

AUSTRALIAN AGENCY for INTERNATIONAL DEVELOPMENT

AGRICULTURAL SYSTEMS OF PAPUA NEW GUINEA

Working Paper No. 5

GULF PROVINCE

TEXT SUMMARIES, MAPS, CODE LISTS AND VILLAGE IDENTIFICATION

R.L. Hide, R.M. Bourke, B.J. Allen, N. Fereday, D. Fritsch,
R. Grau, E. Lowes and M. Woruba

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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

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

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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:

Australian National University: Bryant Allen, Michael Bourke, Robin Hide (conceptualisation, field mapping, data preparation, writing); Robin Grau (GIS management, ARC/INFO, map preparation); Daniel Fritsch (computer programming and database management); Claudia Camarotto, Vivienne Layne, Elanna Lowes (research assistance); Yvonne Byron (editorial assistance); Merv Commons (technical assistance).

Papua New Guinea Department of Agriculture and Livestock: Ted Sitapai, Derek Tomlinson, Balthazar Wayi (coordination and planning); Nicholas Fereday, Ewa Kalabus, Moses Woruba (field mapping).

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

Field Survey

The initial surveys were done during a walking traverse from Menyamya station in Morobe Province to the Swanson River in 1980; a survey near Kotidanga station in 1981; and a Rapid Rural Appraisal by Department of Agriculture and Livestock staff in 1986. Some locations were visited as part of the Morobe Province survey in October 1991. The main surveys were conducted in April-May 1992. Extensive traverses were conducted by aircraft, road, foot and boat throughout the province. One party surveyed the coastal area west of Ihu; another the coastal area and inland rivers between Ihu and the border with Central Province; and a third in the mountainous area between the Morobe Province border and Kaintiba and Kotidanga. Details of the surveys are given in the section Survey Description for each agricultural system.

Revised and reprinted version

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

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1. INTRODUCTION

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

Identification of agricultural systems and subsystems

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

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

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

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

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

Relationship to PNGRIS

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

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

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

Note for reprinted edition

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

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

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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* [VSMBOUND]: Mounds up to 10 cm high.

54. *Small Mounds* [SMMBOUND]: 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:

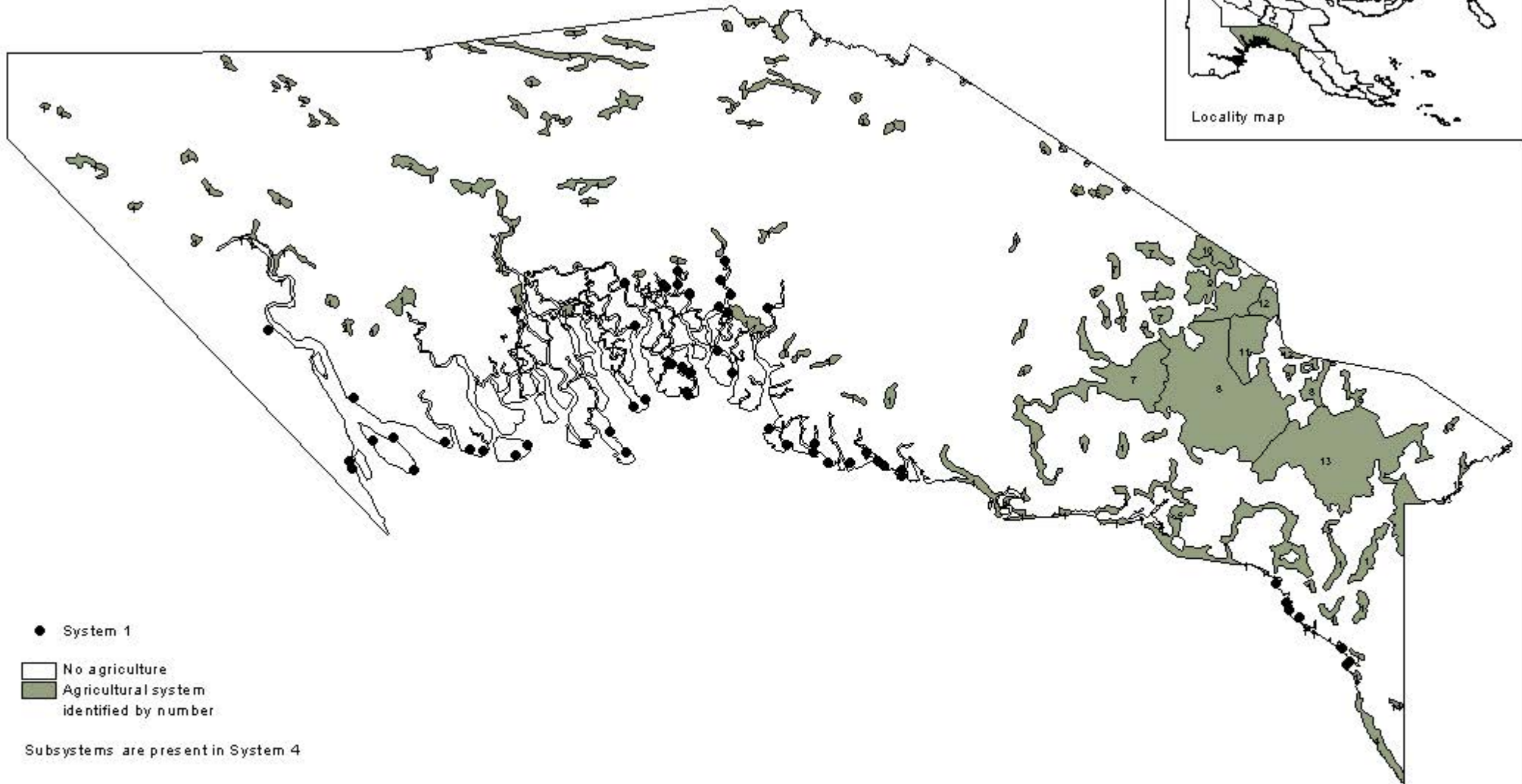
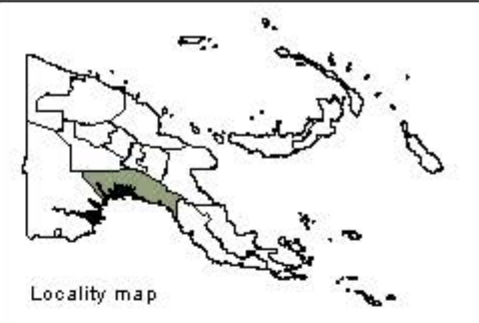
| | | |
|-------------------------------|----------------------------------|----------------------------|
| PROVINCE 15 West Sepik | AGRICULTURAL SYSTEM No. 3 | Subsystem No 2 of 2 |
| Districts 4 Telefomin | Subsystem Extent 25 % | |

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 |
|-------------------------------|----------------------------------|----------------------------|

GULF PROVINCE Agricultural Systems



30 0 30 60 Kilometers

| | | |
|--|---|-------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 1 | Subsystem No. 1 of 1 |
| Districts 1 Kikori, 2 Baimuru, 3 Ihu, 4 Kerema, 6 Malalaua | Subsystem Extent 100 % | Area (sq km) 9783 |
| Population 34,724 | Population density 4 persons/sq km | Population absent 35 % |

System Summary

An extensive system throughout the coastal region from the border with Western Province to just west of the Central Province boundary. Sago, from both planted and wild palms, is the major food. The importance of agriculture varies from minimal to significant (providing as much as one third of food intake). It is least important in the delta areas of the Kikori and Purari Rivers, and most significant where there is greater access to raised land. Tall woody regrowth over 15 years old is cleared and burnt for new gardens. Banana and coconut are important crops; other crops are taro, sweet potato, cassava and Chinese taro. Only one planting is made before fallowing. Fishing and the collection of crabs and shellfish are very important subsistence activities. In some inland locations, hunting is significant.

Extends across provincial border to System(s) None

Altitude range (m) 5-50 **Slope** Gentle (2-10 degrees)

CROPS

| | |
|---------------------|---|
| STAPLES DOMINANT | Sago |
| STAPLES SUBDOMINANT | Banana, Coconut |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Aibika, Amaranthus spp., Corn, Cucumber, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Bean (snake), Kalava |
| FRUITS | Malay apple, Mango, Orange, Pawpaw, Pineapple, Sugarcane, Watermelon, Guava |
| NUTS | Breadfruit, Okari |
| NARCOTICS | Betel nut (lowland), Betel pepper (lowland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|--------------|-------------|
| 1 Betel nut | Significant |
| 2 Crocodile | 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 | Significant |
| TILLAGE | None |
| MECHANIZATION | None |
| DEEP HOLING | None |
| MULCHING | None |
| SOIL RETENTION BARRIERS | None |
| Mounding Techniques: | |
| VERY SMALL MOUNDS | None |
| SMALL MOUNDS | Minor |
| MOUNDS | None |
| LARGE MOUNDS | None |
| Garden Bed Techniques: | |
| BEDS SQUARE | None |
| BEDS LONG | None |
| Other Features: | |
| FENCES | None |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | None |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

The western part was surveyed in May-June 1992, with a 7 day traverse by dinghy from Kikori station to Keakea village east of Ihu station; side traverses were made up three rivers - the Kikori River to Kaiam village, the Era River to Aurei village, and the Vailala River to Lohiki village; the section from Kilava village east to Ihu station was on foot. The eastern survey was also made in May 1992; a traverse by dinghy from Kerema west to Herehere and Mei'i No. 2 villages, and north to Kapiri village (2 days); a vehicle traverse from Kerema to Malalaua station via Lalafuru village (1 day); a boat traverse Malalaua-Moveave village-Tauri River to Putei village-Terapo mission (2 days); and a boat traverse to the coastal villages of Lalapipi, Lese Avihara, Miaru and Sarota (2 days).

Boundary definition

The western boundary was defined arbitrarily as the Western Province border between the Turama and Gama Rivers. The northwestern boundary with System 0202 was based on a boat traverse on the Kikori River. The northern boundary with System 0203 was based on interviews at Kikori and on the approximate 100 m contour. The northeastern boundary with System 0207 was based on a boat traverse on the Vailala River and interviews at Lohiki village; that with System 0205 on a vehicle traverse from Kerema to Murua Settlement Scheme, and the borders of the Scheme; and that with System 0213 on a boat traverse on the Tauri River. The southeastern boundary with System 0204 was based on a boat traverse along the coast from Malalaua station to Sarota village, with a clear boundary identified east of Miaru village.

Notes

This system is very similar to System 0114 to the west. It is distinguished from it because agriculture is insignificant in that system as in parts of this system. This system is very similar to System 0202, but is distinguished from it because fallow vegetation is cut onto planted crops there. It is distinguished from Systems 0203, 0205 and 0207 by differences in the staple food crops. This system is distinguished from System 0204 where short grass or tall woody regrowth fallows are used and banana is the most important crop.

Everywhere gardening is of less significance than sago, but there is considerable variation in the relative importance of gardening. This was recorded during the 1992 survey and is documented by written sources. At one extreme, very few families may have gardens (Austen 1946; Hamilton 1955), or cultivated areas per person may be minimal (for instance 0.014 ha; Rhoads 1980); at the other extreme, some small, single community, dietary intake studies have indicated that non-sago garden food may provide more than one third of food intake (Korovake village, Baimuru District in 1980; Ulijaszek 1982, 88; Pekoe village, Kerema District in 1979; Ulijaszek 1980). It has long been noted that gardening is generally more significant in the east than the west of this coastal region (Holmes 1924, 254-5; Hamilton 1955; McAlpine 1969). However, there are exceptions. For instance, in Malalaua District some coastal Toaripi villages (such as Uritai and Kukipi) have little or no agricultural land (Seiler 1974). In 1992 very few food gardens were noted at the four Lese villages, Miaru and Lalapipi villages. At Lalapipi, very small gardens containing cassava, sweet potato and yam (*D. alata*) are made adjacent to the shoreline after fallows of short grass.

There is also an apparent trend for gardening (but not holdings of coconut trees which showed the opposite) to be more important in inland villages than coastal ones, in the Purari Delta area (Maher 1961, 82, 90). However, in a recent rapid survey of the Delta, although the proportion of families claiming gardens ranged from 45 to 92 per cent, no coastal-inland gradient was apparent (Jenkins 1986). Elsewhere possible coastal-inland differences may be offset by some villages having water access to garden land at considerable distances: for instance, 70 miles upriver on the Tauri and Lakekamu Rivers by villages such as Heatoare and Heavara (Seiler 1974), and in the Kerema area (Bualia 1990, 229).

Until the 1950s, sago was exported from the area between Cape Possession and just west of the Vailala River, to the Motu region in the east by means of the Hiri and other canoe voyages (Dutton, 1982). Subsequent attempts to commercialise the trade were not sustained (Maher 1961).

Since at least the 1970s, there has been major use of purchased imported foods such as rice, particularly in the east of the system in Malalaua District (Morauta, 1982, 1984; Clunies Ross, 1984, 60; and the National Nutrition Survey data shown below). Also in Malalaua District, there is considerable internal trade: sago purchases in Kukipi village exceeded sago production in 1979 (Morauta, 1982). She noted that increasing salinity of water may have destroyed sago palms. In 1992, villagers at Lalapipi, Kukipi and Uritai were buying bananas, sweet potato and betel nut from Kamea speakers from the inland Tauri River area.

From the west to as far east as the Vailala River at least, gardens in the coastal and delta areas are typically seen as the responsibility of men (Austen 1946; Maher 1961; Williams 1924, 1940). Inland gardening is equally, if not predominantly, done by women (Rhoads 1980). Gender roles in the various stages of sago production vary though

Notes continued

women are largely responsible. Two major types of sago processing occur: west from the Kaimari area near Baimuru and up the Kikori River, chopped sago pith is placed in a woven bag and the starch expressed by treading on the bag; from the Koriki area of the Purari Delta eastward, chopped pith is beaten with a wooden flail before the starch is expressed by hand.

While woody regrowth is the major fallow vegetation type, in the delta areas some gardens are cleared from nipa palm (Conroy and Bridgland 1950; Ulijaszek and Poraituk 1983). In the 1960s, fallow lengths were described as less than 10 years in the more densely populated part of the Kerema region (McAlpine 1969, 138). In 1992, fallow lengths were recorded in the range of 5 to 20 years inland of Kerema and in the coastal areas east of Malalaua. In some places fallow periods exceed 40 years, for example in the coastal areas west of Kerema. A small survey at Koravake village in Baimuru District showed a trend for reductions in planting density and in the number of sago palm cultivars planted (Ulijaszek 1991). He suggested that the currently most popular cultivar was distinguished by rapid maturation and least processing effort.

From the eastern Purari Delta to just east of the Vailala River, the tidal flat areas support a mixed mangrove and nipa vegetation in which extensive areas of crab mounds or islands occur (Holmes 1924, 255; McAlpine 1969, 138-140). These are used for growing crops and for agroforestry. In 1992 at Keakea village, small mounds in the flats behind the village were planted extensively with *Ormocarpum orientale*, the leaves of which are eaten, and with a mangrove which provides building timber.

Near Kerema town there are informal settlers from the Kanabea area who grow food for consumption and market sale, reportedly using some practices associated with the upland System 0208 such as felling trees onto crops (Ulijaszek and Kavir n.d.). Aerial observations in 1992 also showed some untypical long beds running downslope in hill gardens to the east of Kerema.

Sweet potato is planted without mounding or in mounds 20-40 cm high. In 1992 tobacco was observed growing west of Kerema but not to the east.

Copra was previously a major source of cash income through much of the area, especially in Malalaua District (Clunies Ross 1984, 56-62). By 1992 production had virtually ceased. In some places, rubber was previously produced but this had almost ceased in 1992. Significant amounts of fresh food are sold in the Kerema area. Elsewhere small quantities are sold in local markets. Some sago and coconuts are sold in Port Moresby, especially from the eastern part of the system. Betel nut is the most important cash crop. Significant quantities are transported to Port Moresby for sale from the eastern half of the system (to just west of Ihu station). In 1992 most was sold to Highland middlemen in or near Port Moresby, but some was retailed in Port Moresby by producers. In Kikori District in 1992, income associated with the Kutubu-Kikori oil pipeline was of varying significance: this included royalties, food sales and casual employment. In the same year, logging royalties were significant in the Turama River area of Kikori District.

Additional Census Divisions in which the system occurs include (by National Population Census codes) 12-19 and 25-30.

National Nutrition Survey 1982/83

613 families from 30 villages were asked in November or December 1982, or August, November or December 1983, what they had eaten the previous day. 85 per cent reported eating sago, 51 per cent coconut, 35 per cent banana, 14 per cent sweet potato, 5 per cent cassava, 3 per cent taro, 1 per cent Chinese taro and 1 per cent yam. 36 per cent reported eating rice. 41 per cent reported eating fresh fish. This is similar to the crop pattern.

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| | | |
|---------------------------|---|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 2 | Subsystem No. 1 of 1 |
| Districts 1 Kikori | Subsystem Extent 100 % | Area (sq km) 756 |
| Population 321 | Population density 1 persons/sq km | Population absent 2 % |

System Summary

Located south of Mt Bosavi along the Suri and Turama Rivers in Southern Highlands Province; and along the upper reaches of the Kikori River to below Kaiam village in Gulf Province. Sago, mainly produced from planted palms, is the most important food; banana is an important crop; other crops include sweet potato, taro and Chinese taro. Small gardens are made in tall woody regrowth, more than 15 years old, or primary forest. The underbrush is cleared, crops are planted by dibbling and the trees are later felled onto the crops. Only one planting is made before fallowing. Tree crops such as coconut, tulip and breadfruit are commonly planted as gardens age. Household gardens are common. Hunting and fishing are of major importance.

Extends across provincial border to System(s) 0710

Altitude range (m) 10-500 **Slope** Flat (<2 degrees)

CROPS

| | |
|---------------------|---|
| STAPLES DOMINANT | Sago |
| STAPLES SUBDOMINANT | Banana |
| STAPLES PRESENT | Banana, Chinese taro, Sago, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Aibika, Amaranthus spp., Highland pitpit, Kumu musong, Lowland pitpit, Pumpkin fruit, Pumpkin tips, Tulip, Dicliptera, Kalava |
| FRUITS | Malay apple, Mango, Marita pandanus, Pawpaw, Pineapple, Sugarcane, Guava |
| NUTS | Breadfruit, Coconut, Okari, Tulip |
| NARCOTICS | Betel nut (lowland), Betel pepper (lowland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|--------------|-------|
| 1 Chillies | 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 | None |
| 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 | None |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | Very significant |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

In May 1992, boat traverse from Kikori station up the Kikori River via Kopi village to Kaiam village; gardens viewed along river and inspected at Kopi; meeting with Kaiam villagers and 3 gardens inspected (1 day). The Southern Highlands Province part of this system was not visited.

Boundary definition

This system is distinguished from System 0708 on the basis of interviews near Ludesa mission. The northern boundary with System 0711 was determined from interviews with Kaiam villagers and fieldwork in the Lake Kutubu area. It corresponds with the 400 m contour. The southern boundary with Gulf Province System 0201 was based on a boat traverse on the Kikori River. The western boundary with the same system was based on Saunders (1993), and population distribution. The eastern boundary with Gulf Province System 0203 was based on interviews with Irou Valley villagers.

Notes

This small area south of Mt Bosavi in the Southern Highlands has been classed as part of Gulf Province System 0202. It is similar to Gulf Province System 0201, except that fallow vegetation is burnt in System 0201, but not in 0202; and fallow vegetation is cut onto planted crops in System 0202, but not in 0201. This system is also very similar to Western Province System 0104, except that fallow vegetation is only sometimes felled onto planted crops in System 0104, and this is more commonly done in this system. This system is very similar to System 0708 where sweet potato is somewhat more important. It is also similar to System 0711 to the northeast, but banana is not an important crop and fallow vegetation is not cut onto planted crops there. This system was distinguished from System 0203 to the east where sweet potato and sago are the most important crops.

Fallow periods are not known but probably lie within the range 20-40 years.

The southern boundary between areas where fallow vegetation is burnt or not burnt occurs between Kaiam and Kopi villages in Gulf Province. The extraction of starch from sago in this system is done by hand, not by foot as is common in the western part of System 0201 to the south. The change from hand to foot processing on the Kikori River occurs between Kopi and Babaguina villages. In 1992, kava was reported as previously cultivated.

In 1992, income associated with the Kutubu-Kikori oil pipeline was of major significance. This included royalties, food sales and casual employment. Some copra and rubber was produced in the past, but this had ceased by 1992.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

None.

| | | |
|--------------------------------------|---|-------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 3 | Subsystem No. 1 of 1 |
| Districts 1 Kikori, 2 Baimuru | Subsystem Extent 100 % | Area (sq km) 300 |
| Population 1,014 | Population density 3 persons/sq km | Population absent 22 % |

System Summary

Located in the Irou River Valley in Southern Highlands and Gulf Provinces; along the upper reaches of the Purari River above Wabo in Gulf Province; and along the Pio River in Gulf and Chimbu Provinces. Sweet potato and planted sago are the most important crops, with sweet potato more important at higher altitudes and sago at lower altitudes. Other crops are banana, Chinese taro, yam (*D. alata*), cassava and taro. Gardens are made in tall woody regrowth more than 15 years old. There is only one planting before fallow. Burning is limited to around tree stumps. Cut vegetation is sometimes placed in rows or heaps. Household gardens are common. Hunting is important.

Extends across provincial border to System(s) 0723-1012

Altitude range (m) 100-1100 **Slope** Multiple classes

CROPS

| | |
|---------------------|---|
| STAPLES DOMINANT | Sago, Sweet potato |
| STAPLES SUBDOMINANT | Chinese taro |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>) |
| OTHER VEGETABLES | Lowland pitpit, Highland pitpit, Rungia, Aibika, Tulip, Corn, Bean (common), Cucumber, Pumpkin tips, Choko tips |
| FRUITS | Marita pandanus, Pawpaw, Pineapple, Sugarcane |
| NUTS | Breadfruit, Okari, <i>Pangium edule</i> |
| NARCOTICS | Betel nut (highland), Betel pepper (highland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|----------------|-------|
| 1 Animal skins | Minor |
|----------------|-------|

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In June 1989, gardens were visited in the vicinity of Haia mission, Chimbu Province (1 hour). In May 1992, villagers from the Irou River Valley in Gulf Province were interviewed at Kikori station. The Gulf Province part of this system was not visited. In May 1993, the Sopese area in the Irou Valley in Southern Highlands Province was visited (2 days).

Boundary definition

In Gulf Province, the southern boundary with System 0201 was based on interviews with Irou Valley villagers. In Southern Highlands Province, the northern boundary with System 0722 was based on walking traverses in the upper Irou Valley and in the Wopasali mission to Samberigi station area. In Chimbu Province, the northern boundary with System 1010 was based on foot traverses throughout the Karimui Plateau, interviews with Yuro villagers and garden visits near Haia station. The eastern boundary with System 1011 was based on the generally greater altitude (above 1200 m) of the two areas assigned to System 1011, and their adjacent location to the Heroana area of the Eastern Highlands Province part of the system (System 1114).

