	19	17	0525
MADAU	5	22	15	0528	OMARAKANA	5	18	29	0525
MADAUA	6	28	7	0518	OPANAMBU	1	4	9	0506
MAIABARI	4	15	6	0519	OSAPOLA	5	19	18	0525
MAINAWA	1	4	17	0506	OVIAl	5	22	24	0528
MAIWARA (NTH/STH)	2	6	8	0511	OYAMAMANIA	3	10	20	0511
MANUBADA	1	3	5	0508					
MAPAMOIWA	4	12	16	0519	PAMBWA	6	25	8	0518
MAPAS	5	22	16	0528	PAMELA	6	28	9	0518
MAPONA	1	1	15	0501	PANAMAN	6	28	10	0518
MASIMASI	4	12	17	0519	PANAPOMPOM	6	24	4	0514
MATAITA	4	11	14	0522	PANAUMARA	6	26	5	0512
MENAPI	1	1	16	0501	PANAWINA	6	27	6	0517
MEUDANA	4	16	16	0519	PANTAVA	6	28	11	0518
MIADEBA	4	15	7	0519	PARAM	1	2	12	0507
MIDINO	1	1	17	0502	PAYAWA	1	2	13	0507
MILA	2	7	3	0511	PEM	1	1	20	0504
MODEWA	3	10	18	0511	PIRON ISLAND	6	28	12	0518
MOLIGILAGI	5	18	22	0525	POLOTONA	2	5	13	0511
MONARI	1	1	18	0505	POVA	1	4	18	0508
MORPA	6	25	6	0518	PUMANI	1	1	21	0505
MOTORINA	6	26	4	0512	PWANAPWANA	4	16	19	0519
MUKAWA	1	1	19	0502					
MULOSAIDA	5	19	13	0525	RABE	2	6	12	0511
MUNEIVEYOVA	5	22	17	0528	RADAVA	1	3	7	0509
MUNUWATA	5	17	9	0523	RAMBUSO	6	28	13	0518
MUTAWA	5	18	23	0525	REHUWO	6	28	14	0518
MUTIUWA	2	6	9	0511	RONANA	2	5	14	0510
MWADOGA	4	14	4	0519					
MWALAKASIA	4	16	17	0519	SABRA	6	27	7	0517
MWATAWA	5	18	24	0525	SAGA' AHO	3	10	21	0511