Notes

This system occurs between 100 m and 1100 m, where the population density is very low. It includes a number of small scattered areas of land use in inland Gulf Province near the border with Southern Highlands and Chimbu Provinces; in the upper Irou Valley in the Sopese mission area in the Southern Highlands; and in the Pio Tura census division in the south of this province. The major feature of this low intensity system is the joint importance of sweet potato and sago as the most important crops. This contrasts with Gulf Province System 0201 to the south where sago is the most important food and agriculture is of lesser importance. At higher altitudes to the north, it also contrasts with Southern Highlands Province System 0722, and Systems 1010 and 1011 in this province, in all of which sweet potato is the most important food.

Within the system, the relative importance of sweet potato and sago varies by altitude. In the west, in the upper Irou Valley above 900 m, sweet potato is the most important crop, with Chinese taro and sago less important; in the lower Irou Valley below 900 m, sago is most important. Elsewhere in this system, Chinese taro is of minor importance. In the upper Irou Valley, it is grown in separate gardens, typically in moist, shady locations near limestone cliffs.

In the eastern part of the system, descriptions referring to the Pawaian-speaking people around the Upper Purari region suggest that sago is the major staple, with gardening of varying importance (Warrilow 1978; Toft 1980). At Wabo, at about 100 m, on the Purari River, a nutritional study in 1976 reported sago as the major staple, with sweet potato eaten by 30 per cent of persons surveyed (Lambert 1983). In October 1987, 75 women at Haia, at about 700 m, in Chimbu Province were asked what they had eaten the previous day. 96 per cent reported eating sago (or a supplementary root crop such as yam, taro or cassava), 65 per cent sweet potato, 36 per cent breadfruit and/or marita pandanus and none rice (Groos and Hide 1989, 83, 86).

In the upper Irou Valley, sweet potato gardens are made on both river terraces and hill slopes. Stands of sago are planted along the Irou River in swampy locations. Toft (1980, 36) implies that, in the upper Purari region, cleared vegetation is not always burnt: it may be allowed to rot, or is thrown into waterways if it is too wet to burn. Burnt sites are used to plant corn and beans. Some of the cut fallow vegetation is laid in piles or rows. Crops such as banana and aibika may be planted in these, but the organic material is not incorporated into the soil as compost. Fencing is common; timber is laid horizontally to form fences before full garden clearance. There is also some use of ditches and bench cuts to control pig movement. The betel nut palm in this area is not the more common highland 'kavivi' (*Areca macrocalyx*). This betel nut was recorded from the Irou Valley, but not elsewhere in the system.

In the limestone areas in the east of the system, a method of pig management using natural rock enclosures and isolated sago areas has been reported (Hughes 1970). Some sweet potato is planted in small mounds near Haia airstrip, but not in the Irou Valley. It is possible that sweet potato planted in mounds in the Haia area represents a second planting, as occurs on the Karimui Plateau (System 1010).

A little Arabica coffee has been planted in the upper Irou Valley and in the Haia area. It was not being sold in the Irou Valley in 1993 because of transport costs and low prices, and is probably not being sold in the Haia area. Some cardamom was planted in the Haia area in the late 1980s as part of the South Simbu Rural Development Project, but is probably no longer being sold.

National Nutrition Survey 1982/83

16 families from 4 villages were asked in December 1982 what they had eaten the previous day. 75 per cent reported eating sago, 6 per cent yam and none sweet potato, taro, banana, Chinese taro, cassava or coconut. None reported eating rice. None reported eating fresh fish. The lack of sweet potato and Chinese taro consumption differs from the crop pattern.

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| | | |
|-----------------------------|--|-------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 4 | Subsystem No. 1 of 2 |
| Districts 6 Malalaua | Subsystem Extent 75 % | Area (sq km) 53 |
| Population 1,673 | Population density 32 persons/sq km | Population absent 56 % |

System Summary

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

Extends across provincial border to System(s) 0303

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

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|--------------|------------------|
| 1 Betel nut | Very significant |
| 2 Fresh food | Significant |

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

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

Boundary definition

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

Notes

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

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

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

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

National Nutrition Survey 1982/83

53 families from 1 village were asked in December 1982 what they had eaten the previous day. 75 per cent reported eating sago, 47 per cent banana, 21 per cent sweet potato, 11 per cent coconut, 4 per cent cassava, 2 per cent taro, and none Chinese taro or yam. 92 per cent reported eating rice. 45 per cent reported eating fresh fish. The high sago consumption in this one village differs from the crop pattern.

Main References

None.

Other References

None.

System Summary

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

Extends across provincial border to System(s) 0303

Altitude range (m) 0-100

Slope Gentle (2-10 degrees)

CROPS

STAPLES DOMINANT Banana

STAPLES SUBDOMINANT Coconut

STAPLES PRESENT Banana, Cassava, Coconut, Sago, Sweet potato, Yam (*D. esculenta*), Queensland arrowroot, Taro (*Amorphophallus*)

OTHER VEGETABLES Aibika, Corn, Cucumber, Lowland pitpit, Bean (snake)

FRUITS Mango, Orange, Pawpaw, Pineapple, Watermelon, Guava

NUTS Breadfruit

NARCOTICS Betel nut (lowland), Betel pepper (lowland)

FALLOW & CROPPING PERIOD

FALLOW TYPE Tall woody regrowth

SHORT FALLOW None

LONG FALLOW PERIOD 5-15 years

CROPPING PERIOD 1 planting

R VALUE 28 (low)

GARDEN SEGREGATION

GARDEN SEGREGATION Minor

CROP SEGREGATION Minor

CROP SEQUENCES Minor

MIXED VEGETABLE GARDENS None

HOUSEHOLD GARDENS None

SOIL FERTILITY MAINTENANCE

LEGUME ROTATION None

PLANTED TREE FALLOW None

COMPOST None

ANIMAL MANURE None

ISLAND BED None

SILT FROM FLOOD None

INORGANIC FERTILISER None

CASH EARNING ACTIVITIES

1 Betel nut Very significant

2 Fresh food Significant

OTHER AGRONOMIC PRACTICES**Water Management:**

DRAINAGE None

IRRIGATION None

Soil Management:

PIGS PLACED IN GARDENS None

BURN FALLOW VEGETATION Significant

TILLAGE None

MECHANIZATION None

DEEP HOLING None

MULCHING None

SOIL RETENTION BARRIERS None

Mounding Techniques:

VERY SMALL MOUNDS None

SMALL MOUNDS Minor

MOUNDS None

LARGE MOUNDS None

Garden Bed Techniques:

BEDS SQUARE None

BEDS LONG None

Other Features:

FENCES None

STAKING OF CROPS Minor

FALLOW CUT ONTO CROPS None

SEASONAL MAIN CROPS Significant

SEASONAL SEC'DARY CROPS Significant

OTHER DOCUMENTATION

Notes

No gardens were seen in this subsystem, and information is based on interviews only.

| | | |
|---------------------------|--|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 5 | Subsystem No. 1 of 1 |
| Districts 4 Kerema | Subsystem Extent 100 % | Area (sq km) 20 |
| Population 435 | Population density 22 persons/sq km | Population absent 0 % |

System Summary

Located in the Murua Settlement area northeast of Kerema. Originally, settlement gardens were made in tall woody regrowth over 30 years old. A little more than half of current gardens are made in tall woody regrowth typically 8-12 years old, with the rest in fallow older than 30 years. The vegetation is cut, dried and burnt. Sweet potato, banana, Chinese taro and coconut are important crops; other crops are sago and cassava. Only one planting of food crops is made before fallowing. Some gardens are not fallowed but are interplanted with cocoa and rubber. Sweet potato and Chinese taro are planted in separate sections of gardens.

Extends across provincial border to System(s) None

Altitude range (m) 40-80 **Slope** Gentle (2-10 degrees)

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | None |
| STAPLES SUBDOMINANT | Banana, Chinese taro, Coconut, Sweet potato |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Coconut, Sago, Sweet potato |
| OTHER VEGETABLES | Aibika, Corn, Lowland pitpit, Pumpkin tips, Tulip, |
| FRUITS | Mango, Orange, Pawpaw, Pineapple, Sugarcane, Guava |
| NUTS | Breadfruit, Okari |
| NARCOTICS | Betel nut (lowland), Betel pepper (lowland) |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|--------------|-------------|
| 1 Betel nut | Significant |
| 2 Cocoa | Minor |
| 3 Fresh food | Minor |
| 4 Rubber | Minor |

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In May 1992, a road traverse from Kerema to Murua Settlement (1 day): 4 settlers interviewed and 13 food gardens visited.

Boundary definition

The boundaries with System 0201 follow those of the Settlement Scheme.

Notes

This system is distinguished from System 0201 where sago is the most important food.

The Murua Settlement Scheme was established in the early 1960s based on rubber as a cash crop. Settlers came from Malalaua and Ihu Districts, and some from two villages near Kerema town. Block sizes range from 11 to 24 ha. In 1966, 33 of 77 blocks were occupied, with the Scheme covering 2917 ha (McAlpine 1969, 141). Currently the sources of cash income, in descending order of significance, are betel nut (mostly sold in Moresby), fresh food (some to Moresby, mostly to Kerema), cocoa (sold by about half the settlers) and rubber. Rubber production has declined greatly since the 1970s (Agricultural Development Services 1992, 58-60). Gulf Province produced 63 and 136 tonnes in 1990 and 1991 respectively, but production was probably lower in 1992 due to low prices.

Settlers currently make gardens in either parts of their blocks not previously used by them (tall woody regrowth, older than 30 years, or forest with no signs of previous use), or after tall woody fallows of typically 8 to 12 years. The latter are slightly more common. Small sweet potato gardens near houses are occasionally made after short grass fallows. The continued use of older forest to make new gardens may be related to the common practice of establishing crops of rubber and cocoa in old gardens (under initial banana shade).

Of the three important annual food crops, Chinese taro is less important than sweet potato and banana. Only some settlers have access to sago on or near their blocks; most is purchased at Kerema market. Within gardens, sweet potato and Chinese taro are planted in separate sections; banana is interplanted with both. Sweet potato is planted in small mounds 20-30 cm high and 80-100 cm in diameter. Sharrock and Jones (1989) reported a number of diseases on bananas growing between Kerema and Murua (Black Sigatoka, freckle, black cross, Cordana and leaf curl symptoms).

There is a little fishing and hunting, and prawns are collected from streams.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

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Other References

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| | | |
|---|---|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 6 | Subsystem No. 1 of 1 |
| Districts 2 Baimuru, 3 Ihu, 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 33 |
| Population 0 | Population density 0 persons/sq km | Population absent 0 % |

System Summary

Located in the unpopulated north of Ihu District as a southern extension from Eastern Highlands Province System 1114. Tall woody regrowth, more than 15 years old is cut, dried and burnt. Sweet potato is the most important crop; banana is an important crop; and other crops are taro and yam (*D. alata*). Crops are planted by dibbling. Only one planting is made before fallowing. Household gardens are common.

Extends across provincial border to System(s) 1011-1114

Altitude range (m) 400-2000 **Slope** Multiple classes

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | Banana |
| STAPLES PRESENT | Banana, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>) |
| OTHER VEGETABLES | Bean (common), Bean (winged), Corn, Cucumber, Highland pitpit, Pumpkin fruit, Pumpkin tips |
| FRUITS | Marita pandanus, Sugarcane |
| NUTS | Breadfruit, Karuka (planted), Karuka (wild) |
| NARCOTICS | Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|------------------|-------|
| 1 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 | None |
| MECHANIZATION | None |
| DEEP HOLING | None |
| MULCHING | None |
| SOIL RETENTION BARRIERS | None |
| Mounding Techniques: | |
| VERY SMALL MOUNDS | Very significant |
| SMALL MOUNDS | None |
| MOUNDS | None |
| LARGE MOUNDS | None |
| Garden Bed Techniques: | |
| BEDS SQUARE | None |
| BEDS LONG | None |
| Other Features: | |
| FENCES | Very significant |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | None |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

The Gulf Province part of this system was not visited. In August 1982, gardens near Simbari airstrip in Eastern Highlands Province were visited briefly by helicopter; and low level aerial observations made of gardens in the Andakombi area (half day). In November 1990, the Wantakia area was observed from the air, and villagers from the neighbouring Aziana area were interviewed.

Boundary definition

The northern boundaries with Eastern Highlands Province Systems 1105, 1107, 1111, 1112, 1113 and 1120 were based on aerial observations. In Chimbu Province, two small areas were assigned to this system on the basis of both their adjacent location to the Heroana area in Eastern Highlands Province, and their generally greater altitude (above 1200 m) than System 0203/0723/1012 to the west and south. In Gulf Province, the southern boundary with System 0207 was based on surveys in the Ivore-Swanson area and the clustering of areas of agricultural land use; that with System 0201 was based on interviews at Lohiki village.

Notes

This system is distinguished from Systems 1105, 1107, 1111, 1113 and 1120 by differences in fallow vegetation and cropping period. It is similar to System 1112, but there sweet potato, taro and yam (*D. alata*) are all important crops. It is distinguished from Systems 0203/0723/1012 and 0201 where sago is a most important food. This system is similar to System 0207, but there both sweet potato and banana are the most important crops.

Aerial observations of the Wantakia area west of Wonenara in November 1990 indicated that most food gardens were made in woody regrowth. People in the Aziana area said that the Wantakia gardens were made in forest with sweet potato and taro as the staple crops.

According to Herdt (1981, 23-29), sweet potato was the major staple food in the Simbari area in the Eastern Highlands in 1974-76, with taro, banana and yam also grown. There was some garden segregation (taro and banana planted near rivers), and fallow periods ranged from 5 to 20 years. Karuka nut pandanus, both planted and wild, were important tree crops. Hunting was a significant activity, and eels were trapped in the rivers. Only a small number of pigs were maintained.

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

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

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Other References

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| | | |
|-----------------------------|---|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 7 | Subsystem No. 1 of 1 |
| Districts 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 416 |
| Population 1,291 | Population density 3 persons/sq km | Population absent 4 % |

System Summary

Located in the Ivore-Swanson Census Division west of Kanabea mission. The undergrowth is cleared from tall woody regrowth, typically more than 30 years old. Crops are planted and trees are felled onto them. There is little burning of cleared fallow vegetation. Banana and sweet potato are the most important crops; Chinese taro is an important crop; taro is also grown. Chinese taro was the most important crop until the early 1980s. Only one planting is made before fallowing. Chinese taro and sweet potato are often planted in separate gardens.

Extends across provincial border to System(s) None

Altitude range (m) 200-1400 **Slope** Steep (10-25 degrees)

CROPS

| | |
|---------------------|---|
| STAPLES DOMINANT | Banana, Sweet potato |
| STAPLES SUBDOMINANT | Chinese taro |
| STAPLES PRESENT | Banana, Chinese taro, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Aibika, Choko tips, Corn, Ferns, Highland pitpit, Lowland pitpit, Oenanthe, Pumpkin fruit, Pumpkin tips, Rungia |
| FRUITS | Marita pandanus, Pawpaw, Pineapple, Sugarcane |
| NUTS | Breadfruit, Okari, Pangium edule |
| 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 | Significant |
| CROP SEGREGATION | Minor |
| CROP SEQUENCES | None |
| MIXED VEGETABLE GARDENS | None |
| HOUSEHOLD GARDENS | None |

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|------------------|-------|
| 1 Coffee Arabica | Minor |
|------------------|-------|

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In August 1980, a foot traverse from Menyamya in Morobe Province to Komako and Swanson River (3 days). This description is mostly based on a Rapid Rural Appraisal survey of 5 communities by a Department of Agriculture and Livestock team in November 1986 (Levett et al. 1988).

Boundary definition

The northwestern boundary with System 0206 was based on the relative proximity of the two clusters of separate areas of land use. To the east, the boundaries with Systems 0210, 0209 and 0208 were based on a foot traverse from Komako village to the Swanson Valley. The southeastern boundary with System 0208 was estimated at the 500 m contour. The southwestern boundary with System 0201 on the Lohiki River was based on interviews at Lohiki village.

Notes

This system is distinguished from Systems 0206, 0208, 0209 and 0210 where sweet potato is the most important crop. It is distinguished from System 0201 where sago is the most important crop.

Though very similar to System 0213, this system differs in that Chinese taro is more important here and is segregated in separate gardens. Located at a higher altitude, it also has different vegetables. In 1980, Chinese taro was said to be the most important crop, with sweet potato, banana and taro of lesser significance. By 1986 Chinese taro was apparently much less significant (Levett et al. 1988, 35, 65, 106-7). According to R. Speece (pers.comm.), a linguist resident at Ankai village intermittently between 1979 and 1990, much less Chinese taro was eaten by the late 1980s than in the early 1980s. It is likely that the decline of Chinese taro was due to disease (probably *Pythium* root rot). Following research in 1987-88, Bonnemère (1992, 38) included Chinese taro as a staple with sweet potato and banana, and considered that taro was least important. The 1986 evidence on the relative importance of the staple crops is somewhat ambiguous (Levett et al. 1988, 35, 65, 106, 107). In five new gardens the following frequencies were recorded (ibid., 65): banana (35 per cent), sweet potato (29 per cent) and taro (22 per cent). Elsewhere it was stated that the most important crops were Chinese taro, banana and sweet potato, although it was noted that garden observations did not support villagers' assessment of Chinese taro as the most important crop. Sago was reported at only one of five villages (Levett et al. 1988, 36).

Although the system spans a wide altitude range, most settlement is located between 1000-1400 m (Bonnemère 1992, 38). Fallow periods are generally longer than 30 years (Levett et al. 1988, 59), or 20-30 years (Bonnemère 1992, 39). Bonnemère (1992, 39) distinguished 3 kinds of garden: those in the permanent hamlet sites, surrounding each house and planted with sweet potato, taro, banana and a number of other interplanted crops; a new garden with mainly sweet potato and both kinds of pitpit; and an older garden (over 2 years old) with banana, sugarcane and Chinese taro. In the 600-1000 m zone, the tree crops *Pangium edule* (fruiting during April-August) and breadfruit are important (Bonnemère 1992, 41, 44, 274). There is very little cash income except for small quantities of Arabica coffee.

National Nutrition Survey 1982/83

45 families from 2 villages were asked in November or December 1982 what they had eaten the previous day. 82 per cent reported eating Chinese taro, 53 per cent sweet potato, 16 per cent banana, 4 per cent taro, and none sago, yam, cassava or coconut. 2 per cent reported eating rice. 4 per cent reported eating fresh fish. The high Chinese taro consumption differs from the 1992 crop pattern, but is similar to that reported for the early 1980s.

Main References

Bonnemère, P. 1992 *Le casoar, le pandanus rouge et l'anguille: différence des sexes, substances et parenté chez les Ankave-Anga (Papouasie Nouvelle-Guinée)*. PhD thesis, E.H.E.S.S., Paris.

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Lemonnier, P. and P. Bonnemère 1988 Anthropological and medical report on Angave population. Unpublished paper, Institute of Medical Research, Goroka.

Levett, M.P. In press. A comparative study of gardening systems in two mountainous census divisions of Kaintiba District, Gulf Province. Yagl-Ambu.

| | | |
|---------------------------------------|---|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 8 | Subsystem No. 1 of 1 |
| Districts 4 Kerema, 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 902 |
| Population 6,439 | Population density 7 persons/sq km | Population absent 7 % |

System Summary

Located from north of Kanabea mission in the Tauri Valley to about 500 m altitude south of Kamina mission. Fallow vegetation is woody regrowth, more than 10 m tall and older than 15 years. Undergrowth is cleared and burnt in heaps. Crops are then planted and the trees are felled onto them. Sweet potato is the most important crop; banana is an important crop; other crops are taro, cassava, Chinese taro, sago and yam (*D. alata*). Only one planting is made before fallowing. However after sweet potato has been harvested, the density of sugarcane and lowland pitpit is increased. There is no weeding. Few gardens are fenced. Household gardens are common.

Extends across provincial border to System(s) 1234

Altitude range (m) 500-1000 **Slope** Very steep (>25 degrees)

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | Banana |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (<i>Colocasia</i>), Yam (<i>D. alata</i>) |
| OTHER VEGETABLES | Aibika, Bean (common), Highland pitpit, Kumu musong, Lowland pitpit, Oenanthe, Pumpkin tips, Rungia, Tulip |
| FRUITS | Avocado, Marita pandanus, Orange, Pawpaw, Pineapple, Sugarcane |
| NUTS | Breadfruit, Okari |
| NARCOTICS | Betel nut (lowland), Betel pepper (lowland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

| | |
|----------------------|------|
| LEGUME ROTATION | None |
| PLANTED TREE FALLOW | None |
| COMPOST | None |
| ANIMAL MANURE | None |
| ISLAND BED | None |
| SILT FROM FLOOD | 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 | Minor |
| TILLAGE | None |
| MECHANIZATION | None |
| DEEP HOLING | None |
| MULCHING | None |
| SOIL RETENTION BARRIERS | None |
| Mounding Techniques: | |
| VERY SMALL MOUNDS | None |
| SMALL MOUNDS | None |
| MOUNDS | None |
| LARGE MOUNDS | None |
| Garden Bed Techniques: | |
| BEDS SQUARE | None |
| BEDS LONG | None |
| Other Features: | |
| FENCES | Minor |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | Very significant |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

In March 1981, a four day visit to Kotidanga station, during which 21 gardens were surveyed at Ipaiya village. In April 1992, a flight from Kotidanga to Kamina mission, garden inspections at Kamina (2 days), and a flight from Kamina to Komako mission.

Boundary definition

The northern boundaries with Systems 1229 and 1233 were based on observations from 2 flights and a road traverse from Wau to Menyamyia via Aseki. The boundary with System 0211 is the watershed between the Tauri and Werr Rivers, and was determined by a foot traverse. The southeastern boundary with System 0213 was estimated at the 500 m contour from interviews at Kamina and Putei missions. The western boundary with System 0207 was also estimated at the 500 m contour.

Notes

This system is distinguished from System 1229 where fallow vegetation is short woody regrowth with some cane grass, 5-15 years old. It is very similar to System 1233 where bananas are less important. It is also very similar to System 0211, except that trees are not felled onto planted crops in that system. It is similar to Systems 0207 and 0213 where banana and sweet potato are the most important crops.