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 5 Milne Bay

Village	Dist	Div	Unit	System	Village	Dist	Div	Unit	System
SAIBUTU	4	12	19	0521	UNGONAM	5	22	21	0528
SAMAN	6	25	9	0518	UNI	1	2	14	0508
SAUASAUAGA	3	9	13	0519	UNUMATANA	5	22	20	0528
SAVAIA	3	10	22	0511	URUA	4	13	17	0519
SAVALALA	3	10	23	0511	UTALO	4	11	17	0521
SAWA'EDI	4	13	14	0520					
SAWATUPWA	4	16	20	0519	VAKUTA	5	20	11	0524
SEASEA/AVALOLO	3	10	24	0511	VIDIA	1	3	10	0509
SEBUTUIA	4	13	15	0519	VIVIGANI	4	11	18	0522
SEKUKU	3	9	14	0519					
SEWATAITAI	4	16	21	0519	WABUBU	1	1	23	0504
S'IILUGU	4	13	16	0519	WABUNUNA	5	22	22	0528
SIAGARA	6	23	15	0516	WABUTUMA	5	19	22	0525
SIASIADA	2	7	4	0511	WADALEI	4	13	18	0519
SIAUSI	4	16	22	0519	WADAUDA	3	10	28	0529
SIAWAWA	4	14	6	0519	WADOBUNA	1	3	11	0508
SIBALAI	3	10	25	0511	WAEMA	2	6	13	0511
SIBONAI	4	16	23	0519	WAGAHUHU	2	5	18	0510
SIDUDU	3	9	15	0519	WAGARA	4	13	19	0519
SIGASIGA	4	16	24	0519	WAGAWAGA	2	8	7	0511
SIMAGAI	3	9	16	0511	WAGIFA	4	11	19	0522
SINAKETA	5	20	10	0524	WAIKIKI	5	18	32	0525
SINAMATA	5	22	18	0528	WAIWATA	5	22	23	0528
SIPUPU	4	16	25	0519	WAIBULA	4	11	20	0521
SIRISIRI	1	3	8	0505	WAKAILUVA	5	18	33	0525
SISIANA	4	15	8	0519	WAKESA	5	18	34	0525
SIVIAGILA	5	19	19	0525	WAKONAI	4	11	21	0522
SKELETON IS	3	9	17	0512	WAKWAPU	1	1	24	0504
SOMWADINA	4	16	26	0520	WALALAIA	2	6	14	0510
SUAIBINA/LAIMODO	3	10	26	0529	WAMAWAMANA	2	5	19	0510
SUAU ISLAND	3	10	27	0511	WAMIRA	1	3	12	0509
					WANAMA	1	4	21	0506
TAKWATAKWAI	3	10	29	0511	WAPON	1	1	25	0505
TANUBUIBUINA	3	9	18	0519	WARAWADIDI	1	4	22	0506
TAPIO	1	1	22	0502	WARE IS	3	9	22	0513
TARAMUGU	1	4	19	0506	WASAISUIA	5	19	23	0525
TARANGIA	6	28	15	0518	WASAPOLA	5	18	35	0525
TAUBADI	1	4	20	0506	WATULUMA - UPPER	4	11	23	0522
TAULU	4	15	9	0519	WATULUMA - LOWER	4	11	22	0522
TAUPOTA NO 1	2	5	15	0510	WATUNOU	2	6	15	0511
TAUPOTA NO 2	2	5	16	0510	WAWELA	5	19	24	0524
TAWEMA	5	17	11	0524	WEDAU	1	3	13	0509
TEGERAUNA	3	9	19	0519	WEST PANAEATI	6	24	3	0514
TEWARRA	4	14	7	0519	WESTERN POINT	6	28	16	0518
TEWATEWA	3	9	20	0512	WEYOKO	4	16	27	0519
TEYAVA	5	19	20	0525	WULANGA BAY	6	25	10	0518
TILAKEWA	5	18	30	0525					
TOAGESI	4	12	20	0519	YALAKA	5	19	25	0525
TOBU	5	22	19	0528					
TOKWAUKWA	5	19	21	0525					
TOPURA	2	5	17	0501					
TUBETUBE	3	9	21	0512					
TUBOWADA	5	18	31	0525					
TUTUBEA	4	12	21	0519					
UDAUDANA	4	14	8	0519					
UFAUFA	4	11	15	0521					
UFUFU	4	11	16	0522					
UGA	1	3	9	0501					
UKEOKEO	4	12	22	0519					

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM

Province: 5 Milne Bay

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
SYSTEM 0501					SYSTEM 0507				
ABUARO	1	1	1	39	ILAKAE-MODENI	1	2	11	17
BAKO	1	1	3	35	KAKAIA	1	2	10	16
BANAPA	1	1	4	40	PARAM	1	2	12	18
DABORA	1	1	9	40	PAYAWA	1	2	13	19
GIWA	1	1	11	39	SYSTEM 0508				
KOIABAGIRA	1	1	13	39	AUGWANA	1	3	1	46
MAPONA	1	1	15	40	BEMBERI	1	1	5	24
MENAPI	1	1	16	40	BIMAN	1	2	2	20
TOPURA	2	5	17	71	DANAWAN	1	2	5	21
UGA	1	3	9	43	DIVARI	1	3	2	63
SYSTEM 0502					GWADEDE	1	2	8	18
BOGABOGA	1	1	7	35	GWAGUT	1	2	9	18
IARAME	1	1	12	30	KWABUNAKI	1	3	4	62
MIDINO	1	1	17	23	LAVORA	2	5	11	69
MUKAWA	1	1	19	40	MANUBADA	1	3	5	68
TAPIO	1	1	22	33	POVA	1	4	18	63
SYSTEM 0504					UNI	1	2	14	17
GINADA	1	1	10	35	WADOBUNA	1	3	11	45
PEM	1	1	20	23	SYSTEM 0509				
WABUBU	1	1	23	35	GADOA	1	3	3	45
WAKWAPU	1	1	24	26	RADAVA	1	3	7	61
SYSTEM 0505					VIDIA	1	3	10	62
BAI'AWA	1	1	2	23	WAMIRA	1	3	12	66
BOROVIA	1	1	8	27	WEDAU	1	3	13	66
MONARI	1	1	18	26	SYSTEM 0510				
PUMANI	1	1	21	27	AWAIAMA	2	5	1	97
SIRISIRI	1	3	8	39	BIWA	2	5	2	373
WAPON	1	1	25	27	BOU	2	6	2	107
SYSTEM 0506					DIVINAI	2	6	4	108
ARITAPU	1	4	1	48	EAST CAPE	2	5	3	373
BAUWA	1	4	11	17	GARUahi	2	5	4	95
BIBITAN	1	2	1	7	GUGA	2	5	5	103
BIDIESI	1	4	2	48	IAPOA NO 1	2	5	8	102
BIRAT	1	2	3	18	IAPOA NO 2	2	5	9	97
BOIABOIA	1	4	3	62	KEIA	2	5	10	81
BONENAU	1	2	4	16	LELEHUDI	2	6	7	107
BONENEPI	1	4	4	49	NAKARA	1	3	6	44
BOWADI	1	4	5	52	RONANA	2	5	14	105
DANOBU	1	4	6	60	TAUPOTA NO 1	2	5	15	95
DIDIA	1	4	7	52	TAUPOTA NO 2	2	5	16	95
DOMBASAINA	1	4	8	52	WAGAHUHU	2	5	18	103
EVIAUWA	1	2	6	16	WALALAIA	2	6	14	373
GADOVISU	1	4	10	52	WAMAWAMANA	2	5	19	92
GAUNANI	1	2	7	16	SYSTEM 0511				
GWIRORO	1	4	13	18	AHIOMA	2	6	1	111
IKARA	1	4	14	48	ALOALO	3	10	1	149
KANATURU	1	4	15	17	AUNIERI	3	10	2	158
KARAGAUTU	1	4	16	52	BAIBAISIGA	3	10	3	160
MAINAWA	1	4	17	65	BONABONA	3	10	4	159
OPANAMBU	1	4	9	47	BOROWAI	3	10	6	91
TARAMUGU	1	4	19	372	BUBULETA	2	6	3	109
TAUBADI	1	4	20	48	DAHUNI	3	10	7	158
WANAMA	1	4	21	52	DAIO	2	8	1	118
WARAWADIDI	1	4	22	52	DAWADAWA	2	8	2	125