An extensive system covering a large area, in which tall trees are felled onto crops after planting (see also McAlpine 1969, 140). Sweet potato may be harvested for up to three years without replanting. The importance of highland pitpit is striking. Household gardens are very common and may be a major source of green vegetables which are said not to grow well in the main gardens. They often include soil beds, and the use of organic waste as fertilizer. They are more important in the northern part of the system. At Kanabea small areas on river flats are cleared of tall and short grasses and planted with a first crop of banana, sugarcane and sweet potato. *Ischaemum* grass is used as mulch. This is followed by repeated crops of sweet potato until yields are no longer acceptable. Bench cut walking tracks now have settlements concentrated along them. In the past, settlements were more scattered. In Weibi Census Division in 1992, DPI tree counts recorded 32,000 mature and 22,300 immature Arabica coffee trees in 635 gardens.

In Gulf Province, this system is isolated from road and air connections. Cash incomes are very small with minor sales of Arabica coffee and fresh food.

National Nutrition Survey 1982/83

168 families from 10 villages were asked in November or December 1982, or August 1983, what they had eaten the previous day. 76 per cent reported eating sweet potato, 42 per cent taro, 21 per cent banana, 11 per cent Chinese taro, 1 per cent sago, 1 per cent yam and none cassava or coconut. 2 per cent reported eating rice. 1 per cent reported eating fresh fish. This is similar to the crop pattern except for the high taro consumption.

Main References

None.

Other References

Bourke, R.M. 1980 Report on a patrol to Menyamyia and Swanson River area, Morobe and Gulf Provinces. Unpublished Report, Highlands Agricultural Experiment Station, Aiyura.

Lemonnier, P. 1982 Les jardins Anga (Nouvelle-Guinée). *Journal d'Agriculture Traditionnelle et de Botanique Appliquée* 29, 3-4, 227-245.

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| | | |
|-----------------------------|--|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 9 | Subsystem No. 1 of 1 |
| Districts 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 216 |
| Population 5,474 | Population density 25 persons/sq km | Population absent 4 % |

System Summary

Located in the Tauri and Hauabanga valleys, north of Bema mission and east of Wempango village. The trees in the woody regrowth fallows are less than 10 m tall, 5 to 15 years old, thin stemmed, and consist of only a few species. The regrowth is cut down and heaped. Some heaps are burnt, some left to decompose, and other material is removed from the garden. Much leaf litter is left on the surface. Sweet potato is the most important crop; other crops are banana, Chinese taro, taro, cassava and potato. Only one planting is made before fallowing. Sweet potato is planted without mounds. Household gardens containing corn, taro and green vegetables are common. There are indications of stress in the system.

Extends across provincial border to System(s) None

Altitude range (m) 1200-2000 **Slope** Steep (10-25 degrees)

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | None |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Potato, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Bean (winged), Corn, Ferns, Highland pitpit, Kumu musong, Lowland pitpit, Oenanthe, Rungia |
| FRUITS | Marita pandanus, Orange, Pineapple, Sugarcane |
| NUTS | Karuka (planted) |
| NARCOTICS | Betel nut (highland), Betel pepper (highland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

| | |
|----------------------|------|
| LEGUME ROTATION | 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 | Significant |
| TILLAGE | None |
| MECHANIZATION | None |
| DEEP HOLING | None |
| MULCHING | None |
| SOIL RETENTION BARRIERS | None |
| Mounding Techniques: | |
| VERY SMALL MOUNDS | None |
| SMALL MOUNDS | None |
| MOUNDS | None |
| LARGE MOUNDS | None |
| Garden Bed Techniques: | |
| BEDS SQUARE | None |
| BEDS LONG | None |
| Other Features: | |
| FENCES | Significant |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | None |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

In November 1986, a Rapid Rural Appraisal survey by a Department of Agriculture and Livestock team covered 3 communities (Levett et al. 1988). In October 1991, a flight from Menyamya station in Morobe Province to Komako mission, and two hours of garden inspections at Komako. In April 1992, a flight from Kamina mission to Komako and to Hauabanga mission; a foot traverse from Hauabanga to Hambia, Tetamanga and Wempango villages, returning to Kaintiba via Bema mission (3 days).

Boundary definition

The northern boundary with System 0210 was based on aerial observations. Both the eastern boundary with System 0212 and the southeastern boundary with System 0211 were based on foot traverses. The southern boundary with System 0208 was based on two flights.

Notes

This system is distinguished from Systems 0208, 0211 and 0212 where fallow vegetation is tall woody regrowth more than 15 years old. It is distinguished from System 0210 where fallow vegetation is short woody regrowth and grass, and 2-3 plantings are made before fallowing.

A number of signs of agricultural stress are evident. Although fallow regrowth is woody, it consists of low, thin-stemmed trees of uniform height, with little species diversity. Up to the level of the daily cloud base at around 2000 m altitude, no secondary forest remains. There is little gardening above that altitude because of the cloud. According to Levett et al. (1988, 62), who surveyed 3 villages in this system, many gardens were also cleared from grassland. Some trees were also felled onto the crop. During clearing some material is heaped and burnt, while much is removed from the garden. Sweet potato and highland pitpit dominate all gardens. Corn, taro and green vegetables are grown in household gardens. These gardens are formed into beds, mulched and fertilized with organic material. These crops are said not to grow well in the main gardens. Chinese taro is grown in gully sides and around the edges of gardens. Some Arabica coffee is intercropped with banana and Chinese taro beneath Albizzia trees, but the areas seen were too small to be distinguished as a subsystem. In 1992, people complained frequently of low sweet potato yields, a lack of green vegetables, poor soils and the inability to grow corn satisfactorily in the main gardens. The area is connected by a bench cut track to Kaintiba station but is one-and-a-half days walk from the roadhead at Menyamya.

National Nutrition Survey 1982/83

86 families from 2 villages were asked in November or December 1982 what they had eaten the previous day. 91 per cent reported eating sweet potato, 26 per cent Chinese taro, 10 per cent taro, 8 per cent banana, and none sago, yam, cassava or coconut. 2 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the relatively high Chinese taro consumption.

Main References

Levett, M.P., C. Davies, P. Kokoa, K. Kalit, D.J. Dockery, H.J. Itagau, J.W. Kerage, G. Geroro, M. Kavir and F. Milala 1988 Multisectoral rapid rural appraisal of Ivore-Swanson Census Division in Kaintiba District of Gulf Province, 18 November to 5 December, 1986. Technical Report 88/1, Department of Agriculture and Livestock, Port Moresby.

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Levett, M.P. In press. A comparative study of gardening systems in two mountainous census divisions of Kaintiba District, Gulf Province. Yagl-Ambu.

| | | |
|-----------------------------|--|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 10 | Subsystem No. 1 of 1 |
| Districts 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 51 |
| Population 588 | Population density 12 persons/sq km | Population absent 4 % |

System Summary

Located along the boundary between a ragged forest edge and extensive, largely uncultivated, grasslands in the Tauri River Valley north and south of Menyama and extending into Gulf Province; to Akwanje mission and Yegepa mission in the Warr River valley, around Naniwe mission, in the headwaters of the Langimar River; and in the Slate River valley, west of Bulolo. Fallows 5-15 years old, predominantly short woody regrowth, but with some tall cane grass, are cleared and burnt. Areas of short grass, although common, are rarely cultivated. Sweet potato is the most important crop; other crops are banana, taro, Chinese taro, potato and yam (D. alata). Up to 3 plantings of sweet potato are made before fallowing, with pigs placed in gardens between plantings. Household gardens are important.

Extends across provincial border to System(s) 1229

Altitude range (m) 900-2000 **Slope** Steep (10-25 degrees)

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | None |
| STAPLES PRESENT | Banana, Chinese taro, Potato, Sweet potato, Taro (Colocasia), Yam (D. alata) |
| OTHER VEGETABLES | Amaranthus spp., Bean (common), Bean (winged), Chinese cabbage, Corn, Cucumber, Highland pitpit, Lowland pitpit, Nasturtium spp., Spring onion |
| FRUITS | Marita pandanus, Orange, Passionfruit (purple), Sugarcane |
| NUTS | Karuka (planted) |
| NARCOTICS | Betel nut (highland), Betel pepper (highland), 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 | None |
| MIXED VEGETABLE GARDENS | None |
| HOUSEHOLD GARDENS | Significant |

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|------------------|-------|
| 1 Coffee Arabica | Minor |
| 2 Fresh food | Minor |

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In October 1991, road traverses from Wau to Menyamya via the Slate River Valley (1 day); from Menyamya station to Akwanje mission, Kwapalim mission and Nainwe mission (2 days); walking traverse up the Kawapalim Valley (1 day); flight from Menyamya to Yegepa, Umba, Langimar and Engati airstrips (2 days); and a flight from Menyamya station to Komako mission in Gulf Province. In April 1992, a flight from Komako to Hauabanga mission via the Tauri Valley, in Gulf Province. The Gulf Province part of the system was not visited on the ground.

Boundary definition

Boundaries with Systems 1226, 1227, 1230, 1231, 1233/0212 and 1234/0208 were determined by walking and road traverses between Wau, Aseki station and Menyamya station, Menyamya and Naniwe mission, Kwapalim mission and Akwanje mission, and by aerial reconnaissance en route from Menyamya to Umba, Engati, Yegepa, Langimar and Aseki airstrips. The southern boundary with System 0209 was based on aerial observations.

Notes

Located north and south of Menyamya station, in the Tauri River Valley and extending into Gulf Province, in the Warr River Valley, the Naniwe mission area, the headwaters of the Langimar River, and the Slate River Valley, west of Bulolo township. The system is distinguished from System 1226 where the fallow vegetation is tall woody regrowth and the fallow period is longer; from System 1227 where the fallow vegetation is short woody regrowth and banana is a more important crop; from System 1230 and 1231 where short fallows are used and the cropping interval is longer; and from System 1233/0212 and 1234/0208 where fallow vegetation is tall woody regrowth and the fallow period is longer. It is very similar to System 0209 to the south where only one planting is made before fallowing.

Gardens are located between the ragged lower edge of previously uncultivated forest and the upper edge of extensive short grasslands. This system is occupied by Anga speaking people, who also occupy Systems 1231, 1234, 1233 and 1226. It is a medium intensity system relative to other systems used by Anga-speaking people.

The predominant fallow vegetation cleared for cultivation is short woody regrowth and tall cane grass. Fallows are usually 10-15 years old. Extensive areas of short grasses occur adjacent to this system, especially in the Slate River Valley where they cover the main valley floor. They are rarely used for agriculture. In the Akwanje mission area, a local rule of not burning short grass areas is resulting in areas of short grass being colonised by trees. Two common fallow species here are *Dodonea* and *albizzia*. *Albizzia* predominates after about 10 years. It is self-seeding, and is protected in gardens. Undergrowth is cleaned, trees are felled, and burnt. Most gardens are not fenced. In some gardens, logs are laid across the slope to act as soil retention barriers.

Sweet potato is dibbled into the soil surface by three or four sharp blows with a stick. However small mounds are used at Akwanje and in the southern Tauri Valley. Sweet potato is clearly the most important crop. Banana is intercultivated with sweet potato. Triploid banana is becoming increasingly important, but it is grown mainly in large village house gardens, surrounded by fences. Very small segregated taro gardens may be also planted. Yam (*D. alata*) is unimportant. Potato is planted at higher altitudes, but is not important. *Karuka panadanus* is planted in forest above areas of cultivation, and the wild species is also exploited.

Two plantings of sweet potato are usually made, and sometimes three, before fallowing. Pigs are placed in gardens between crops to break up the soil. The cultivation of taro is said to be seasonal (eaten, with bamboo shoots, in the period June-December) in contrast to the aseasonal cultivation and consumption of sweet potato.

The system appears to have changed little in almost 60 years. The Slate River Valley was visited for 9 months in 1936-37 by Beatrice Blackwood (Blackwood 1978, 29-34). She observed that sweet potato was 'by far the most important' food, and banana was important. Taro and yam were unimportant. Tomato, cabbage and corn were being grown in 1936 and were being sold to miners at Bulolo. Blackwood distributed seeds of peas, runner beans, carrots, beetroot and lettuce. Gardens were not fenced. Short grass areas were not cultivated. Blackwood noted the importance of *albizzia*, and claimed it was not felled. It is likely however, that the systems has moved upslope during this period, leaving now uncultivated grassland behind it.

Arabica coffee was introduced in the 1950s, but it is only important today in the Slate River Valley, which has had a road connection to Bulolo since the 1940s. Much of the short grass areas on either side of the river is now occupied with coffee gardens. Elsewhere coffee gardens are small and not well cared for. In Morobe Province, parts of the system is well connected by roads to Menyamya and on to Bulolo, Wau and Lae. Other parts are some hours walk

Notes continued

from a road. Small amounts of cash are earned from sales of fresh food in local markets, firewood to public servants and missions, and Arabica coffee to itinerant buyers along roads.

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Blackwood, B. 1978 The Kukukuku of the Upper Watut. Oxford, Pitt Rivers Museum. Monograph 2.

Other References

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Lemonnier, P. 1982 Les jardins Anga (Nouvelle-Guinée). *Journal d'Agriculture Traditionnelle et de Botanique Appliquée* 29, 3-4, 227-245.

| | | |
|-----------------------------|---|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 11 | Subsystem No. 1 of 1 |
| Districts 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 131 |
| Population 1,049 | Population density 8 persons/sq km | Population absent 4 % |

System Summary

Located from just north of Kaintiba airstrip in the Werr Valley to the confluence with the Tauri River. The undergrowth below tall woody regrowth, more than 25 years old, is cleared. Crops are planted beneath the trees. The trees are pollarded and the branches burnt in heaps or removed from the gardens. Standing trees are killed by burning the base. Sweet potato is the most important crop; banana is an important crop; other crops are Chinese taro, taro, cassava and sago. Only one planting is made before fallowing. Household gardens are common.

Extends across provincial border to System(s) None

Altitude range (m) 600-1000 **Slope** Very steep (>25 degrees)

CROPS

| | |
|---------------------|--|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | Banana |
| STAPLES PRESENT | Banana, Cassava, Chinese taro, Sago, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Aibika, Bean (common), Bean (winged), Cabbage, Choko tips, Highland pitpit, Kumu musong, Lowland pitpit, Bamboo shoots |
| FRUITS | Avocado, Marita pandanus, Sugarcane |
| NUTS | Breadfruit, Okari |
| NARCOTICS | Betel nut (lowland), Betel pepper (lowland), Tobacco |

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|------------------|-------|
| 1 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 | Minor |
| TILLAGE | None |
| MECHANIZATION | None |
| DEEP HOLING | None |
| MULCHING | None |
| SOIL RETENTION BARRIERS | None |
| Mounding Techniques: | |
| VERY SMALL MOUNDS | None |
| SMALL MOUNDS | None |
| MOUNDS | None |
| LARGE MOUNDS | None |
| Garden Bed Techniques: | |
| BEDS SQUARE | None |
| BEDS LONG | None |
| Other Features: | |
| FENCES | Very significant |
| STAKING OF CROPS | Minor |
| FALLOW CUT ONTO CROPS | Minor |
| SEASONAL MAIN CROPS | None |
| SEASONAL SEC'DARY CROPS | None |

OTHER DOCUMENTATION**Survey description**

In April 1992, foot traverses south from Kaintiba station to Hapataewa village, and from Bema mission to Kaintiba (2 days); flights from Kaintiba station to Kamina mission, and to Tawa station in Morobe Province.

Boundary definition

The northwestern boundary with System 0209 and the northeastern boundary with System 0212 were based on foot traverses. The southwestern boundary with System 0208 is the watershed between the Tauri and Werr Rivers, and was based on a foot traverse.

Notes

This system is distinguished from System 0209 where fallow vegetation is short woody regrowth, 5-15 years old. It is similar to System 0212, but there banana is less important and composted heaps are used to plant taro and banana. This system is very similar to System 0208 in the Tauri Valley, but it has been distinguished because fallow vegetation is cut onto planted crops there.

There is less pressure on land here than to the north, but people say that crops such as corn cannot be grown unless leaf litter is burnt and the ash spread around before planting. Fallow lengths are typically 25 to 30 years. Fallows are shorter nearer the road, but are not used for major gardens. Settlements and gardens have been concentrated near Kaintiba station and along the bench cut which runs south from the airstrip. Long beds were seen, but their use was restricted to the cultivation of introduced vegetables for market sale. Household gardens are very common. They often include soil tillage, and the use of organic waste as fertilizer. In 1992, DPI tree counts recorded 118,000 mature and 91,000 immature Arabica coffee trees in 920 gardens.

National Nutrition Survey 1982/83

31 families from 2 villages were asked in August 1982 or August 1983 what they had eaten the previous day. 97 per cent reported eating sweet potato, 6 per cent banana, 3 per cent taro, 3 per cent sago, and none yam, Chinese taro, cassava or coconut. 6 per cent reported eating rice. None reported eating fresh fish. This is similar to the crop pattern except for the low consumption of banana.

Main References

None.

Other References

Lemonnier, P. 1982 Les jardins Anga (Nouvelle-Guinée). *Journal d'Agriculture Traditionnelle et de Botanique Appliquée* 29, 3-4, 227-245.

| | | |
|-----------------------------|--|------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 12 | Subsystem No. 1 of 1 |
| Districts 5 Kaintiba | Subsystem Extent 100 % | Area (sq km) 60 |
| Population 1,566 | Population density 26 persons/sq km | Population absent 5 % |

System Summary

Located northeast of Bema mission, extending into the Aseki area of Morobe Province, where most of the system is located. Woody regrowth, thin-stemmed and dense, more than 10 m tall, and older than 15 years, is cleared. Many trees are left standing. Felled trees are cut into pieces and stacked in low heaps all over the garden site. In other places short hurdles, about 3 m long and 1 m tall are constructed, and branches and leaves are heaped over them. The heaps are distinctive. Taro and bananas are planted into and around the lower margins of them. There is very little burning, except for small piles of leaf litter. Vegetables are planted in the ash. Leaves and other material are also spread over the surface as mulch. Sweet potato is the most important crop; other crops are taro, banana and Chinese taro. Sweet potato is planted by dibbling over the whole site and the other crops are planted almost exclusively in the heaps. Highland pitpit is an important vegetable which is intercropped with sweet potato. Only one planting is made before fallowing. Household gardens are common.

Extends across provincial border to System(s) 1233

Altitude range (m) 1400-1900 **Slope** Very steep (>25 degrees)

CROPS

| | |
|---------------------|---|
| STAPLES DOMINANT | Sweet potato |
| STAPLES SUBDOMINANT | None |
| STAPLES PRESENT | Banana, Chinese taro, Sweet potato, Taro (Colocasia) |
| OTHER VEGETABLES | Aibika, Amaranthus spp., Cucumber, Ferns, Highland pitpit, Lowland pitpit, Oenanthe, Pumpkin tips, Rungia, Spring onion |
| FRUITS | Marita pandanus, Sugarcane |
| NUTS | Karuka (planted) |
| NARCOTICS | Betel nut (highland), Betel pepper (highland), 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 | Significant |

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|------------------|-------|
| 1 Animal skins | Minor |
| 2 Coffee Arabica | Minor |

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In October 1991, a road traverse from Wau to Menyamya station via Aseki station; a visit to gardens in the Aseki area (1 day); a visit to gardens near Tawa station (2 hours); and flights from Menyamya to Tawa via Aseki. In Gulf Province in April 1992, a foot traverse from Hauabanga mission to Wempango village, returning to Kaintiba via Bema mission (3 days); a second short visit to Tawa in Morobe Province by air; an aerial reconnaissance of Yaewa mission area, and flights from Kaintiba to Aseki, Aseki to Langimar mission and from Aseki to Wau.

Boundary definition

The boundaries with Systems 1234 and 1226 were determined by a road traverse from Wau to Aseki and Menyamya, and from the air en route from Aseki to Wau; those with System 1229 from visits by air to Tawa mission and Naniwae mission and extrapolated along the watershed. Both the western boundary with System 0209 and the southern boundary with System 0211 in Gulf Province, were based on foot traverses. The southern boundary is also clearly defined by a watershed. Aerial observations were also used, due to the visually distinctive heaps of cut vegetation.

Notes

The use of mulching and heaps of fallow vegetation distinguish this system from nearby systems. This system is distinguished from System 1226 where the cropping interval is longer; from System 1229 where the fallow vegetation is predominantly short woody regrowth and two plantings are made before fallowing; from Systems 1234 and 0211 which are very similar, except that banana is an important crop there; and from System 0209 where fallows are short woody regrowth and fallow periods are shorter.

A number of techniques are used to overcome low soil fertility. Heaps of cut vegetation (some of which are trunks of trees from earlier cultivation) are carefully constructed into a heap over a wooden hurdle, and are used to grow taro and banana. These heaps are called 'wika' in the Aseki language, and 'mui'ge' on the Wempango side of the range in Gulf Province. It is said that taro and banana will not grow satisfactorily unless this is done. On steep slopes the cut vegetation is heaped on the upslope side of the hurdle. Leaf litter is deliberately spread over the garden surface.

Greens are grown only in the ash produced from burning small piles of litter, and the ash from these small fires is also sometimes placed around sweet potato plants. Household gardens are fertilized with organic waste. Highland pitpit is planted at least as densely as sweet potato, which is planted by dibbling, with no mounding. Fences are common.

The Morobe part of the system is connected by road to Menyamya and to Bulolo, Wau and Lae. Small amounts of Arabica coffee were being sold to a cooperative at Aseki in 1992. Small amounts of cash are earned selling food in local markets. A nutrition survey conducted in June 1980 found the most common foods offered for sale in the Aseki market were sweet potato, banana, betel nut and mandarins. In 1980 coffee was being sold in small amounts (Eng 1980).

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

Levett, M.P., C. Davies, P. Kokoa, K. Kalit, D.J. Dockery, H.J. Itagau, J.W. Kerage, G. Geroro, M. Kavir and F. Milala 1988 Multisectoral rapid rural appraisal of Ivore-Swanson Census Division in Kaintiba District of Gulf Province, 18 November to 5 December, 1986. Technical Report 88/1, Department of Agriculture and Livestock, Port Moresby.

Other References

Eng, J. 1980 Observations during a nutrition survey of children under seven years of age in Aseki sub-district, Menyamya district, Morobe Province, June 27-30, 1980. Unpublished report, Nutrition Section, Department of Health, Port Moresby.

Lemonnier, P. 1982 Les jardins Anga (Nouvelle-Guinée). *Journal d'Agriculture Traditionnelle et de Botanique Appliquée* 29, 3-4, 227-245.

Levett, M.P. In press. A comparative study of gardening systems in two mountainous census divisions of Kaintiba District, Gulf Province. Yagl-Ambu.

| | | |
|-----------------------------|---|-------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 13 | Subsystem No. 1 of 1 |
| Districts 6 Malalaua | Subsystem Extent 100 % | Area (sq km) 777 |
| Population 889 | Population density 1 persons/sq km | Population absent 11 % |

System Summary

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

Extends across provincial border to System(s) 0301-1238

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

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

| | |
|--------------|-------------|
| 1 Betel nut | Significant |
| 2 Fresh food | Minor |

OTHER AGRONOMIC PRACTICES

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

OTHER DOCUMENTATION**Survey description**

In May 1992, a boat traverse on the Tauri River (route Malalaua-Moveave-Putei-Tarapo) in May 1992; meetings at Karai, Mirivare and Piria settlements (all probably part of Nemanu village), and Putei village; 17 gardens visited (2 days).