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM

Province: 5 Milne Bay

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
GABUGABUNA	2	6	5	115	SYSTEM 0515				
GAMADOUDOU	2	8	3	118	AWAIBI	6	23	2	331
GELEMALAI	2	7	1	87	BAGILINA	6	23	3	378
GIBARA	2	8	4	116	BWAGABWAGA	6	23	5	378
GWAWILI	2	8	5	125	EBORA	6	23	8	378
HUHUNA	2	5	6	97	EWENA	6	23	9	378
IANIANINI	2	6	6	114	SYSTEM 0516				
ILOILO	3	10	9	136	ALHOGA	6	23	1	334
IPOULI	2	7	2	88	BOIOU	6	23	4	335
IPULAI	3	10	11	146	BWAGAOIA	6	23	6	335
ISUAI	3	10	12	144	EAUS	6	23	7	335
ISUDAU	3	10	13	149	GULEWA	6	23	10	333
ISUISU	3	10	14	149	HINAUTA	6	23	11	335
LAMHAGA	2	8	6	125	KAUBWAGA	6	23	12	335
LEILEIAFA	3	10	17	154	LIAK	6	23	13	333
LOANI	3	9	11	125	NARIAN	6	23	14	335
MAIWARA (NTH/STH)	2	6	8	116	SIAGARA	6	23	15	333
MILA	2	7	3	87	SYSTEM 0517				
MODEWA	3	10	18	138	BWAILAHINA	6	27	1	352
MUTIUWA	2	6	9	111	DADAHAI	6	27	2	356
NAUABU	3	10	19	144	GRASS ISLAND	6	27	3	353
NAURA	2	6	10	115	KIMUTA	6	24	1	337
NIGILA	2	6	11	110	NIGAHAU	6	27	4	352
OYAMAMANIA	3	10	20	144	NIMOA	6	27	5	354
POLOTONA	2	5	13	97	PANAWINA	6	27	6	347
RABE	2	6	12	115	SABRA	6	27	7	350
SAGA'HO	3	10	21	147	SYSTEM 0518				
SAVAIA	3	10	22	144	ABELETI	6	25	1	361
SAVALALA	3	10	23	381	DAMUNU	6	25	2	361
SEASEA/AVALOLO	3	10	24	149	EAST POINT	6	25	3	379
SIASIADA	2	7	4	88	EAST POINT	6	28	1	360
SIBALAI	3	10	25	139	EMBABALIA	6	28	2	358
SIMAGAI	3	9	16	164	GESILA	6	28	3	360
SUAU ISLAND	3	10	27	381	IONGA BAY	6	25	4	361
TAKWATAK WAI	3	10	29	74	JELEWAGA	6	28	4	360
WAEMA	2	6	13	115	JINJO	6	25	5	379
WAGAWAGA	2	8	7	118	JOLANDAN	6	28	5	358
WATUNOU	2	6	15	108	JURU	6	28	6	360
SYSTEM 0512					MADAUA	6	28	7	360
ANAGUSA IS	3	9	1	190	MORPA	6	25	6	361
BAGAMAN	6	26	1	342	NANHIL	6	28	8	360
BROOKER	6	26	2	339	NJARU	6	25	7	361
DAWSON IS	3	9	4	197	PAMBWA	6	25	8	361
KUANAK	6	26	3	346	PAMELA	6	28	9	360
KWARAIWA	3	9	10	191	PANAMAN	6	28	10	364
MOTORINA	6	26	4	341	PANTAVA	6	28	11	360
PANAUMARA	6	26	5	345	PIRON ISLAND	6	28	12	355
SKELETON IS	3	9	17	192	RAMBUSO	6	28	13	360
TEWATEWA	3	9	20	195	REHUWO	6	28	14	360
TUBETUBE	3	9	21	193	SAMAN	6	25	9	361
SYSTEM 0513					TARANGIA	6	28	15	358
WARE IS	3	9	22	187	WESTERN POINT	6	28	16	359
SYSTEM 0514					WULANGA BAY	6	25	10	361
EAST PANAEATI	6	24	2	326					
PANAPOMPOM	6	24	4	328					
WEST PANAEATI	6	24	3	326					

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM

Province: 5 Milne Bay

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
SYSTEM 0519					SEBUTUIA	4	13	15	243
AILULUAI	4	12	2	251	SEKUKU	3	9	14	177
BARABARA	4	16	1	206	SEWATAITAI	4	16	21	222
BASIMA	4	13	1	247	SI'ILUGU	4	13	16	241
BEDAUNA	3	9	2	183	SIAUSI	4	16	22	207
BONARUA	3	10	5	162	SIAWAWA	4	14	6	234
BOSALEWA	4	13	2	255	SIBONAI	4	16	23	218
BUIARI IS	3	9	3	178	SIDUDU	3	9	15	168
BUNAMA	4	16	3	202	SIGASIGA	4	16	24	207
BWAKERA	4	15	1	225	SIPUPU	4	16	25	204
BWASIYAIYAI	4	16	4	201	SISIANA	4	15	8	228
DAGUIARA	4	13	4	241	TANUBUIBUINA	3	9	18	180
DARUBIA	4	15	2	376	TAULU	4	15	9	228
DAWADA	4	16	5	207	TEGERAUNA	3	9	19	174
DILIA	4	14	2	283	TEWARRA	4	14	7	288
DU'UNA	4	13	7	243	TOAGESI	4	12	20	251
DUDUNA	4	13	6	247	TUTUBEA	4	12	21	254
DUIAUNA	3	9	5	175	UDAUDANA	4	14	8	234
EBADIDI	4	12	5	254	UKEOKEO	4	12	22	251
ETANA	4	14	1	234	URUA	4	13	17	247
FAIAIANA	4	12	7	251	WADALEI	4	13	18	255
GADOGADOWA	3	9	6	172	WAGARA	4	13	19	243
GALUBWA	4	13	8	243	WEYOKO	4	16	27	204
GAMETA	4	13	9	247					
GAREA	4	13	10	251	SYSTEM 0520				
GOMWA/BEGASI	4	13	11	241	BIAUWA	4	16	2	202
GUDUMULI	4	16	6	202	BWAIOWA	4	13	3	241
GUMAWANA	4	14	3	286	DEIDEI	4	13	5	241
HABANI	3	9	7	180	DOBU	4	15	3	232
HAMAMA	3	9	8	182	GULEGULEU	4	16	7	207
IABAM-PAHILELE	2	5	7	200	NUMANUMA	4	13	13	238
IBWANANIU	4	12	12	257	SAWA'EDI	4	13	14	244
IGWAGETA	4	12	13	256	SOMWADINA	4	16	26	207
IO'O	4	15	4	230					
ISUMAIMIAIU	4	16	8	216	SYSTEM 0521				
KASIKASI	4	16	9	207	AGIALUMA	4	12	1	262
KEOLOGEA	4	16	10	207	ATUGAMANA	4	12	3	262
KITAI ISLAND	3	9	9	185	AWALE	4	11	2	277
KORUWEA	4	15	5	228	DIDIAU	4	12	4	255
KUKUIA	4	12	15	256	DIODIO	4	11	5	277
KUMWARAU	4	16	11	207	FAGALULU	4	12	6	260
KURADA	4	16	12	201	GEWATA	4	12	8	260
KWANAULA	4	16	13	204	GWABEGWABE	4	12	9	255
LOBODA	4	16	14	204	IAMALELE NO1	4	12	10	260
LOGEA	3	9	12	163	IAMALELE NO2	4	12	11	258
LOMITAWA	4	16	15	207	IAUIAULA	4	11	8	279
MAIABARI	4	15	6	224	KALOKALO	4	12	14	255
MAPAMOIWA	4	12	16	259	KILIA	4	11	12	269
MASIMASI	4	12	17	255	LAUWELA	4	11	13	280
MEUDANA	4	16	16	207	SAIBUTU	4	12	19	262
MADEBA	4	15	7	376	UFAUFA	4	11	15	272
MWADOGA	4	14	4	284	UTALO	4	11	17	274
MWALAKASIA	4	16	17	207	WAIBULA	4	11	20	272
MWATEBU	4	16	18	222					
NABWAGETA	4	14	5	287	SYSTEM 0522				
NADE	4	13	12	251	ABOLU	4	11	1	267
NIUBUO	4	12	18	254	BELEBELE	4	11	3	272
NUAKATA	2	5	12	198	BWAIDOGA	4	11	4	267
PWANAPWANA	4	16	19	218	EWELI	4	11	6	273
SAUASAUAGA	3	9	13	167	FAIAVA	4	11	7	268
SAWATUPWA	4	16	20	205	IDAKAMENAI	4	11	9	272