Boundary definition

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

Notes

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

Agriculture and settlement is located along the rivers. Banana and sweet potato are grown in gardens cleared from tall woody fallows on river bank levees. There has been population movement in recent decades toward the middle Tauri River, from both the up-river area and from the lower reaches. Although the altitude range is 40-1000 m, the typical range for settlement and agriculture in the system is a much more restricted 40-100 m. Hunting (pig, wallaby, cassowary, flying fox) is important; as is fishing for those with river access.

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

Betel nut is the major source of cash income and is sold in Port Moresby. The trade started in about 1980 when the road from Central Province was extended to Iokea station in Gulf Province. Some fresh food (bananas, sweet potato, greens) is sold to coastal villagers in System 0201.

National Nutrition Survey 1982/83

19 families from 2 villages were asked in December 1982 what they had eaten the previous day. 84 per cent reported eating sago, 79 per cent banana, 42 per cent sweet potato, 5 per cent cassava and none Chinese taro, taro, coconut or yam. 21 per cent reported eating rice. 21 per cent reported eating fresh fish. This is similar to the crop pattern except for the high consumption of sago.

Main References

None.

Other References

None.

| | | |
|-----------------------------|---|-------------------------------|
| PROVINCE 2 Gulf | AGRICULTURAL SYSTEM No. 14 | Subsystem No. 1 of 1 |
| Districts 6 Malalaua | Subsystem Extent 100 % | Area (sq km) 5 |
| Population 573 | Population density 115 persons/sq km | Population absent 16 % |

System Summary

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

Extends across provincial border to System(s) 0302

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

CROPS

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

FALLOW & CROPPING PERIOD

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

GARDEN SEGREGATION

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

SOIL FERTILITY MAINTENANCE

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

CASH EARNING ACTIVITIES

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

OTHER AGRONOMIC PRACTICES

| | |
|-------------------------------|------------------|
| 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 | Minor |
| FALLOW CUT ONTO CROPS | None |
| SEASONAL MAIN CROPS | Significant |
| SEASONAL SEC'DARY CROPS | Significant |

OTHER DOCUMENTATION**Survey description**

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

Boundary definition

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

Notes

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

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

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

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

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

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

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

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

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

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

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

National Nutrition Survey 1982/83

No villages from this system were included in the survey.

Main References

None.

Other References

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

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.

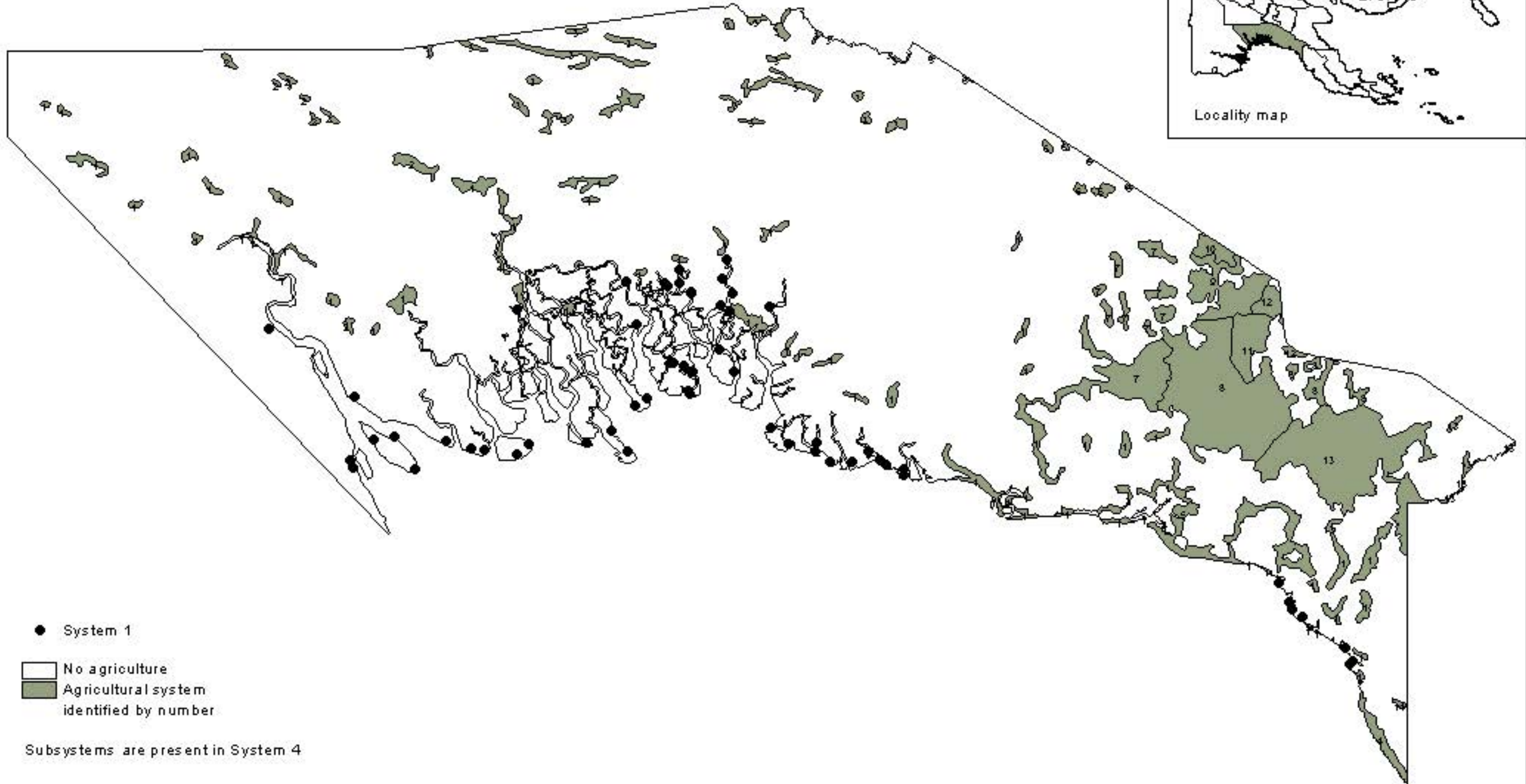
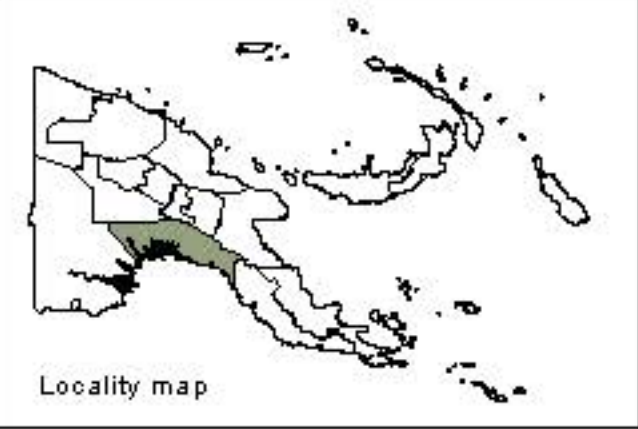
| Map title | Notes |
|--------------------------------------|---|
| 1. Agricultural Systems | Boundaries and identification numbers (eg. 1 = System 1401). See key for subsystem occurrences. |
| 2. Fallow vegetation | The vegetation cleared from garden sites at the beginning of a new period of cultivation (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. |

GULF PROVINCE Agricultural Systems

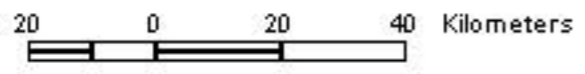
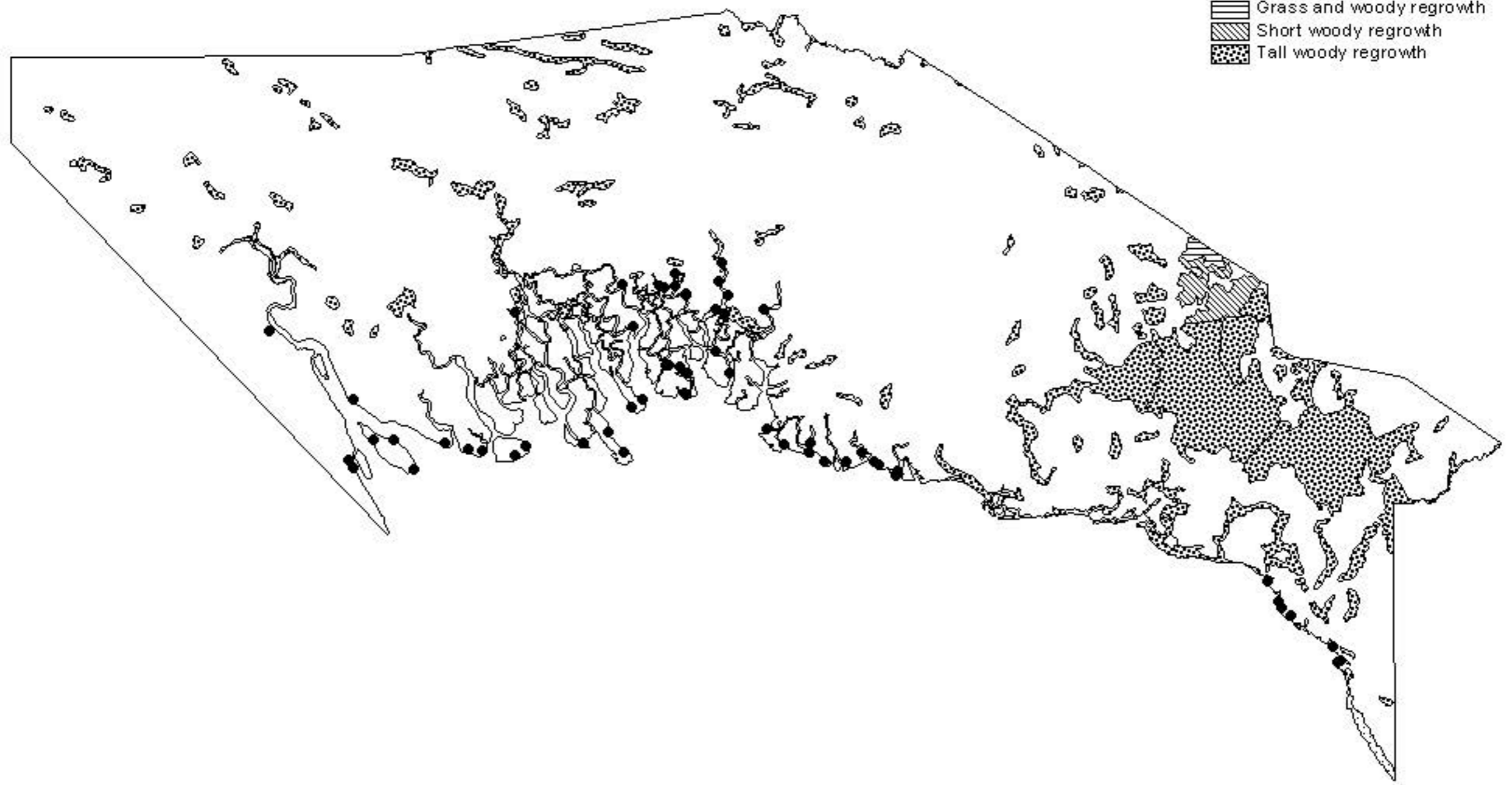


30 0 30 60 Kilometers

GULF PROVINCE

Fallow Vegetation

- Tall woody regrowth
- ▨ Short grass
- ▧ Grass and woody regrowth
- ▩ Short woody regrowth
- ▤ Tall woody regrowth



GULF PROVINCE

Long fallow period

● Greater than 15 years

▨ Greater than 15 years

▩ 5-15 years

▬ Long fallow not used



20 0 20 40 Kilometers

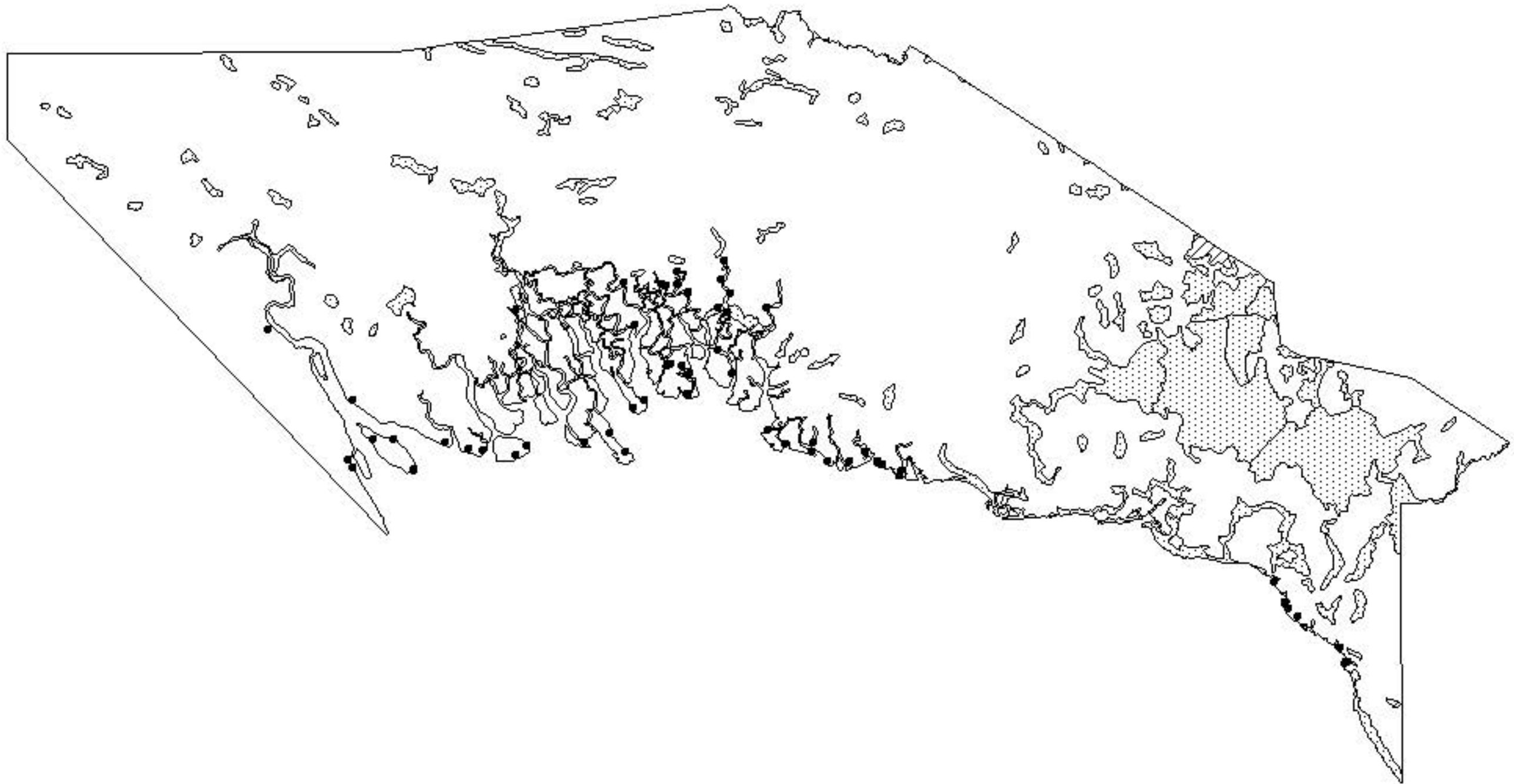
GULF PROVINCE

Number of plantings before fallow

● One planting only

▨ One planting only

▧ Two plantings



20 0 20 40 Kilometers

GULF PROVINCE

Intensity of land use

Ratio of cropping period to fallow period

• Very Low

▨ Very Low

▭ Low

▨ Medium

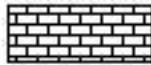

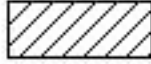

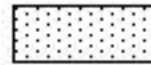

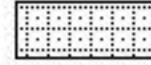
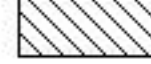

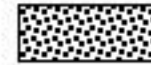

▨ High



20 0 20 40 Kilometers

GULF PROVINCE

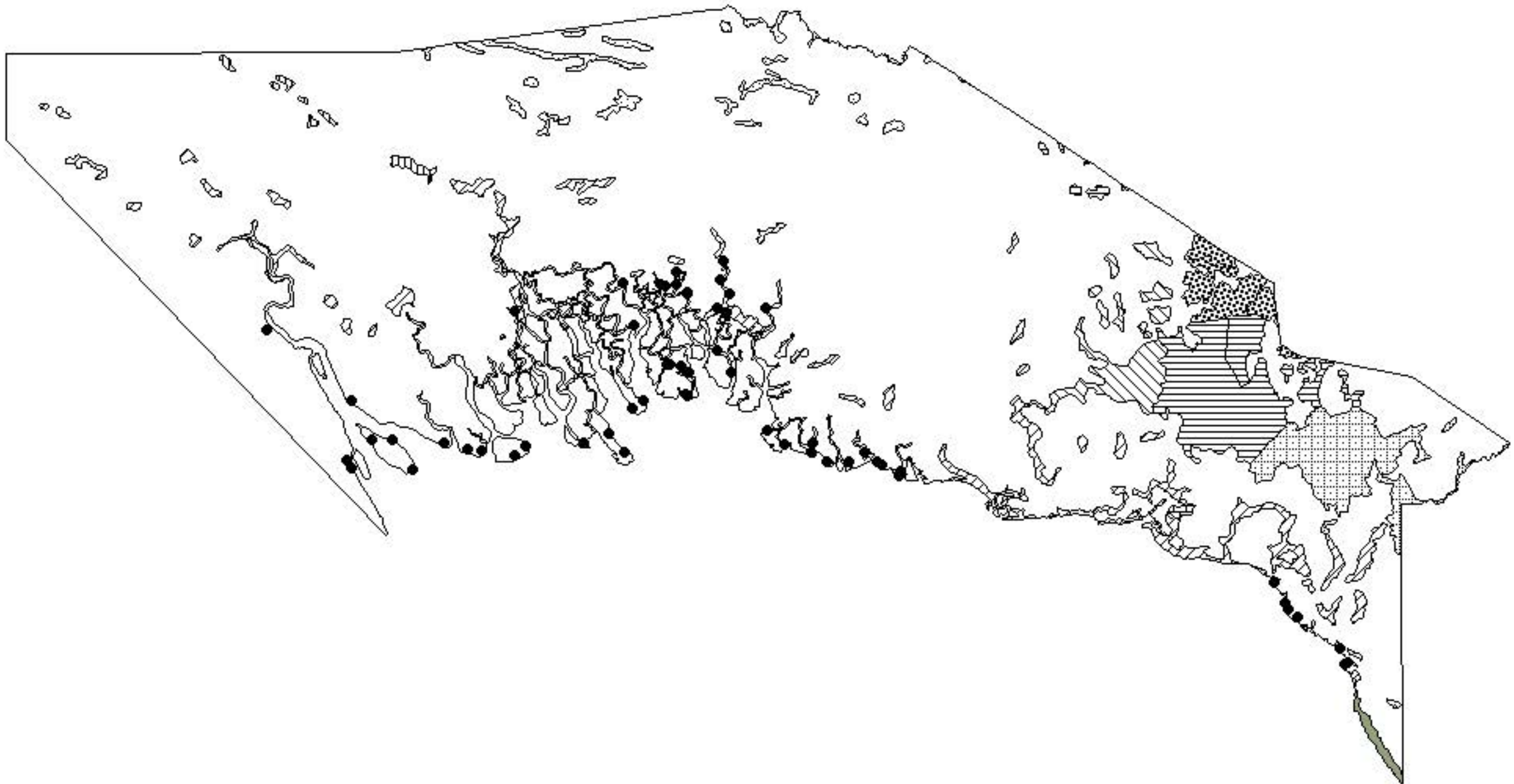
Crop combinations

| | Most important crops | Important crops |
|---|----------------------|--|
|  | None | Banana/Chinese taro/coconut/sweet potato |
|  | Sago | Banana |
|  | Sago | Banana/coconut |
|  | Sago | Banana/coconut |
|  | Sago/sweet potato | Chinese taro |
|  | Banana | Coconut |
|  | Banana/sweet potato | None |
|  | Banana/sweet potato | Chinese taro |
|  | Banana | Sweet potato/taro |
|  | Sweet potato | None |
|  | Sweet potato | Banana |

GULF PROVINCE

Crop combinations

Legend on facing page

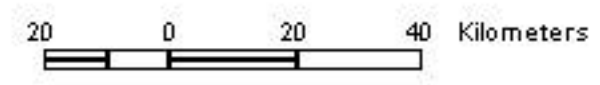
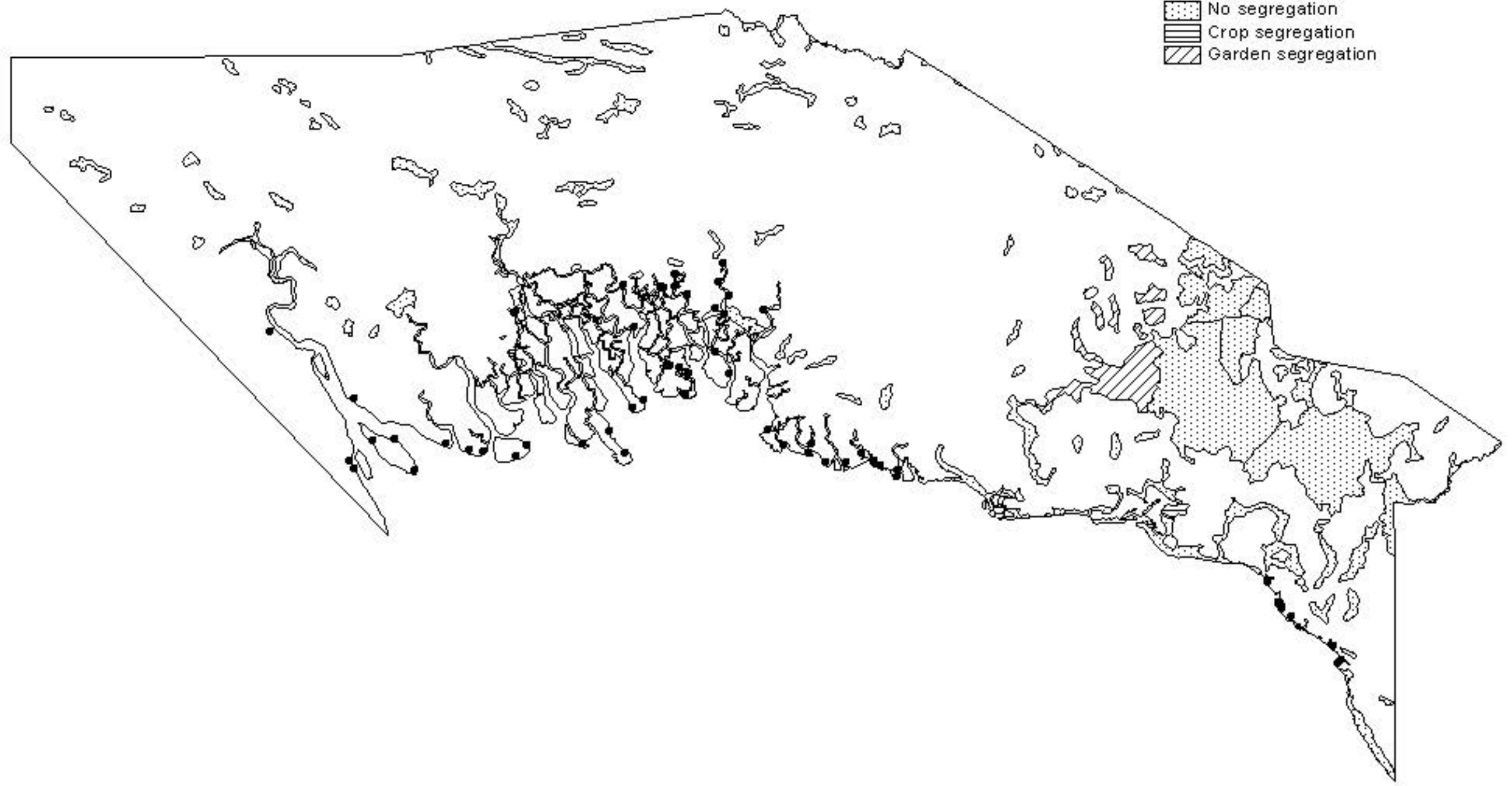