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM

Province: 5 Milne Bay

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
KALAUNA	4	11	10	273	KAULAGU	5	18	13	290
KALIMTABUTABU	4	11	11	272	KAULIKWAWU	5	18	14	295
MATAITA	4	11	14	268	KAVATARIA	5	19	7	294
UFUFU	4	11	16	274	KEMWAMWALA	5	18	11	290
VIVIGANI	4	11	18	272	KUDEULI	5	21	1	299
WAGIFA	4	11	19	266	KUDUKABILIA	5	18	15	290
WAKONAI	4	11	21	274	KUDUKWAIKELA	5	19	8	290
WATULUMA - UPPER	4	11	23	272	KULUA	5	19	9	290
WATULUMA -LOWER	4	11	22	272	KUMWAGEA	5	21	2	299
SYSTEM 0523					KURUVITU	5	18	16	290
ALCESTER	5	22	1	323	KWABULA	5	19	10	290
BOAGIS	5	22	2	311	KWAIBWAGA	5	18	17	290
BUDIBUDI ISLAND	5	22	14	324	KWEMTULA	5	19	26	294
EGOM ISLAND	5	22	4	365	LABAI	5	18	18	290
IANABA	5	22	7	304	LALELA NO1	5	21	3	299
KONIA	5	17	6	310	LALELA NO2	5	21	4	299
KUYAWA	5	17	7	297	LIBUTUMA	5	18	19	290
MUNUWATA	5	17	9	297	LILUTA	5	18	20	290
OGIGIKU	5	17	10	310	LOBUA	5	19	11	290
SYSTEM 0524					LUWEBILA	5	18	21	290
BULAKWA	5	17	1	296	LUYA	5	19	12	290
BWADELA	5	20	1	290	MOLIGILAGI	5	18	22	290
GILIBWA	5	20	2	290	MULOSAIDA	5	19	13	294
GIVA	5	17	2	296	MUTAWA	5	18	23	290
KADUWAGA	5	17	3	296	MWATAWA	5	18	24	290
KAISIGA	5	17	4	296	OBOWADA	5	18	25	290
KAULAKA	5	20	3	289	OBWELIA	5	18	26	290
KAWOLA	5	20	4	290	OIVEYOVA	5	19	15	294
KOMA	5	17	5	296	OKABALULA NO2	5	21	6	299
KOPILA	5	20	5	290	OKABULULA NO.1	5	21	5	299
KUMILABWAGA	5	20	6	290	OKAIBOBWA	5	18	27	290
LEBOLA	5	17	8	296	OKAIBOMA	5	19	16	290
LOYA	5	20	7	290	OKAIKODA	5	18	28	290
OBULAKU	5	19	14	294	OKOPUKOPU	5	19	17	290
OKAIAULA	5	20	8	290	OMARAKANA	5	18	29	290
OKINAI	5	20	9	289	OSAPOLA	5	19	18	290
SINAKETA	5	20	10	290	SIVIAGILA	5	19	19	290
TAWEMA	5	17	11	296	TEYAVA	5	19	20	294
VAKUTA	5	20	11	289	TILAKEWA	5	18	30	290
WAWELA	5	19	24	290	TOKWAWUKWA	5	19	21	294
SYSTEM 0525					TUBOWADA	5	18	31	290
BOITALU	5	19	1	290	WABUTUMA	5	19	22	290
BUDUWAILAKA	5	19	2	290	WAIKIKI	5	18	32	290
BWETAVAYA	5	18	1	295	WAKAILUVA	5	18	33	290
DAIAGULA	5	18	2	290	WAKESA	5	18	34	290
GILIGALI	5	18	3	290	WASAISUIA	5	19	23	290
GUMILABABA	5	19	3	290	WASAPOLA	5	18	35	290
IALUMGWA	5	18	4	290	YALAKA	5	19	25	290
IDALEKA	5	18	5	290	SYSTEM 0526				
ILALIMA	5	19	4	290	IWA	5	22	8	300
IOULAOTU	5	18	6	290	SYSTEM 0527				
IUWADA	5	18	7	290	GAWA ISLAND	5	22	5	303
KABULULA	5	18	8	290	KWAIWATTA ISLAND	5	22	13	302
KABWAKU	5	18	9	290	SYSTEM 0528				
KAIBOLA	5	18	10	290	DIKOIAS	5	22	3	317
KAITUVI	5	19	5	290	GUASOPA	5	22	6	317
KAPWANI	5	18	12	237	KAURAI	5	22	9	317
KAPWAPU	5	19	6	290	KAUWAI	5	22	10	317

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM

Province: 5 Milne Bay

Village	Dist	Div	Unit	RMU	Village	Dist	Div	Unit	RMU
KAVATANA	5	22	11	317	SYSTEM 0529				
KROPAN	5	22	12	317	BALA'A	3	10	15	52
MADAU	5	22	15	311	GADAI SU	3	10	8	80
MAPAS	5	22	16	363	IO SOLOLO	3	10	10	79
MUNEIVEYOVA	5	22	17	311	KWAI'OA	3	10	16	78
OVI AI	5	22	24	317	SUAIBINA/LAIMODO	3	10	26	79
SINAMATA	5	22	18	317	WADAUDA	3	10	28	55
TOBU	5	22	19	317					
UN GONAM	5	22	21	317	SYSTEM 0530				
UNUMATANA	5	22	20	317	BINIGUNI	1	1	6	29
WABUNUNA	5	22	22	317	KWAGILA	1	1	14	367
WAI AWATA	5	22	23	317					

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, MILNE BAY PROVINCE¹

Code	Division	Code	Division
01	RABARABA	05	LOSUIA
01	CAPE VOGEL	17	LUSANCAY
02	DAGA	18	KILIVILA
03	G/ENOUGH BAY COASTAL	19	KUBOMA
04	G/ENOUGH BAY INLAND	20	SOUTH KIRIWINA
		21	KITAVA
02	ALOTAU	22	WOODLARK ISLAND
05	MARAMATANA		
06	TAVARA	06	MISIMA
07	BUHUTU	23	MISIMA ISLAND
08	EALEBA	24	DEBOYNE & REYNARD ISLAND
		25	ROSSEL ISLAND
03	SAMARAI	26	WEST CALVADOS CHAIN
09	SAMARI ISLANDS	27	EAST CALVADOS CHAIN
10	SUAU COAST	28	SUDEST ISLAND
04	ESA'ALA		
11	GOODENOUGH ISLAND		
12	WEST & INLAND FERGUSSON		
13	EAST FERGUSSON		
14	AMPHLETTS & SANAROA		
15	NORTH NORMANBY		
16	SOUTH NORMANBY		

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.