20 0 20 40 Kilometers

GULF PROVINCE

Garden and crop segregation

- No segregation
- ▨ No segregation
- ▨ Crop segregation
- ▨ Garden segregation



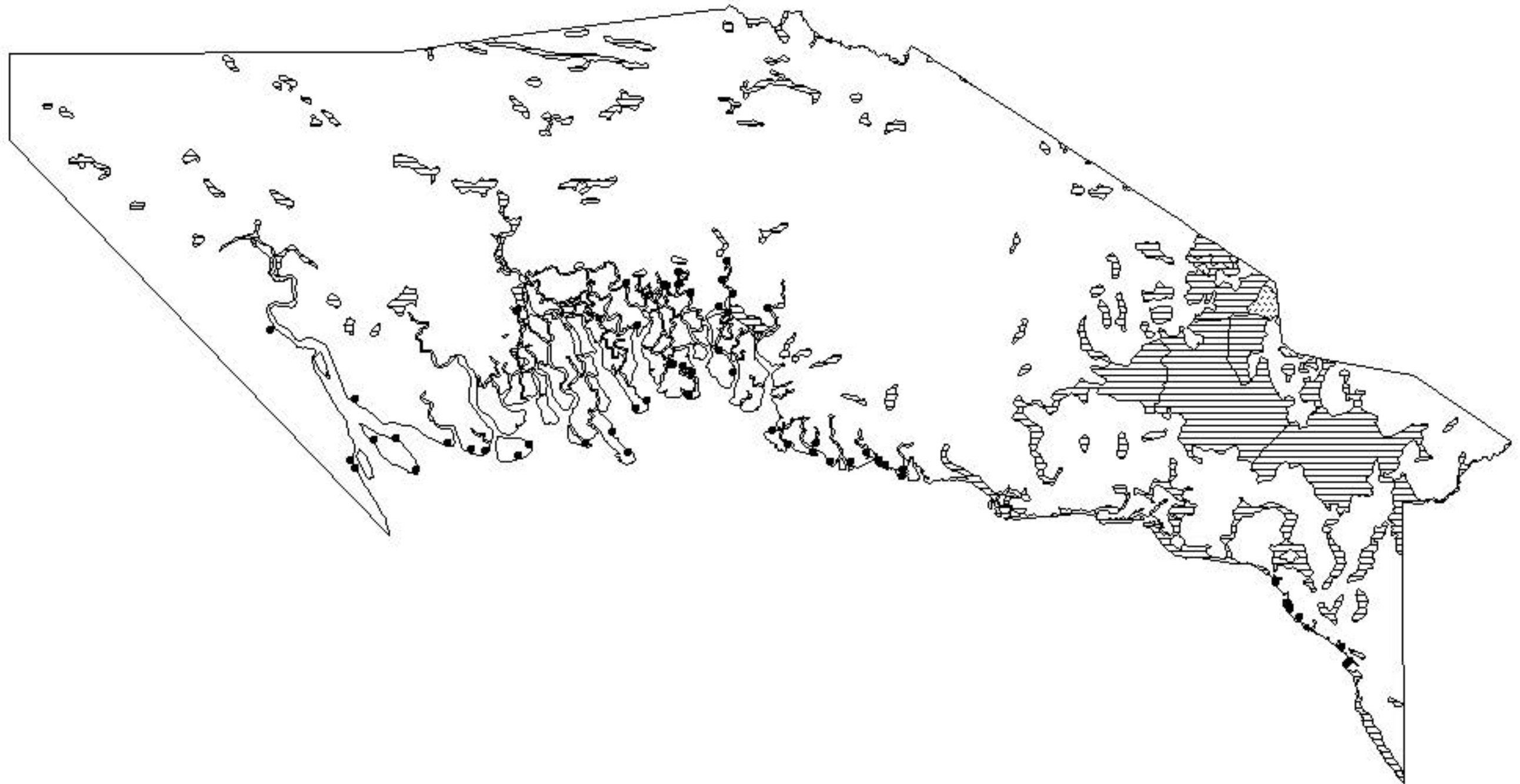
GULF PROVINCE

Soil fertility maintenance

● No technique

▨ No technique

▩ Mulch

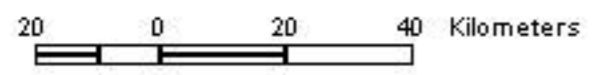
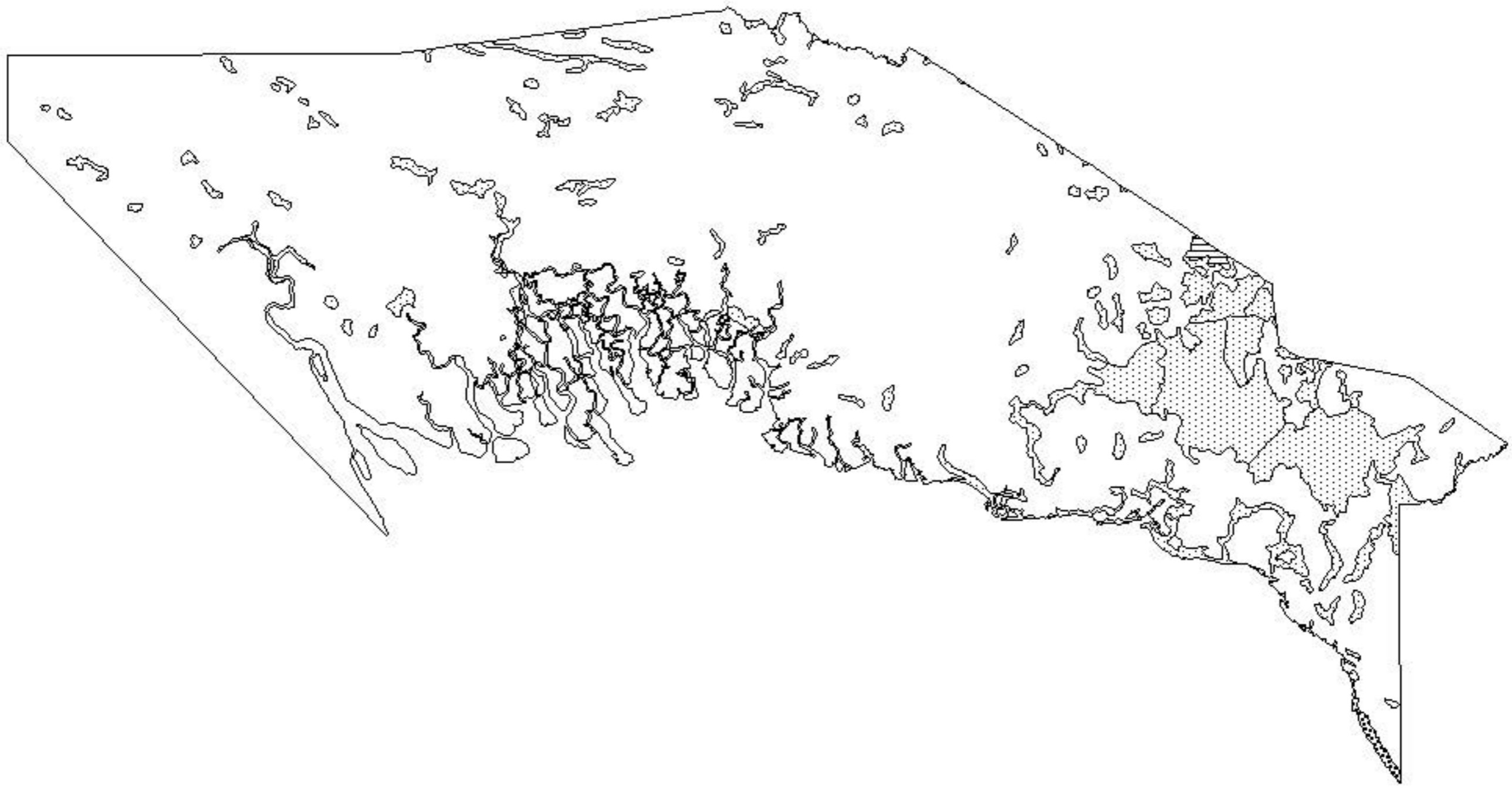


20 0 20 40 Kilometers

GULF PROVINCE

Soil tillage

- None
- Minor/insignificant
- Very significant



GULF PROVINCE

Fallow clearing practices

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

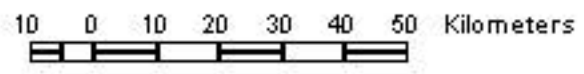
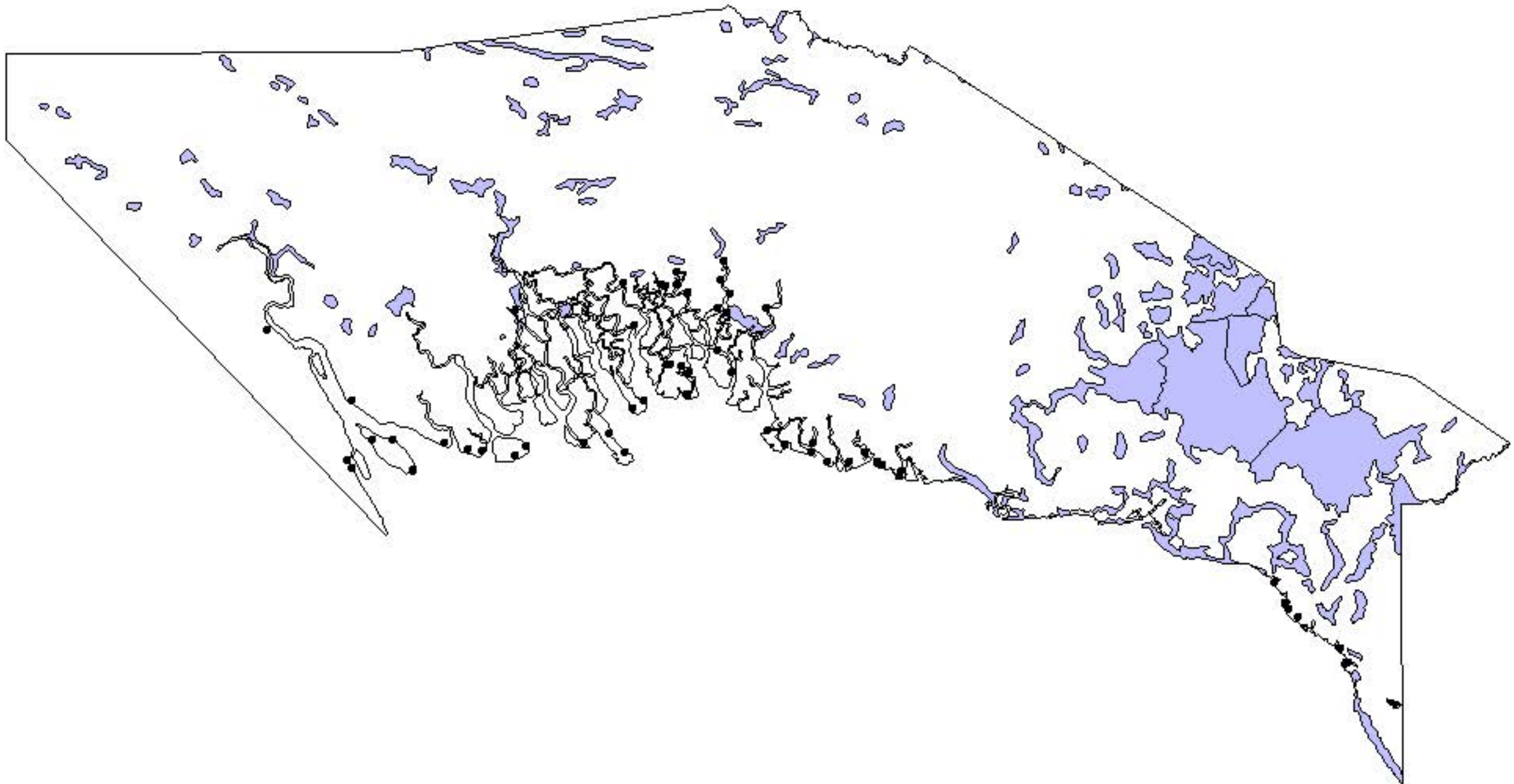


20 0 20 40 Kilometers

GULF PROVINCE

Soil mounds and beds

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

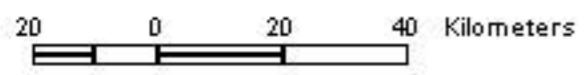
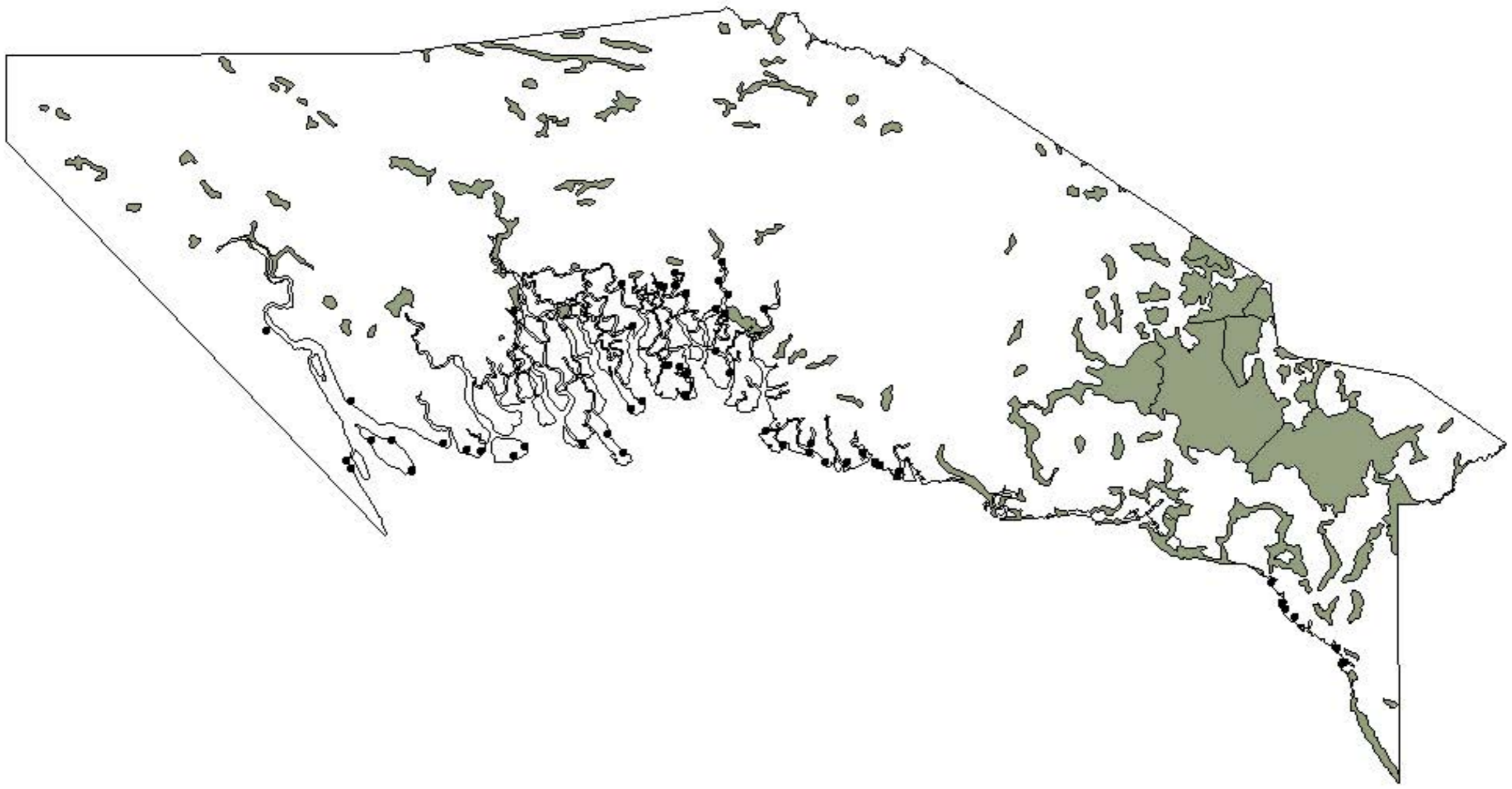


GULF PROVINCE

Water management techniques

● No water control

■ No water control



GULF PROVINCE

Cash income activities

- Betel nut
- ▨ No significant cash income
- ▧ Betel nut
- Betel nut, fresh food



20 0 20 40 Kilometers

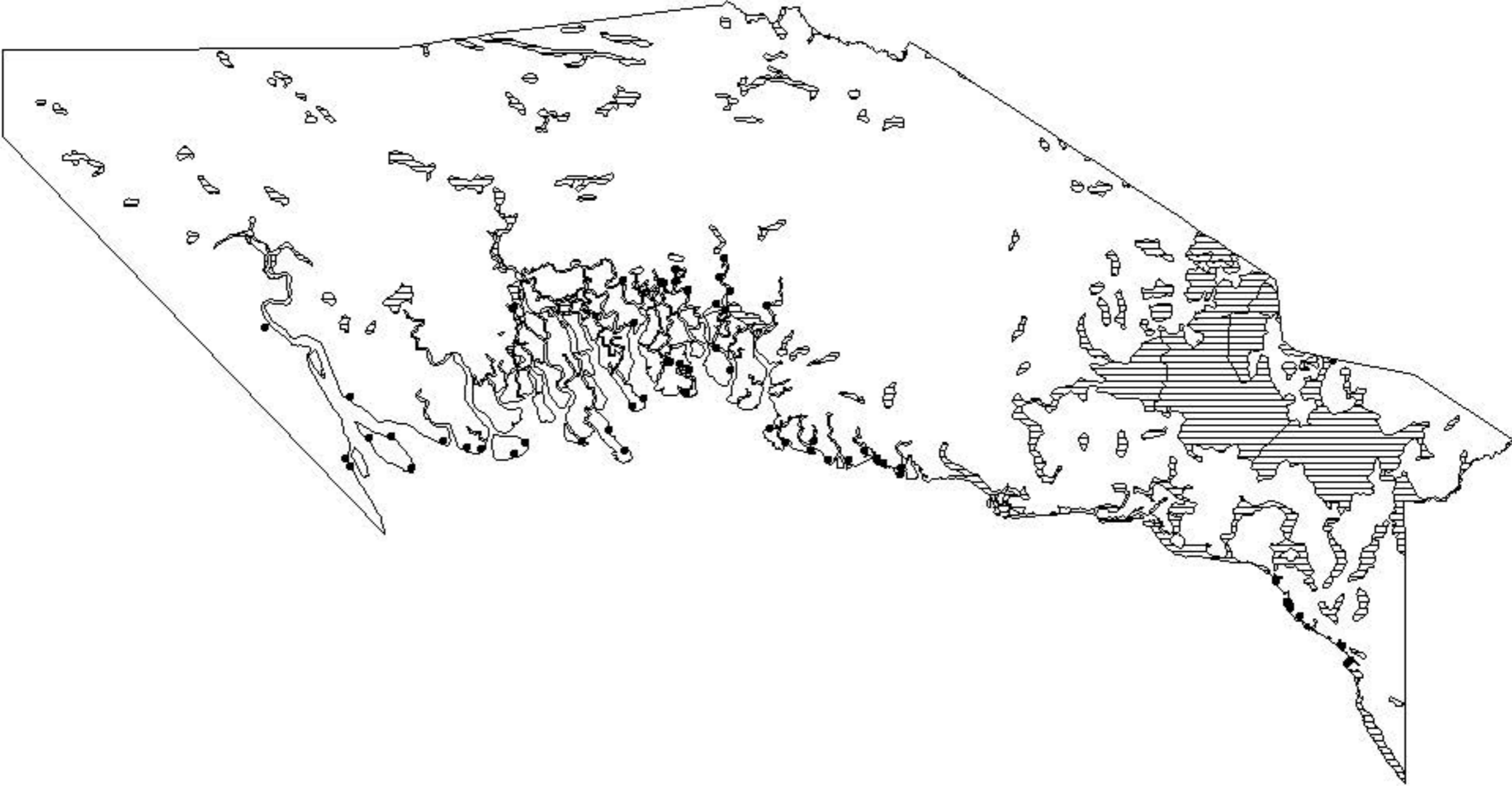
GULF PROVINCE

Seasonality of main food crops

● No seasonal planting

▨ No seasonal planting

▩ Planted seasonally



20 0 20 40 Kilometers

GULF PROVINCE

Population density

Persons per square kilometre

● below 10

▨ below 10

▨ 10 - 24

▨ 25 - 49

▨ 50 - 74

▨ 75 - 99

▨ above 99

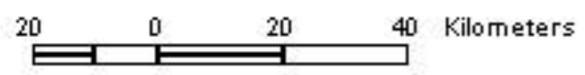


20 0 20 40 Kilometers

GULF PROVINCE

Population absent

- above 19
- ▨ below 5
- ▨ 5-9
- ▨ 10-14
- ▨ 15-19
- ▨ above 19



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: 02 Gulf**

| System | Sub sys | No. of subsys | Subsys extent | Same sys oth prov | Districts | Census Divisions |
|--------|---------|---------------|---------------|-------------------|-----------|-------------------------------------|
| 201 | 1 | 1 | 4 | | 1-2-3-4-6 | 01-02-03-04-05-06-07-08-09-11-12-13 |
| 202 | 1 | 1 | 4 | 0710 | 1 | 03 |
| 203 | 1 | 1 | 4 | 0723-1012 | 1-2 | 04-10 |
| 204 | 1 | 2 | 3 | 0303 | 6 | 30 |
| 204 | 2 | 2 | 1 | 0303 | 6 | 30 |
| 205 | 1 | 1 | 4 | | 4 | 26 |
| 206 | 1 | 1 | 4 | 1011-1114 | 2-3-5 | 10-20-21 |
| 207 | 1 | 1 | 4 | | 5 | 17-20-25 |
| 208 | 1 | 1 | 4 | 1234 | 4-5 | 20-21-23-24-25-28 |
| 209 | 1 | 1 | 4 | | 5 | 21-22 |
| 210 | 1 | 1 | 4 | 1229 | 5 | 21 |
| 211 | 1 | 1 | 4 | | 5 | 22-23 |
| 212 | 1 | 1 | 4 | 1233 | 5 | 22 |
| 213 | 1 | 1 | 4 | 0301-1238 | 6 | 28 |
| 214 | 1 | 1 | 4 | 0302 | 6 | 30 |