1. Bourke, R.M., B.J. Allen, P. Hobsbawn and J. Conway (1998) Papua New Guinea: Text Summaries (two volumes).
2. Allen, B.J., R.L. Hide, R.M. Bourke, D. Fritsch, R. Grau, E. Lowes, T. Nen, E. Nirsie, J. Risimeri and M. Woruba (2002) East Sepik Province: Text Summaries, Maps, Code Lists and Village Identification.
3. Bourke, R.M., B.J. Allen, R.L. Hide, D. Fritsch, R. Grau, E. Lowes, T. Nen, E. Nirsie, J. Risimeri and M. Woruba (2002) West Sepik Province: Text Summaries, Maps, Code Lists and Village Identification.
4. Allen, B.J., R.L. Hide, R.M. Bourke, W. Akus, D. Fritsch, R. Grau, G. Ling and E. Lowes (2002) Western Province: Text Summaries, Maps, Code Lists and Village Identification.
5. Hide, R.L., R.M. Bourke, B.J. Allen, N. Fereday, D. Fritsch, R. Grau, E. Lowes and M. Woruba (2002) Gulf Province: Text Summaries, Maps, Code Lists and Village Identification.
6. Hide, R.L., R.M. Bourke, B.J. Allen, T. Betitis, D. Fritsch, R. Grau, L. Kurika, E. Lowes, D.K. Mitchell, S.S. Rangai, M. Sakiasi, G. Sem and B. Suma (2002) Milne Bay Province: Text Summaries, Maps, Code Lists and Village Identification.
7. Allen, B.J., R.L. Hide, R.M. Bourke, D. Fritsch, R. Grau, P. Hobsbawn, M.P. Levett, I.S. Majnep, V. Mangai, T. Nen and G. Sem (2002) Madang Province: Text Summaries, Maps, Code Lists and Village Identification.
8. Bourke R.M., B.J. Allen, R.L. Hide, D. Fritsch, R. Grau, P. Hobsbawn, E. Lowes and D. Stannard (2002) Eastern Highlands Province: Text Summaries, Maps, Code Lists and Village Identification.
9. Allen, B.J., R.L. Hide, R.M. Bourke, C. Ballard, D. Fritsch, R. Grau, P. Hobsbawn, G.S. Humphreys and D. Kandasari (2002) Enga Province: Text Summaries, Maps, Code Lists and Village Identification.
10. Hide, R.L., R.M. Bourke, B.J. Allen, D. Fritsch, R. Grau, P. Hobsbawn and S. Lyon (2002) Western Highlands Province: Text Summaries, Maps, Code Lists and Village Identification.
11. Bourke, R.M., B.J. Allen, R.L. Hide, D. Fritsch, R. Grau, P. Hobsbawn, B. Konabe, M.P. Levett, S. Lyon and A. Varvaliu (2002) Southern Highlands Province: Text Summaries, Maps, Code Lists and Village Identification.
12. Hide, R.L., R.M. Bourke, B.J. Allen, D. Fritsch, R. Grau, P. Hobsbawn and S. Lyon (2002) Chimbu Province: Text Summaries, Maps, Code Lists and Village Identification.
13. Bourke, R.M., R.L. Hide, B.J. Allen, D. Fritsch, R. Grau, P. Hobsbawn, M. Levett, S. Lyon, L. Nama and T. Nen (2002) West New Britain Province: Text Summaries, Maps, Code Lists and Village Identification.
14. Bourke, R.M., B.J. Allen, R.L. Hide, D. Fritsch, T. Geob, R. Grau, S. Heai, P. Hobsbawn, G. Ling, S. Lyon and M. Poienou (2002) East New Britain Province: Text Summaries, Maps, Code Lists and Village Identification.
15. Allen, B.J., T. Nen, R.M. Bourke, R.L. Hide, D. Fritsch, R. Grau, P. Hobsbawn and S. Lyon (2002) Central Province: Text Summaries, Maps, Code Lists and Village Identification.
16. Allen, B.J., T. Nen, R.L. Hide, R.M. Bourke, D. Fritsch, R. Grau, P. Hobsbawn, S. Lyon and G. Sem (2002) Northern Province: Text Summaries, Maps, Code Lists and Village Identification.
17. Hide, R.L., R.M. Bourke, B.J. Allen, W. Akus, D. Frisch, R. Grau, P. Hobsbawn, P. Igua, R. Kameata, S. Lyon and N. Miskaram (2002) New Ireland Province: Text Summaries, Maps, Code Lists and Village Identification.
18. Hide, R.L., B.J. Allen, R.M. Bourke, D. Frisch, R. Grau, J.L. Helepet, P. Hobsbawn, S. Lyon, M. Poienou, S. Pondrilei, K. Pouru, G. Sem and B. Tewi (2002) Manus Province: Text Summaries, Maps, Code Lists and Village Identification.
19. Bourke, R.M., B.J. Allen, R.L. Hide, N. Fereday, D. Fritsch, B. Gaupu, R. Grau, P. Hobsbawn, M.P. Levett, S. Lyon, V. Mangi and G. Sem (2002) Morobe Province: Text Summaries, Maps, Code Lists and Village Identification.
20. Bourke, R.M., M. Woruba, B.J. Allen, M. Allen, R. Grau and P. Hobsbawn (2002) Bougainville Province: Text Summaries, Maps, Code Lists and Village Identification.
21. Hobsbawn, P., D. Fritsch, R. Grau, B.J. Allen, R.L. Hide and R.M. Bourke (1997) Technical Information and Methods.
22. Hobsbawn, P. and J. Conway (1998) Bibliography.
23. Stuckings, N.E., R.L. Hide, R.M. Bourke, B.J. Allen, P. Hobsbawn and J. Conway (1997) Papua New Guinea Agriculture Literature Database.

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