KEY

Subsys Subsystem
 Same sys Same system in
 oth prov other province

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 02 Gulf

| System | Sub sys | Area km ² | Population | | | Altitude range m | | Slope | Fallows | | |
|--------|---------|----------------------|------------|-----|-----|------------------|------|-------|---------|-----|-----|
| | | | Total | Abs | Den | Low | High | | Veg | Sht | Per |
| 201 | 1 | 9783 | 34724 | 35 | 4 | 5 | 50 | 2 | 5 | 0 | 3 |
| 202 | 1 | 756 | 321 | 2 | 1 | 10 | 500 | 1 | 5 | 0 | 3 |
| 203 | 1 | 300 | 1014 | 22 | 3 | 100 | 1100 | 5 | 5 | 0 | 3 |
| 204 | 1 | 53 | 1673 | 56 | 32 | 0 | 100 | 2 | 1 | 0 | 2 |
| 204 | 2 | 0 | 0 | 0 | 0 | 0 | 100 | 2 | 5 | 0 | 2 |
| 205 | 1 | 20 | 435 | 0 | 22 | 40 | 80 | 2 | 5 | 0 | 2 |
| 206 | 1 | 33 | 0 | 0 | 0 | 400 | 2000 | 5 | 5 | 0 | 3 |
| 207 | 1 | 416 | 1291 | 4 | 3 | 200 | 1400 | 3 | 5 | 0 | 3 |
| 208 | 1 | 902 | 6439 | 7 | 7 | 500 | 1000 | 4 | 5 | 0 | 3 |
| 209 | 1 | 216 | 5474 | 4 | 25 | 1200 | 2000 | 3 | 4 | 0 | 2 |
| 210 | 1 | 51 | 588 | 4 | 12 | 900 | 2000 | 3 | 3 | 0 | 2 |
| 211 | 1 | 131 | 1049 | 4 | 8 | 600 | 1000 | 4 | 5 | 0 | 3 |
| 212 | 1 | 60 | 1566 | 5 | 26 | 1400 | 1900 | 4 | 5 | 0 | 3 |
| 213 | 1 | 777 | 889 | 11 | 1 | 40 | 1000 | 2 | 5 | 0 | 3 |
| 214 | 1 | 5 | 573 | 16 | 115 | 10 | 20 | 1 | 5 | 0 | 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: 02 Gulf

| System | Sub sys | Staple crops | | | Narcotic crops |
|--------|---------|--------------|-------------|-------------------------------|----------------|
| | | Most import | Important | Present | |
| 201 | 1 | 09 | 02-06 | 02-04-05-06-09-11-13 | 2-4-5 |
| 202 | 1 | 09 | 02 | 02-05-09-11-13 | 2-4-5 |
| 203 | 1 | 09-11 | 05 | 02-04-05-09-11-13-14 | 1-3-5 |
| 204 | 1 | 02 | 06 | 02-04-06-09-11-15-18-19 | 2-4 |
| 204 | 2 | 02 | 06 | 02-04-06-09-11-15-18-19 | 2-4 |
| 205 | 1 | 00 | 02-05-06-11 | 02-04-05-06-09-11 | 2-4 |
| 206 | 1 | 11 | 02 | 02-11-13-14 | 5 |
| 207 | 1 | 02-11 | 05 | 02-05-11-13 | 2-4-5 |
| 208 | 1 | 11 | 02 | 02-04-05-09-11-13-14 | 2-4-5 |
| 209 | 1 | 11 | 00 | 02-04-05-08-11-13 | 1-3-5 |
| 210 | 1 | 11 | 00 | 02-05-08-11-13-14 | 1-3-5 |
| 211 | 1 | 11 | 02 | 02-04-05-09-11-13 | 2-4-5 |
| 212 | 1 | 11 | 00 | 02-05-11-13 | 1-3-5 |
| 213 | 1 | 02-11 | 00 | 02-04-05-09-11-13 | 2-4-5 |
| 214 | 1 | 02 | 11-13 | 02-04-05-09-11-12-13-14-15-17 | 2-4-5 |

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 02 Gulf

| System | Sub sys | Vegetable crops | Fruit crops | Nut crops |
|--------|---------|-------------------------------|-------------------------|-------------|
| 201 | 1 | 01-02-09-10-16-20-21-23-27-36 | 05-07-09-12-13-15-17-23 | 01-10 |
| 202 | 1 | 01-02-13-15-16-20-21-23-35-36 | 05-07-08-12-13-15-23 | 01-04-10-13 |
| 203 | 1 | 16-13-22-01-23-09-03-10-21-08 | 08-12-13-15 | 01-10-11 |
| 204 | 1 | 01-09-16-23-27 | 07-09-12-13-17-23 | 01 |
| 204 | 2 | 01-09-10-16-27 | 07-09-12-13-17-23 | 01 |
| 205 | 1 | 01-09-16-21-23 -27 | 07-09-12-13-15-23 | 01-10 |
| 206 | 1 | 03-05-09-10-13-20-21 | 08-15 | 01-08-09 |
| 207 | 1 | 01-08-09-11-13-16-18-20-21-22 | 08-12-13-15 | 01-10-11 |
| 208 | 1 | 01-03-13-15-16-18-21-22-23 | 01-08-09-12-13-15 | 01-10 |
| 209 | 1 | 05-09-11-13-15-16-18-22 | 08-09-13-15 | 08 |
| 210 | 1 | 02-03-05-07-09-10-13-16-17-28 | 08-09-11-15 | 08-09 |
| 211 | 1 | 01-03-05-06-08-13-15-16-26 | 01-08-15 | 01-10 |
| 212 | 1 | 01-02-10-11-13-16-18-21-22-28 | 08-15 | 08 |
| 213 | 1 | 01-09-10-11-15-16-20-21-23 | 08-12-13-15-17 | 01-04-10 |
| 214 | 1 | 01-09-10-15-21-23-27 | 07-08-09-12-13-15-17 | 01-04-10 |

KEY

Subsys Subsystem

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 02 Gulf

| System | Sub sys | Segregation | | Crop Seq | Gard types | | Soil fertility maintenance techniques | | | | | | | |
|--------|---------|-------------|-----|----------|------------|------|---------------------------------------|-----|-----|-----|-----|-----|-----|---|
| | | Gar | Crp | | Mix | H'ld | Leg | Tre | Com | Man | Isl | Sil | Fer | |
| 201 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 202 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 203 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 205 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 206 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 207 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 208 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 209 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 210 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 211 | 1 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 212 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 213 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 214 | 1 | 0 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

KEY

Subsys Subsystem

Segregation

Gar Garden

Crp Crop

Crop seq Crop sequences

Gard types Garden types

Mix Mixed vegetable gardens

H'ld Household gardens

Soil fertility maintenance techniques

Leg Legume rotation

Tre Planted tree fallow

Com Compost

Man Animal manure

Isl Island bed

Sil Silt from floods

Fer Inorganic fertilizer

AGRICULTURAL SYSTEM DATA LISTING - CODES

Province: 02 Gulf

| System | Sub sys | Management techniques | | | | | | | | | | | |
|--------|---------|-----------------------|-----|------|------|-----|-----|-----|-----|--------|-----|-------|-----|
| | | Water | | Soil | | | | | | Fallow | | Other | |
| | | Irr | Drn | Pig | Till | Hol | Bar | Mul | Mec | Brn | Cut | Fen | Stk |
| 201 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| 202 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 |
| 203 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 1 |
| 204 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 |
| 204 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| 205 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| 206 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 1 |
| 207 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 |
| 208 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 |
| 209 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 1 |
| 210 | 1 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 1 |
| 211 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 |
| 212 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 0 |
| 213 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 |
| 214 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 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: 02 Gulf

| System | Sub sys | Management techniques | | | | | | Crop planting seasonality | | Cropping intensity | R value |
|--------|---------|-----------------------|----|----|-----|-------------|----|---------------------------|-----|--------------------|---------|
| | | Soil mounds | | | | Garden beds | | Maj | Min | | |
| | | Vsm | Sm | Md | Lge | Sq | Lg | | | | |
| 201 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 202 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 203 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 204 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 29 |
| 204 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 28 |
| 205 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 206 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 207 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 208 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 209 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 210 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 17 |
| 211 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 212 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| 213 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 9 |
| 214 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 20 |

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: 02 Gulf

| System | Sub sys | Cash income sources | | | | | | | | | | | |
|--------|---------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | An | Bet | Crd | Cat | Chi | Coc | Cnt | CfA | CfR | Crc | Fwd | Fsh |
| 201 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 202 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 203 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 205 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 206 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 207 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 208 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 209 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 210 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 211 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 212 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 213 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 214 | 1 | 0 | 3 | 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: 02 Gulf

| System | Sub sys | Cash income sources | | | | | | | | | | |
|--------|---------|---------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | Fod | Op | Pot | Pyr | Ric | Rub | Shp | Tea | Tob | Ot1 | Ot2 |
| 201 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 202 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 203 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 204 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 205 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 206 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 207 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 208 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 209 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 210 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 211 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 212 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 213 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 214 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 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: 02 Gulf

| 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 |
| 201 | 1 | 05 92 | - | 4 | RMB | 05 92 | - | 4 | RLH | - - | - | - | |
| 202 | 1 | 05 92 | - | 2 | RLH | - - | - | - | - - | - | - | - | |
| 203 | 1 | 06 89 | - | 1 | RMB | 05 92 | - | 1 | RLH | 05 93 | - | 2 | MPL |
| 204 | 1 | 05 92 | - | 3 | RMB | 08 95 | - | 2 | TN | - - | - | - | |
| 204 | 2 | 05 92 | - | 3 | RMB | 08 95 | - | 3 | TN | - - | - | - | |
| 205 | 1 | 05 92 | - | 2 | RMB | - - | - | - | - - | - | - | - | |
| 206 | 1 | 08 82 | - | 1 | RMB | 11 90 | - | 1 | RMB | - - | - | - | |
| 207 | 1 | 08 80 | - | 3 | RMB | - - | - | - | - - | - | - | - | |
| 208 | 1 | 03 81 | - | 4 | BJA | 04 92 | - | 3 | BJA | - - | - | - | |
| 209 | 1 | 10 91 | - | 2 | GS | 04 92 | - | 3 | BJA | - - | - | - | |
| 210 | 1 | 10 91 | - | 3 | A/S | 04 92 | - | 1 | BJA | - - | - | - | |
| 211 | 1 | 04 92 | - | 2 | BJA | - - | - | - | - - | - | - | - | |
| 212 | 1 | 10 91 | - | 2 | BJA | 04 92 | - | 3 | BJA | - - | - | - | |
| 213 | 1 | 05 92 | - | 3 | RMB | - - | - | - | - - | - | - | - | |
| 214 | 1 | 08 95 | - | 3 | BJA | - - | - | - | - - | - | - | - | |

KEY

| | | | |
|--------|-------------------|-----|---------------------|
| Subsys | Subsystem | A/S | B. J. Allen/G.Sem |
| | | BJA | B. J. Allen |
| | | GS | G. Sem |
| Sv tp | Survey type | H/W | R.L. Hide/M. Woruba |
| | | MPL | M.P. Levett |
| Sv in | Surveyor initials | RMB | R.M. Bourke |
| | | RLH | R.L. Hide |
| | | TN | T. Nen |

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

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

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

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

Abbreviations used are:

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

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 2 Gulf

| Village | Population | System | Village | Population | System |
|--------------------------------|------------|--------|---------------------------------|------------|--------|
| DISTRICT 1 Kikori | | | 7 MINOGOIRAVI | 191 | 0201 |
| Division 1 Upper Turama | | | 8 WAITARI | 116 | 0201 |
| 2 HAIVARO | 94 | 0201 | 9 WOWOBO | 168 | 0201 |
| 3 KOUMAIO | 297 | 0201 | 10 UBOU | 208 | 0201 |
| 4 MOKA | 141 | 0201 | Division 8 Urama | | |
| 6 SUMAKARIMO | 96 | 0201 | 1 AIBIGAI | 100 | 0201 |
| Division 2 Lower Turama | | | 2 DAIMAIBARI | 25 | 0201 |
| 1 DADEBI | 35 | 0201 | 3 GAURI | 67 | 0201 |
| 2 EKEIRAU | 48 | 0201 | 5 KINOMERE | 152 | 0201 |
| 3 EREHEHE | 58 | 0201 | 6 KIVAUMAI 1 | 120 | 0201 |
| 4 GIBU 1 | 47 | 0201 | 7 KIVAUMAI 2 | 175 | 0201 |
| 5 GIBU 2 | 27 | 0201 | 8 LARIMIA | 135 | 0201 |
| 6 HARAGU | 51 | 0201 | 9 MAIRIPEPA | 79 | 0201 |
| 7 KESEMUBA MEAGIO | 56 | 0201 | 11 MORAVAMU | 78 | 0201 |
| 8 MISIKI | 116 | 0201 | 12 OMAUMERE | 57 | 0201 |
| 9 SARAGI | 92 | 0201 | 13 VERAIBARI | 124 | 0201 |
| Division 3 Ikobi-Kairi | | | DISTRICT 2 Baimuru | | |
| 1 BAINA | 151 | 0201 | Division 9 Era | | |
| 2 GIBIDAI | 95 | 0201 | 1 AIMEI | 92 | 0201 |
| 3 KAIAM | 321 | 0202 | 2 AUREI | 79 | 0201 |
| 4 KIBENI | 135 | 0201 | 3 ERA MAIPUA | 181 | 0201 |
| 5 OMATI | 344 | 0201 | 4 GIGORI | 76 | 0201 |
| Division 4 Pepike | | | 5 GOIRAVI | 6 | 0201 |
| 1 FARU | 131 | 0203 | 6 IMEIA | 53 | 0201 |
| 2 KARE | 40 | 0201 | 7 NAHOROMERE | 85 | 0201 |
| 3 NEGEBARE | 71 | 0203 | 8 VEIAMU | 16 | 0201 |
| 4 SENADU NEGATARE | 65 | 0203 | Division 10 Upper-Purari | | |
| 5 SERA | 45 | 0203 | 3 POROI NO1 | 64 | 0203 |
| 6 SURI | 13 | 0203 | 4 POROI NO2 | 72 | 0203 |
| 7 TEKARAPOU | 38 | 0203 | 7 WABO/LURI | 226 | 0203 |
| 8 TETRABARE | 120 | 0203 | Division 11 Baimuru | | |
| 9 TOBARE | 91 | 0203 | 1 AMEPOKE | 131 | 0201 |
| 10 TREBESARE WIMA | 31 | 0203 | 2 BEKORO | 126 | 0201 |
| 11 URINITE | 47 | 0203 | 3 KARARAU | 363 | 0201 |
| Division 5 Kikori-Kairi | | | 4 RAVIPAKA | 100 | 0201 |
| 1 IRIMUKU | 81 | 0201 | Division 12 Baroi | | |
| 2 KAUBERAU | 100 | 0201 | 1 AKIARAVI | 183 | 0201 |
| 3 KOPI | 218 | 0201 | 2 KOROVAKE | 234 | 0201 |
| 4 MORERE | 65 | 0201 | 3 ORAVI | 87 | 0201 |
| 5 OGOMOBU | 79 | 0201 | Division 13 Koriki | | |
| 6 WAIRA | 56 | 0201 | 1 AKOMA | 305 | 0201 |
| Division 6 Goaribari | | | 2 ARAIAVA | 353 | 0201 |
| 1 AI'D'IO | 30 | 0201 | 3 IKINU | 100 | 0201 |
| 2 AVIOVA/APEOA | 144 | 0201 | 4 KINIBO | 343 | 0201 |
| 3 BABAGUINA | 209 | 0201 | 5 KAIARAVI | 51 | 0201 |
| 4 BISI | 151 | 0201 | 6 KAIRIMAI | 167 | 0201 |
| 5 DOIBO | 105 | 0201 | Division 14 Kaimari | | |
| 6 DOPIMA | 41 | 0201 | 1 MARIKI | 428 | 0201 |
| 7 ERO | 446 | 0201 | 2 MIRIMAILAU | 108 | 0201 |
| 8 GOARI | 53 | 0201 | 3 VARIA | 259 | 0201 |
| 9 KAMAPU'U | 69 | 0201 | Division 15 Iare | | |
| 10 KEMEI | 70 | 0201 | 1 AIKAVARAVI | 248 | 0201 |
| 11 SAMOA | 97 | 0201 | 2 ERAVA | 61 | 0201 |
| 12 TIPEOWO | 113 | 0201 | 3 MAIPENAIRU | 225 | 0201 |
| Division 7 Gope | | | 4 OKAIKENAIRU | 102 | 0201 |
| 1 EPEGAU | 61 | 0201 | 5 RAVIKAUPARA NO2 | 329 | 0201 |
| 2 GIPI MEAGOMA | 469 | 0201 | 6 RAVIKIVAU NO1 | 132 | 0201 |
| 3 HOMOBAVI | 155 | 0201 | Division 16 Maipua | | |
| 4 BURI | 100 | 0201 | 1 APIOPE | 72 | 0201 |
| 5 TETEHUI | 76 | 0201 | 2 AIVEI | 75 | 0201 |
| 6 TOVEI | 133 | 0201 | | | |

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 2 Gulf

| Village | Population | System | Village | Population | System |
|---------------------------------------|------------|--------|----------------------------------|------------|--------|
| 3 AUMU | 176 | 0201 | 16 LOVEHOHO | 146 | 0201 |
| 4 KAPAI 1 | 50 | 0201 | 17 OPA | 77 | 0201 |
| 5 KAPAI 2 | 152 | 0201 | 18 OPULARIA | 162 | 0201 |
| DISTRICT 3 Ihu | | | 19 OVA'A | 121 | 0201 |
| Division 17 Upper Vailala | | | 20 OVAHUHU | 172 | 0201 |
| 1 AKOURA | 19 | 0201 | 21 PEKOE | 53 | 0201 |
| 2 HEAWA | 81 | 0201 | 22 POIVA | 81 | 0201 |
| 4 HEPEA | 76 | 0201 | 23 VAILALA EAST 1 | 188 | 0201 |
| 6 IORI | 72 | 0201 | 24 VAILALA EAST 2 | 293 | 0201 |
| 7 KAIRAVA | 21 | 0201 | 25 AKAPIRU | 135 | 0201 |
| 8 KEKA | 28 | 0201 | DISTRICT 4 Kerema | | |
| 9 KOKO | 16 | 0207 | Division 25 Kaberope | | |
| 10 LOHIKI | 52 | 0207 | 2 IWANGENI | 87 | 0201 |
| 11 MAIRAVA | 73 | 0201 | 3 IVANA-WAIYA | 46 | 0201 |
| 12 NAKORO | 25 | 0201 | 4 M'BAUYU | 215 | 0208 |
| 13 PAKU | 18 | 0201 | 5 ONDA | 23 | 0208 |
| Division 18 West Coast Vailala | | | 6 PAINGOBA | 263 | 0207 |
| 1 AREHAVVA | 60 | 0201 | 7 PUTAIA | 123 | 0207 |
| 2 AUMA | 83 | 0201 | 8 TIMBAINGAWA | 188 | 0208 |
| 3 AVAVU | 107 | 0201 | 9 TOVIA | 144 | 0207 |
| 4 ERE | 81 | 0201 | 10 UDOWA | 78 | 0207 |
| 5 HAIARI | 81 | 0201 | 11 WAMDE | 52 | 0208 |
| 6 HARELALEVA | 238 | 0201 | 12 WOTAPAIYU | 99 | 0201 |
| 7 HAREVAVO | 324 | 0201 | 13 AMINAUWA | 81 | 0208 |
| 8 HARUAPE | 118 | 0201 | Division 26 Karema Bay | | |
| 9 HEREKERA | 130 | 0201 | 1 AMUIPI | 113 | 0201 |
| 10 HOHORO | 38 | 0201 | 2 HAUPOE | 117 | 0201 |
| 11 HOPAIKU | 157 | 0201 | 3 HAVIHUHU | 106 | 0201 |
| 12 HURUTA | 88 | 0201 | 4 HEVAVIRI | 67 | 0201 |
| 13 IOKU | 194 | 0201 | 5 ILOVAPARE | 70 | 0201 |
| 14 KAIYAKAVU | 313 | 0201 | 6 KANAKAMDI | 50 | 0201 |
| 15 KAVAVA | 366 | 0201 | 7 KAPIRI | 206 | 0201 |
| 16 KILAVI | 107 | 0201 | 9 LAPARI | 116 | 0201 |
| 17 LARIAU | 145 | 0201 | 10 LOU | 112 | 0201 |
| 18 HURURU | 87 | 0201 | 11 LOVELA | 22 | 0201 |
| 19 MAIVA | 117 | 0201 | 14 MEI'1 | 247 | 0201 |
| 20 MAREA | 212 | 0201 | 15 MEI'2 | 305 | 0201 |
| 21 MIAE | 53 | 0201 | 16 MIRAKERA | 195 | 0201 |
| 22 PAEVERA | 197 | 0201 | 17 NAMOHOROI | 103 | 0201 |
| 23 PAKOVAVU | 192 | 0201 | 18 PETOI | 82 | 0201 |
| 24 VAILALA HILOI | 121 | 0201 | 19 SORI | 35 | 0201 |
| 25 VAILALA KUKIPI | 63 | 0201 | 21 UARIPI | 252 | 0201 |
| 26 VAILALA WEST | 43 | 0201 | 22 URIRI | 186 | 0201 |
| 29 LARIHAIRU | 217 | 0201 | 502 MURUA SETTLEMENT | 435 | 0205 |
| Division 19 East Coast Vailala | | | DISTRICT 5 Kaintiba | | |
| 1 AIVAU | 138 | 0201 | Division 20 Ivore Swanson | | |
| 2 ARURUHU | 29 | 0201 | 2 BU'U | 114 | 0207 |
| 3 BELEPA | 97 | 0201 | 3 FAMBA | 193 | 0208 |
| 4 EPEMEAVO | 93 | 0201 | 4 IOKWA | 180 | 0207 |
| 5 HARONA | 180 | 0201 | 5 MENU | 172 | 0207 |
| 6 HEREHERE | 197 | 0201 | 6 PIO | 140 | 0208 |
| 7 HILOI | 138 | 0201 | 7 TAMDEKENGO | 15 | 0208 |
| 8 HIRU | 63 | 0201 | 8 WAGI | 149 | 0207 |
| 9 IORI | 267 | 0201 | Division 21 Wentia | | |
| 10 KAROKARO | 122 | 0201 | 1 EPANANGO | 145 | 0209 |
| 11 KEAKEA | 193 | 0201 | 2 EWAINYA | 122 | 0209 |
| 12 KOIALAHU | 155 | 0201 | 4 IOMBA | 287 | 0208 |
| 13 LAKOVU | 56 | 0201 | 5 KANABEA | 486 | 0208 |
| 14 LEPOKERA | 286 | 0201 | 6 KOMAKO | 632 | 0209 |
| 15 LUI | 138 | 0201 | | | |

6.1 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN CENSUS ORDER

Province: 2 Gulf

| Village | Population | System | Village | Population | System |
|----------------------------|------------|--------|----------------------------|------------|--------|
| 7 KOPI'WAWA | 242 | 0208 | 8 SILO 2 | 267 | 0201 |
| 8 KWAIYU | 308 | 0209 | 9 TITIKAINI | 62 | 0201 |
| 9 KWEMGA | 196 | 0209 | 10 TOARE | 108 | 0201 |
| 10 MENEMANGO | 1053 | 0209 | 11 UAMAI 1 | 584 | 0201 |
| 11 MEMEWA | 476 | 0209 | 12 UAMAI 2 | 359 | 0201 |
| 951 HARLINGI | 223 | 0210 | 13 KARAMA NO.2 | 446 | 0201 |
| 952 LAGAI | 365 | 0210 | Division 28 Kovio | | |
| Division 22 Hamdei | | | 1 KEREMAHUA | 70 | 0213 |
| 2 DAKOTA | 63 | 0211 | 2 KOKORO | 110 | 0213 |
| 3 EWAU | 208 | 0209 | 3 KOTAI | 95 | 0213 |
| 4 HAMBIA | 148 | 0209 | 4 MIRIMAS | 95 | 0213 |
| 5 HAMDEI | 234 | 0212 | 5 NENAMO | 272 | 0213 |
| 6 HAUABANGA | 492 | 0209 | 6 OKAVAI | 150 | 0213 |
| 7 HUWAWIAR | 199 | 0209 | 7 PARATA | 17 | 0213 |
| 8 IEMEPANGO | 236 | 0209 | 8 PUTEI | 80 | 0213 |
| 9 KAINGO | 275 | 0209 | 9 URULAU | 68 | 0201 |
| 10 KARANGIA | 76 | 0209 | 951 KAKIVA | 126 | 0208 |
| 11 KWOI'AMUNGA | 241 | 0209 | 952 KUKIHE | 69 | 0208 |
| 12 MINE | 405 | 0212 | 953 SAMMANGGWEPA | 82 | 0208 |
| 13 TETAMANGA | 524 | 0209 | 954 UYEIWATA | 239 | 0208 |
| 14 WEMPANGO | 478 | 0212 | 955 WANDI | 137 | 0208 |
| 15 WIMGA | 216 | 0212 | Division 29 Toaripi | | |
| 16 YABONA | 233 | 0212 | 1 HAMUHAMU | 284 | 0201 |
| 17 YAKITANGWA | 252 | 0211 | 2 HEATOARE | 697 | 0201 |
| 18 IAUYETEBU | 129 | 0211 | 3 HEVALA | 1297 | 0201 |
| 21 ATA | 143 | 0209 | 4 ISAPEAPE | 168 | 0201 |
| Division 23 Weiabi | | | 5 KAISAVA | 53 | 0201 |
| 1 HAPAITAMANGA | 113 | 0208 | 6 KUKIPI | 267 | 0201 |
| 2 HAPATAEWA | 209 | 0211 | 7 LALAFURU | 202 | 0201 |
| 3 IKOSE | 125 | 0211 | 8 LALAPIPI | 216 | 0201 |
| 4 MAMBAINYA | 36 | 0211 | 9 LELEFIRU | 356 | 0201 |
| 5 NANGONAI | 119 | 0208 | 10 LULUAPO | 505 | 0201 |
| 6 PALENGAUWA | 155 | 0211 | 11 MAREKEA | 138 | 0201 |
| 8 WEYAWA | 80 | 0211 | 12 MIKAFIRU | 244 | 0201 |
| Division 24 Hangoia | | | 13 MIRIVASE | 201 | 0201 |
| 1 HAWAKABIA | 172 | 0208 | 14 SAVAIVIRI | 297 | 0201 |
| 2 IKOAKE | 124 | 0208 | 15 TAPALA | 247 | 0201 |
| 3 IVANDU | 293 | 0208 | 16 TERAPO | 291 | 0201 |
| 4 KOTIDANGA | 563 | 0208 | 17 URITAI | 547 | 0201 |
| 5 KOTOMBAIWA | 153 | 0208 | Division 30 Moripi | | |
| 6 MAIWOKATA | 160 | 0208 | 1 IOKEA | 782 | 0204 |
| 7 MEIWARI | 232 | 0208 | 2 LAUIRAVA | 79 | 0204 |
| 8 MERAPO | 205 | 0208 | 3 LAUROVO | 109 | 0204 |
| 9 MUTUA | 67 | 0208 | 4 LESE AVIHARA | 453 | 0201 |
| 10 PAINA | 205 | 0208 | 5 LESE ILAVA | 176 | 0201 |
| 11 TIAWA | 134 | 0208 | 6 LESE KAVORA | 290 | 0201 |
| 12 TITIKAMINA | 212 | 0208 | 7 LESE OALAI | 330 | 0201 |
| 13 UKUMINA | 157 | 0208 | 8 MIARU | 646 | 0201 |
| 14 WAUWA | 88 | 0208 | 9 MIRAPO | 87 | 0204 |
| 15 YANKI-DANGA | 64 | 0208 | 10 MORIO | 191 | 0204 |
| 16 M'BEIWI | 191 | 0208 | 11 ROVE | 137 | 0204 |
| 17 MOIWA | 612 | 0208 | 12 SAROTA | 246 | 0204 |
| DISTRICT 6 Malalaua | | | 951 MEAURI | 42 | 0204 |
| Division 27 Kaipi | | | 952 APANAIPi OR AFAGAIFI | 573 | 0214 |
| 1 ELAVA | 220 | 0201 | | | |
| 2 IPAKOTA | 65 | 0201 | | | |
| 3 KARAMA 1 | 333 | 0201 | | | |
| 4 KOARU | 423 | 0201 | | | |
| 6 PUKARI | 695 | 0201 | | | |
| 7 SILO 1 | 261 | 0201 | | | |

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 2 Gulf

| Village | Dist | Div | Unit | System | Village | Dist | Div | Unit | System |
|----------------------|------|-----|------|--------|--------------|------|-----|------|--------|
| AI'D'IO | 1 | 6 | 1 | 0201 | GOARI | 1 | 6 | 8 | 0201 |
| AIBIGAI | 1 | 8 | 1 | 0201 | GOIRAVI | 2 | 9 | 5 | 0201 |
| AIKAVARAVI | 2 | 15 | 1 | 0201 | | | | | |
| AIMEI | 2 | 9 | 1 | 0201 | HAIARI | 3 | 18 | 5 | 0201 |
| AIVAU | 3 | 19 | 1 | 0201 | HAIVARO | 1 | 1 | 2 | 0201 |
| AIVEI | 2 | 16 | 2 | 0201 | HAMBIA | 5 | 22 | 4 | 0209 |
| AKAPIRU | 3 | 19 | 25 | 0201 | HAMDEI | 5 | 22 | 5 | 0212 |
| AKIARAVI | 2 | 12 | 1 | 0201 | HAMUHAMU | 6 | 29 | 1 | 0201 |
| AKOMA | 2 | 13 | 1 | 0201 | HAPAITAMANGA | 5 | 23 | 1 | 0208 |
| AKOURA | 3 | 17 | 1 | 0201 | HAPATAEWA | 5 | 23 | 2 | 0211 |
| AMEPOKE | 2 | 11 | 1 | 0201 | HARAGU | 1 | 2 | 6 | 0201 |
| AMINAUWA | 4 | 25 | 13 | 0208 | HARELALEVA | 3 | 18 | 6 | 0201 |
| AMUIPI | 4 | 26 | 1 | 0201 | HAREVAVO | 3 | 18 | 7 | 0201 |
| APANAIPI OR AFAGAIFI | 6 | 30 | 952 | 0214 | HARLINGI | 5 | 21 | 951 | 0210 |
| APIOPE | 2 | 16 | 1 | 0201 | HARONA | 3 | 19 | 5 | 0201 |
| ARAIAVA | 2 | 13 | 2 | 0201 | HARUAPE | 3 | 18 | 8 | 0201 |
| AREHAVA | 3 | 18 | 1 | 0201 | HAUABANGA | 5 | 22 | 6 | 0209 |
| ARURUHU | 3 | 19 | 2 | 0201 | HAUPOE | 4 | 26 | 2 | 0201 |
| ATA | 5 | 22 | 21 | 0209 | HAVIHUHU | 4 | 26 | 3 | 0201 |
| AUMA | 3 | 18 | 2 | 0201 | HAWAKABIA | 5 | 24 | 1 | 0208 |
| AUMU | 2 | 16 | 3 | 0201 | HEATOARE | 6 | 29 | 2 | 0201 |
| AUREI | 2 | 9 | 2 | 0201 | HEAVALA | 6 | 29 | 3 | 0201 |
| AVAVU | 3 | 18 | 3 | 0201 | HEAWA | 3 | 17 | 2 | 0201 |
| AVIOVA/APEOA | 1 | 6 | 2 | 0201 | HEPEA | 3 | 17 | 4 | 0201 |
| | | | | | HEREHERE | 3 | 19 | 6 | 0201 |
| BABAGUINA | 1 | 6 | 3 | 0201 | HEREKERA | 3 | 18 | 9 | 0201 |
| BAINA | 1 | 3 | 1 | 0201 | HEVAVIRI | 4 | 26 | 4 | 0201 |
| BEKORO | 2 | 11 | 2 | 0201 | HILOI | 3 | 19 | 7 | 0201 |
| BELEPA | 3 | 19 | 3 | 0201 | HIRU | 3 | 19 | 8 | 0201 |
| BISI | 1 | 6 | 4 | 0201 | HOHORO | 3 | 18 | 10 | 0201 |
| BU'U | 5 | 20 | 2 | 0207 | HOMOBAVI | 1 | 7 | 3 | 0201 |
| BURI | 1 | 7 | 4 | 0201 | HOPAIKU | 3 | 18 | 11 | 0201 |
| | | | | | HURURU | 3 | 18 | 18 | 0201 |
| DADEBI | 1 | 2 | 1 | 0201 | HURUTA | 3 | 18 | 12 | 0201 |
| DAIMAIBARI | 1 | 8 | 2 | 0201 | HUWAWIAR | 5 | 22 | 7 | 0209 |
| DAKOTA | 5 | 22 | 2 | 0211 | | | | | |
| DOIBO | 1 | 6 | 5 | 0201 | IAUYETEBU | 5 | 22 | 18 | 0211 |
| DOPIMA | 1 | 6 | 6 | 0201 | IEMEPANGO | 5 | 22 | 8 | 0209 |
| | | | | | IKINU | 2 | 13 | 3 | 0201 |
| EKEIRAU | 1 | 2 | 2 | 0201 | IKOAKE | 5 | 24 | 2 | 0208 |
| ELAVA | 6 | 27 | 1 | 0201 | IKOSE | 5 | 23 | 3 | 0211 |
| EPANANGO | 5 | 21 | 1 | 0209 | ILOVAPARE | 4 | 26 | 5 | 0201 |
| EPEGAU | 1 | 7 | 1 | 0201 | IMEIA | 2 | 9 | 6 | 0201 |
| EPEMEAVO | 3 | 19 | 4 | 0201 | IOKEA | 6 | 30 | 1 | 0204 |
| ERA MAIPUA | 2 | 9 | 3 | 0201 | IOKU | 3 | 18 | 13 | 0201 |
| ERAVA | 2 | 15 | 2 | 0201 | IOKWA | 5 | 20 | 4 | 0207 |
| ERE | 3 | 18 | 4 | 0201 | IOMBA | 5 | 21 | 4 | 0208 |
| EREHEHE | 1 | 2 | 3 | 0201 | IORI | 3 | 17 | 6 | 0201 |
| ERO | 1 | 6 | 7 | 0201 | IORI | 3 | 19 | 9 | 0201 |
| EWAINYA | 5 | 21 | 2 | 0209 | IPAKOTA | 6 | 27 | 2 | 0201 |
| EWAU | 5 | 22 | 3 | 0209 | IRIMUKU | 1 | 5 | 1 | 0201 |
| | | | | | ISAPEAPE | 6 | 29 | 4 | 0201 |
| FAMBA | 5 | 20 | 3 | 0208 | IVANA-WAIYA | 4 | 25 | 3 | 0201 |
| FARU | 1 | 4 | 1 | 0203 | IVANDU | 5 | 24 | 3 | 0208 |
| | | | | | IWANGENI | 4 | 25 | 2 | 0201 |
| GAURI | 1 | 8 | 3 | 0201 | | | | | |
| GIBIDAI | 1 | 3 | 2 | 0201 | KAIAM | 1 | 3 | 3 | 0202 |
| GIBU 1 | 1 | 2 | 4 | 0201 | KAIARAVI | 2 | 13 | 5 | 0201 |
| GIBU 2 | 1 | 2 | 5 | 0201 | KAINGO | 5 | 22 | 9 | 0209 |
| GIGORI | 2 | 9 | 4 | 0201 | KAIRAVA | 3 | 17 | 7 | 0201 |
| GIPI MEAGOMA | 1 | 7 | 2 | 0201 | KAIRIMAI | 2 | 13 | 6 | 0201 |

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 2 Gulf

| Village | Dist | Div | Unit | System | Village | Dist | Div | Unit | System |
|-----------------|------|-----|------|--------|------------------|------|-----|------|--------|
| KAISAVA | 6 | 29 | 5 | 0201 | LESE OALAI | 6 | 30 | 7 | 0201 |
| KAIVAKAVU | 3 | 18 | 14 | 0201 | LOHIKI | 3 | 17 | 10 | 0207 |
| KAKIVA | 6 | 28 | 951 | 0208 | LOU | 4 | 26 | 10 | 0201 |
| KAMAPU'U | 1 | 6 | 9 | 0201 | LOVEHOHO | 3 | 19 | 16 | 0201 |
| KANABEA | 5 | 21 | 5 | 0208 | LOVELA | 4 | 26 | 11 | 0201 |
| KANAKAMDI | 4 | 26 | 6 | 0201 | LUI | 3 | 19 | 15 | 0201 |
| KAPAI 1 | 2 | 16 | 4 | 0201 | LULUAPO | 6 | 29 | 10 | 0201 |
| KAPAI 2 | 2 | 16 | 5 | 0201 | | | | | |
| KAPIRI | 4 | 26 | 7 | 0201 | M'BAUYU | 4 | 25 | 4 | 0208 |
| KARAMA 1 | 6 | 27 | 3 | 0201 | M'BEIWI | 5 | 24 | 16 | 0208 |
| KARAMA NO.2 | 6 | 27 | 13 | 0201 | MAIPENAIRU | 2 | 15 | 3 | 0201 |
| KARANGIA | 5 | 22 | 10 | 0209 | MAIRAVA | 3 | 17 | 11 | 0201 |
| KARARAU | 2 | 11 | 3 | 0201 | MAIRIPEPA | 1 | 8 | 9 | 0201 |
| KARE | 1 | 4 | 2 | 0201 | MAIVA | 3 | 18 | 19 | 0201 |
| KAROKARO | 3 | 19 | 10 | 0201 | MAIWOKATA | 5 | 24 | 6 | 0208 |
| KAUBERAU | 1 | 5 | 2 | 0201 | MAMBAINYA | 5 | 23 | 4 | 0211 |
| KAVAVA | 3 | 18 | 15 | 0201 | MAREA | 3 | 18 | 20 | 0201 |
| KEAKEA | 3 | 19 | 11 | 0201 | MAREKEA | 6 | 29 | 11 | 0201 |
| KEKA | 3 | 17 | 8 | 0201 | MARIKI | 2 | 14 | 1 | 0201 |
| KEMEI | 1 | 6 | 10 | 0201 | MEAURI | 6 | 30 | 951 | 0204 |
| KEREMAHUAU | 6 | 28 | 1 | 0213 | MEI' 1 | 4 | 26 | 14 | 0201 |
| KESEMUBA MEAGIO | 1 | 2 | 7 | 0201 | MEI' 2 | 4 | 26 | 15 | 0201 |
| KIBENI | 1 | 3 | 4 | 0201 | MEIWARI | 5 | 24 | 7 | 0208 |
| KILAVI | 3 | 18 | 16 | 0201 | MEMEWA | 5 | 21 | 11 | 0209 |
| KINIBO | 2 | 13 | 4 | 0201 | MENEMANGO | 5 | 21 | 10 | 0209 |
| KINOMERE | 1 | 8 | 5 | 0201 | MENU | 5 | 20 | 5 | 0207 |
| KIVAUMAI 1 | 1 | 8 | 6 | 0201 | MERAPO | 5 | 24 | 8 | 0208 |
| KIVAUMAI 2 | 1 | 8 | 7 | 0201 | MIAE | 3 | 18 | 21 | 0201 |
| KOARU | 6 | 27 | 4 | 0201 | MIARU | 6 | 30 | 8 | 0201 |
| KOIALAHU | 3 | 19 | 12 | 0201 | MIKAFIRU | 6 | 29 | 12 | 0201 |
| KOKO | 3 | 17 | 9 | 0207 | MINE | 5 | 22 | 12 | 0212 |
| KOKORO | 6 | 28 | 2 | 0213 | MINOGOIRAVI | 1 | 7 | 7 | 0201 |
| KOMAKO | 5 | 21 | 6 | 0209 | MIRAKERA | 4 | 26 | 16 | 0201 |
| KOPI | 1 | 5 | 3 | 0201 | MIRAPO | 6 | 30 | 9 | 0204 |
| KOPI'WAWA | 5 | 21 | 7 | 0208 | MIRIMAILAU | 2 | 14 | 2 | 0201 |
| KOROVAKE | 2 | 12 | 2 | 0201 | MIRIMAS | 6 | 28 | 4 | 0213 |
| KOTAI | 6 | 28 | 3 | 0213 | MIRIVASE | 6 | 29 | 13 | 0201 |
| KOTIDANGA | 5 | 24 | 4 | 0208 | MISIKI | 1 | 2 | 8 | 0201 |
| KOTOMBAIWA | 5 | 24 | 5 | 0208 | MOIWA | 5 | 24 | 17 | 0208 |
| KOUMAIO | 1 | 1 | 3 | 0201 | MOKA | 1 | 1 | 4 | 0201 |
| KUKIHE | 6 | 28 | 952 | 0208 | MORAVAMU | 1 | 8 | 11 | 0201 |
| KUKIPI | 6 | 29 | 6 | 0201 | MORERE | 1 | 5 | 4 | 0201 |
| KWAIYU | 5 | 21 | 8 | 0209 | MORIO | 6 | 30 | 10 | 0204 |
| KWEMGA | 5 | 21 | 9 | 0209 | MURUA SETTLEMENT | 4 | 26 | 502 | 0205 |
| KWOI'AMUNGA | 5 | 22 | 11 | 0209 | MUTUA | 5 | 24 | 9 | 0208 |
| | | | | | | | | | |
| LAGAI | 5 | 21 | 952 | 0210 | NAHOROMERE | 2 | 9 | 7 | 0201 |
| LAKOVU | 3 | 19 | 13 | 0201 | NAKORO | 3 | 17 | 12 | 0201 |
| LALAFURU | 6 | 29 | 7 | 0201 | NAMOHOROI | 4 | 26 | 17 | 0201 |
| LALAPIPI | 6 | 29 | 8 | 0201 | NANGONAI | 5 | 23 | 5 | 0208 |
| LAPARI | 4 | 26 | 9 | 0201 | NEGEBARE | 1 | 4 | 3 | 0203 |
| LARIAU | 3 | 18 | 17 | 0201 | NENAMO | 6 | 28 | 5 | 0213 |
| LARIHAIRU | 3 | 18 | 29 | 0201 | | | | | |
| LARIMIA | 1 | 8 | 8 | 0201 | OGOMOBU | 1 | 5 | 5 | 0201 |
| LAUIRAVA | 6 | 30 | 2 | 0204 | OKAIKENAIRU | 2 | 15 | 4 | 0201 |
| LAUROVO | 6 | 30 | 3 | 0204 | OKAVAI | 6 | 28 | 6 | 0213 |
| LELEFIRU | 6 | 29 | 9 | 0201 | OMATI | 1 | 3 | 5 | 0201 |
| LEPOKERA | 3 | 19 | 14 | 0201 | OMAUMERE | 1 | 8 | 12 | 0201 |
| LESE AVIHARA | 6 | 30 | 4 | 0201 | ONDA | 4 | 25 | 5 | 0208 |
| LESE ILAVA | 6 | 30 | 5 | 0201 | OPA | 3 | 19 | 17 | 0201 |
| LESE KAVORA | 6 | 30 | 6 | 0201 | OPULARIA | 3 | 19 | 18 | 0201 |

6.2 RURAL VILLAGES WITH AGRICULTURAL SYSTEM NUMBERS IN ALPHABETICAL ORDER

Province: 2 Gulf

| Village | Dist | Div | Unit | System | Village | Dist | Div | Unit | System |
|-----------------|------|-----|------|--------|----------------|------|-----|------|--------|
| ORAVI | 2 | 12 | 3 | 0201 | UDOWA | 4 | 25 | 10 | 0207 |
| OVA'A | 3 | 19 | 19 | 0201 | UKUMINA | 5 | 24 | 13 | 0208 |
| OVAHUHU | 3 | 19 | 20 | 0201 | URINITE | 1 | 4 | 11 | 0203 |
| PAEVERA | 3 | 18 | 22 | 0201 | URIRI | 4 | 26 | 22 | 0201 |
| PAINA | 5 | 24 | 10 | 0208 | URITAI | 6 | 29 | 17 | 0201 |
| PAINGOBA | 4 | 25 | 6 | 0207 | URULAU | 6 | 28 | 9 | 0201 |
| PAKOVAVU | 3 | 18 | 23 | 0201 | UYEIWATA | 6 | 28 | 954 | 0208 |
| PAKU | 3 | 17 | 13 | 0201 | VAILALA EAST 1 | 3 | 19 | 23 | 0201 |
| PALENGAUWA | 5 | 23 | 6 | 0211 | VAILALA EAST 2 | 3 | 19 | 24 | 0201 |
| PARATA | 6 | 28 | 7 | 0213 | VAILALA HILOI | 3 | 18 | 24 | 0201 |
| PEKOE | 3 | 19 | 21 | 0201 | VAILALA KUKIPI | 3 | 18 | 25 | 0201 |
| PETOI | 4 | 26 | 18 | 0201 | VAILALA WEST | 3 | 18 | 26 | 0201 |
| PIO | 5 | 20 | 6 | 0208 | VARIA | 2 | 14 | 3 | 0201 |
| POIVA | 3 | 19 | 22 | 0201 | VEIAMU | 2 | 9 | 8 | 0201 |
| POROI NO1 | 2 | 10 | 3 | 0203 | VERAIBARI | 1 | 8 | 13 | 0201 |
| POROI NO2 | 2 | 10 | 4 | 0203 | WABO/LURI | 2 | 10 | 7 | 0203 |
| PUKARI | 6 | 27 | 6 | 0201 | WAGI | 5 | 20 | 8 | 0207 |
| PUTAIA | 4 | 25 | 7 | 0207 | WAIRA | 1 | 5 | 6 | 0201 |
| PUTEI | 6 | 28 | 8 | 0213 | WAITARI | 1 | 7 | 8 | 0201 |
| RAVIKAUPARA NO2 | 2 | 15 | 5 | 0201 | WAMDE | 4 | 25 | 11 | 0208 |
| RAVIKIVAU NO1 | 2 | 15 | 6 | 0201 | WANDI | 6 | 28 | 955 | 0208 |
| RAVIPAKA | 2 | 11 | 4 | 0201 | WAUWA | 5 | 24 | 14 | 0208 |
| ROVE | 6 | 30 | 11 | 0204 | WEMPANGO | 5 | 22 | 14 | 0212 |
| SAMMANGGWEPA | 6 | 28 | 953 | 0208 | WEYAWA | 5 | 23 | 8 | 0211 |
| SAMOA | 1 | 6 | 11 | 0201 | WIMGA | 5 | 22 | 15 | 0212 |
| SARAGI | 1 | 2 | 9 | 0201 | WOTAPAIYU | 4 | 25 | 12 | 0201 |
| SAROTA | 6 | 30 | 12 | 0204 | WOWOBO | 1 | 7 | 9 | 0201 |
| SAVAIVIRI | 6 | 29 | 14 | 0201 | YABONA | 5 | 22 | 16 | 0212 |
| SENADU NEGATARE | 1 | 4 | 4 | 0203 | YAKITANGWA | 5 | 22 | 17 | 0211 |
| SERA | 1 | 4 | 5 | 0203 | YANKI-DANGA | 5 | 24 | 15 | 0208 |
| SILO 1 | 6 | 27 | 7 | 0201 | | | | | |
| SILO 2 | 6 | 27 | 8 | 0201 | | | | | |
| SORI | 4 | 26 | 19 | 0201 | | | | | |
| SUMAKARIMO | 1 | 1 | 6 | 0201 | | | | | |
| SURI | 1 | 4 | 6 | 0203 | | | | | |
| TAMDEKENGO | 5 | 20 | 7 | 0208 | | | | | |
| TAPALA | 6 | 29 | 15 | 0201 | | | | | |
| TEKARAPOU | 1 | 4 | 7 | 0203 | | | | | |
| TERAPO | 6 | 29 | 16 | 0201 | | | | | |
| TETAMANGA | 5 | 22 | 13 | 0209 | | | | | |
| TETEHUI | 1 | 7 | 5 | 0201 | | | | | |
| TETRABARE | 1 | 4 | 8 | 0203 | | | | | |
| TIAWA | 5 | 24 | 11 | 0208 | | | | | |
| TIMBAINGAWA | 4 | 25 | 8 | 0208 | | | | | |
| TIPEOWO | 1 | 6 | 12 | 0201 | | | | | |
| TITIKAINI | 6 | 27 | 9 | 0201 | | | | | |
| TITIKAMINA | 5 | 24 | 12 | 0208 | | | | | |
| TOARE | 6 | 27 | 10 | 0201 | | | | | |
| TOBARE | 1 | 4 | 9 | 0203 | | | | | |
| TOVEI | 1 | 7 | 6 | 0201 | | | | | |
| TOVIA | 4 | 25 | 9 | 0207 | | | | | |
| TREBESARE WIMA | 1 | 4 | 10 | 0203 | | | | | |
| UAMAI 1 | 6 | 27 | 11 | 0201 | | | | | |
| UAMAI 2 | 6 | 27 | 12 | 0201 | | | | | |
| UARIPI | 4 | 26 | 21 | 0201 | | | | | |
| UBOU | 1 | 7 | 10 | 0201 | | | | | |

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM
Province: 2 Gulf

| Village | Dist | Div | Unit | RMU | Village | Dist | Div | Unit | RMU |
|--------------------|------|-----|------|-----|-----------------|------|-----|------|-----|
| SYSTEM 0201 | | | | | HEPEA | 3 | 17 | 4 | 132 |
| AI'D'IO | 1 | 6 | 1 | 20 | HEREHERE | 3 | 19 | 6 | 135 |
| AIBIGAI | 1 | 8 | 1 | 27 | HEREKERA | 3 | 18 | 9 | 91 |
| AIKAVARAVI | 2 | 15 | 1 | 32 | HEVAVIRI | 4 | 26 | 4 | 139 |
| AIMEI | 2 | 9 | 1 | 34 | HILOI | 3 | 19 | 7 | 133 |
| AIVAU | 3 | 19 | 1 | 135 | HIRU | 3 | 19 | 8 | 135 |
| AIVEI | 2 | 16 | 2 | 29 | HOHORO | 3 | 18 | 10 | 91 |
| AKAPIRU | 3 | 19 | 25 | 135 | HOMOBAVI | 1 | 7 | 3 | 27 |
| AKIARAVI | 2 | 12 | 1 | 28 | HOPAIKU | 3 | 18 | 11 | 91 |
| AKOMA | 2 | 13 | 1 | 29 | HURURU | 3 | 18 | 18 | 91 |
| AKOURA | 3 | 17 | 1 | 132 | HURUTA | 3 | 18 | 12 | 32 |
| AMEPOKE | 2 | 11 | 1 | 34 | IKINU | 2 | 13 | 3 | 28 |
| AMUIPI | 4 | 26 | 1 | 140 | ILOVAPARE | 4 | 26 | 5 | 139 |
| APIOPE | 2 | 16 | 1 | 29 | IMEIA | 2 | 9 | 6 | 34 |
| ARAIAVA | 2 | 13 | 2 | 32 | IOKU | 3 | 18 | 13 | 91 |
| AREHAVA | 3 | 18 | 1 | 91 | IORI | 3 | 17 | 6 | 119 |
| ARURUHU | 3 | 19 | 2 | 135 | IORI | 3 | 19 | 9 | 133 |
| AUMA | 3 | 18 | 2 | 91 | IPAKOTA | 6 | 27 | 2 | 184 |
| AUMU | 2 | 16 | 3 | 29 | IRIMUKU | 1 | 5 | 1 | 23 |
| AUREI | 2 | 9 | 2 | 34 | ISAPEAPE | 6 | 29 | 4 | 203 |
| AVAVU | 3 | 18 | 3 | 94 | IVANA-WAIYA | 4 | 25 | 3 | 142 |
| AVIOVA/APEOA | 1 | 6 | 2 | 22 | IWANGENI | 4 | 25 | 2 | 142 |
| BABAGUINA | 1 | 6 | 3 | 21 | KAIARAVI | 2 | 13 | 5 | 32 |
| BAINA | 1 | 3 | 1 | 43 | KAIRAVA | 3 | 17 | 7 | 119 |
| BEKORO | 2 | 11 | 2 | 33 | KAIRIMAI | 2 | 13 | 6 | 33 |
| BELEPA | 3 | 19 | 3 | 133 | KAISAVA | 6 | 29 | 5 | 211 |
| BISI | 1 | 6 | 4 | 21 | KAIYAKAVU | 3 | 18 | 14 | 91 |
| BURI | 1 | 7 | 4 | 27 | KAMAPU'U | 1 | 6 | 9 | 22 |
| DADEBI | 1 | 2 | 1 | 14 | KANAKAMDI | 4 | 26 | 6 | 186 |
| DAIMAIBARI | 1 | 8 | 2 | 25 | KAPAI 1 | 2 | 16 | 4 | 29 |
| DOIBO | 1 | 6 | 5 | 36 | KAPAI 2 | 2 | 16 | 5 | 29 |
| DOPIMA | 1 | 6 | 6 | 20 | KAPIRI | 4 | 26 | 7 | 139 |
| EKEIRAU | 1 | 2 | 2 | 19 | KARAMA 1 | 6 | 27 | 3 | 194 |
| ELAVA | 6 | 27 | 1 | 194 | KARAMA NO.2 | 6 | 27 | 13 | 194 |
| EPEGAU | 1 | 7 | 1 | 248 | KARARAU | 2 | 11 | 3 | 33 |
| EPEMEAVO | 3 | 19 | 4 | 135 | KARE | 1 | 4 | 2 | 60 |
| ERA MAIPUA | 2 | 9 | 3 | 34 | KAROKARO | 3 | 19 | 10 | 267 |
| ERAVA | 2 | 15 | 2 | 94 | KAUBERAU | 1 | 5 | 2 | 42 |
| ERE | 3 | 18 | 4 | 94 | KAVAVA | 3 | 18 | 15 | 91 |
| EREHEHE | 1 | 2 | 3 | 17 | KEAKEA | 3 | 19 | 11 | 135 |
| ERO | 1 | 6 | 7 | 24 | KEKA | 3 | 17 | 8 | 118 |
| GAURI | 1 | 8 | 3 | 25 | KEMEI | 1 | 6 | 10 | 20 |
| GIBIDAI | 1 | 3 | 2 | 4 | KESEMUBA MEAGIO | 1 | 2 | 7 | 9 |
| GIBU 1 | 1 | 2 | 4 | 15 | KIBENI | 1 | 3 | 4 | 4 |
| GIBU 2 | 1 | 2 | 5 | 9 | KILAVI | 3 | 18 | 16 | 94 |
| GIGORI | 2 | 9 | 4 | 28 | KINIBO | 2 | 13 | 4 | 28 |
| GIPI MEAGOMA | 1 | 7 | 2 | 27 | KINOMERE | 1 | 8 | 5 | 27 |
| GOARI | 1 | 6 | 8 | 20 | KIVAUMAI 1 | 1 | 8 | 6 | 27 |
| GOIRAVI | 2 | 9 | 5 | 34 | KIVAUMAI 2 | 1 | 8 | 7 | 27 |
| HAIARI | 3 | 18 | 5 | 91 | KOARU | 6 | 27 | 4 | 194 |
| HAIVARO | 1 | 1 | 2 | 2 | KOIALAHU | 3 | 19 | 12 | 135 |
| HAMUHAMU | 6 | 29 | 1 | 244 | KOPI | 1 | 5 | 3 | 42 |
| HARAGU | 1 | 2 | 6 | 17 | KOROVAKE | 2 | 12 | 2 | 28 |
| HARELALEVA | 3 | 18 | 6 | 91 | KOUMAIO | 1 | 1 | 3 | 5 |
| HAREVAVO | 3 | 18 | 7 | 91 | KUKIPI | 6 | 29 | 6 | 245 |
| HARONA | 3 | 19 | 5 | 135 | LAKOVU | 3 | 19 | 13 | 135 |
| HARUAPE | 3 | 18 | 8 | 91 | LALAFURU | 6 | 29 | 7 | 201 |
| HAUPOE | 4 | 26 | 2 | 140 | LALAPIPI | 6 | 29 | 8 | 247 |
| HAVIHUHU | 4 | 26 | 3 | 139 | LAPARI | 4 | 26 | 9 | 140 |
| HEATOARE | 6 | 29 | 2 | 205 | LARIAU | 3 | 18 | 17 | 91 |
| HEAVALA | 6 | 29 | 3 | 205 | LARIHAIRU | 3 | 18 | 29 | 91 |
| HEAWA | 3 | 17 | 2 | 119 | LARIMIA | 1 | 8 | 8 | 27 |

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM
Province: 2 Gulf

| Village | Dist | Div | Unit | RMU | Village | Dist | Div | Unit | RMU |
|-----------------|------|-----|------|-----|--------------------|------|-----|------|-----|
| LELEFIRU | 6 | 29 | 9 | 194 | TETEHUI | 1 | 7 | 5 | 248 |
| LEPOKERA | 3 | 19 | 14 | 134 | TIPEOWO | 1 | 6 | 12 | 21 |
| LESE AVIHARA | 6 | 30 | 4 | 216 | TITIKAINI | 6 | 27 | 9 | 184 |
| LESE ILAVA | 6 | 30 | 5 | 215 | TOARE | 6 | 27 | 10 | 194 |
| LESE KAVORA | 6 | 30 | 6 | 215 | TOVEI | 1 | 7 | 6 | 27 |
| LESE OALAI | 6 | 30 | 7 | 215 | UAMAI 1 | 6 | 27 | 11 | 194 |
| LOU | 4 | 26 | 10 | 277 | UAMAI 2 | 6 | 27 | 12 | 194 |
| LOVEHOHO | 3 | 19 | 16 | 135 | UARIFI | 4 | 26 | 21 | 138 |
| LOVELA | 4 | 26 | 11 | 191 | UBOU | 1 | 7 | 10 | 27 |
| LUI | 3 | 19 | 15 | 135 | URIRI | 4 | 26 | 22 | 139 |
| LULUAPO | 6 | 29 | 10 | 211 | URITAI | 6 | 29 | 17 | 203 |
| MAIPENAIRU | 2 | 15 | 3 | 29 | URULAU | 6 | 28 | 9 | 212 |
| MAIRAVA | 3 | 17 | 11 | 132 | VAILALA EAST 1 | 3 | 19 | 23 | 135 |
| MAIRIPEPA | 1 | 8 | 9 | 28 | VAILALA EAST 2 | 3 | 19 | 24 | 135 |
| MAIVA | 3 | 18 | 19 | 129 | VAILALA HILOI | 3 | 18 | 24 | 91 |
| MAREA | 3 | 18 | 20 | 91 | VAILALA KUKIPI | 3 | 18 | 25 | 91 |
| MAREKEA | 6 | 29 | 11 | 245 | VAILALA WEST | 3 | 18 | 26 | 91 |
| MARIKI | 2 | 14 | 1 | 28 | VARIA | 2 | 14 | 3 | 28 |
| ME'I 1 | 4 | 26 | 14 | 138 | VEIAMU | 2 | 9 | 8 | 34 |
| ME'I 2 | 4 | 26 | 15 | 138 | VERAIBARI | 1 | 8 | 13 | 25 |
| MIAE | 3 | 18 | 21 | 91 | WAIRA | 1 | 5 | 6 | 42 |
| MIARU | 6 | 30 | 8 | 216 | WAITARI | 1 | 7 | 8 | 248 |
| MIKAFIRU | 6 | 29 | 12 | 212 | WOTAPAIYU | 4 | 25 | 12 | 142 |
| MINOGOIRAVI | 1 | 7 | 7 | 27 | WOWOBO | 1 | 7 | 9 | 26 |
| MIRAKERA | 4 | 26 | 16 | 140 | | | | | |
| MIRIMAILAU | 2 | 14 | 2 | 28 | SYSTEM 0202 | | | | |
| MIRIVASE | 6 | 29 | 13 | 203 | KAIAM | 1 | 3 | 3 | 42 |
| MISIKI | 1 | 2 | 8 | 18 | | | | | |
| MOKA | 1 | 1 | 4 | 6 | SYSTEM 0203 | | | | |
| MORAVAMU | 1 | 8 | 11 | 28 | FARU | 1 | 4 | 1 | 50 |
| MORERE | 1 | 5 | 4 | 249 | NEGEBARE | 1 | 4 | 3 | 55 |
| NAHOROMERE | 2 | 9 | 7 | 34 | POROI NO1 | 2 | 10 | 3 | 75 |
| NAKORO | 3 | 17 | 12 | 119 | POROI NO2 | 2 | 10 | 4 | 95 |
| NAMOHOROI | 4 | 26 | 17 | 139 | SENADU NEGATARE | 1 | 4 | 4 | 56 |
| OGOMOBU | 1 | 5 | 5 | 271 | SERA | 1 | 4 | 5 | 59 |
| OKAIKENAIRU | 2 | 15 | 4 | 32 | SURI | 1 | 4 | 6 | 60 |
| OMATI | 1 | 3 | 5 | 4 | TEKARAPOU | 1 | 4 | 7 | 55 |
| OMAUMERE | 1 | 8 | 12 | 27 | TETRABARE | 1 | 4 | 8 | 55 |
| OPA | 3 | 19 | 17 | 133 | TOBARE | 1 | 4 | 9 | 55 |
| OPULARIA | 3 | 19 | 18 | 133 | TREBESARE WIMA | 1 | 4 | 10 | 75 |
| ORAVI | 2 | 12 | 3 | 33 | URINITE | 1 | 4 | 11 | 53 |
| OVA'A | 3 | 19 | 19 | 135 | WABO/LURI | 2 | 10 | 7 | 75 |
| OVAHUHU | 3 | 19 | 20 | 135 | | | | | |
| PAEVERA | 3 | 18 | 22 | 131 | SYSTEM 0204 | | | | |
| PAKOVAVU | 3 | 18 | 23 | 91 | IOKEA | 6 | 30 | 1 | 217 |
| PAKU | 3 | 17 | 13 | 119 | LAUIRAVA | 6 | 30 | 2 | 220 |
| PEKOE | 3 | 19 | 21 | 135 | LAUROVO | 6 | 30 | 3 | 220 |
| PETOI | 4 | 26 | 18 | 138 | MEAURI | 6 | 30 | 951 | 278 |
| POIVA | 3 | 19 | 22 | 135 | MIRAPO | 6 | 30 | 9 | 217 |
| PUKARI | 6 | 27 | 6 | 194 | MORIO | 6 | 30 | 10 | 219 |
| RAVIKAUPARA NO2 | 2 | 15 | 5 | 32 | ROVE | 6 | 30 | 11 | 219 |
| RAVIKIVAU NO1 | 2 | 15 | 6 | 32 | SAROTA | 6 | 30 | 12 | 220 |
| RAVIPAKA | 2 | 11 | 4 | 33 | | | | | |
| SAMOA | 1 | 6 | 11 | 24 | SYSTEM 0205 | | | | |
| SARAGI | 1 | 2 | 9 | 5 | MURUA SETTLEMENT | 4 | 26 | 502 | 189 |
| SAVAIVIRI | 6 | 29 | 14 | 203 | | | | | |
| SILO 1 | 6 | 27 | 7 | 194 | SYSTEM 0207 | | | | |
| SILO 2 | 6 | 27 | 8 | 194 | BU'U | 5 | 20 | 2 | 158 |
| SORI | 4 | 26 | 19 | 141 | IOKWA | 5 | 20 | 4 | 158 |
| SUMAKARIMO | 1 | 1 | 6 | 5 | KOKO | 3 | 17 | 9 | 120 |
| TAPALA | 6 | 29 | 15 | 202 | LOHIKI | 3 | 17 | 10 | 119 |
| TERAPO | 6 | 29 | 16 | 205 | MENU | 5 | 20 | 5 | 158 |

6.3 RURAL VILLAGES LISTED BY AGRICULTURAL SYSTEM
Province: 2 Gulf

| Village | Dist | Div | Unit | RMU | Village | Dist | Div | Unit | RMU |
|--------------------|------|-----|------|-----|----------------------|------|-----|------|-----|
| PAINGOBA | 4 | 25 | 6 | 142 | SYSTEM 0210 | | | | |
| PUTAIA | 4 | 25 | 7 | 159 | HARLINGI | 5 | 21 | 951 | 157 |
| TOVIA | 4 | 25 | 9 | 142 | LAGAI | 5 | 21 | 952 | 157 |
| UDOWA | 4 | 25 | 10 | 144 | SYSTEM 0211 | | | | |
| WAGI | 5 | 20 | 8 | 158 | DAKOTA | 5 | 22 | 2 | 158 |
| SYSTEM 0208 | | | | | HAPATAEWA | 5 | 23 | 2 | 166 |
| AMINAUWA | 4 | 25 | 13 | 157 | IAUYETEBU | 5 | 22 | 18 | 158 |
| FAMBA | 5 | 20 | 3 | 158 | IKOSE | 5 | 23 | 3 | 166 |
| HAPAITAMANGA | 5 | 23 | 1 | 166 | MAMBAINYA | 5 | 23 | 4 | 158 |
| HAWAKABIA | 5 | 24 | 1 | 157 | PALENGAUWA | 5 | 23 | 6 | 166 |
| IKOAKE | 5 | 24 | 2 | 157 | WEYAWA | 5 | 23 | 8 | 166 |
| IOMBA | 5 | 21 | 4 | 157 | YAKITANGWA | 5 | 22 | 17 | 158 |
| IVANDU | 5 | 24 | 3 | 157 | SYSTEM 0212 | | | | |
| KAKIVA | 6 | 28 | 951 | 169 | HAMDEI | 5 | 22 | 5 | 162 |
| KANABEA | 5 | 21 | 5 | 157 | MINE | 5 | 22 | 12 | 158 |
| KOPIIWAWA | 5 | 21 | 7 | 158 | WEMPANGO | 5 | 22 | 14 | 162 |
| KOTIDANGA | 5 | 24 | 4 | 157 | WIMGA | 5 | 22 | 15 | 158 |
| KOTOMBAIWA | 5 | 24 | 5 | 157 | YABONA | 5 | 22 | 16 | 158 |
| KUKIHE | 6 | 28 | 952 | 169 | SYSTEM 0213 | | | | |
| M'BAUYU | 4 | 25 | 4 | 158 | KEREMAHUA | 6 | 28 | 1 | 211 |
| M'BEIWI | 5 | 24 | 16 | 157 | KOKORO | 6 | 28 | 2 | 231 |
| MAIWOKATA | 5 | 24 | 6 | 158 | KOTAI | 6 | 28 | 3 | 180 |
| MEIWARI | 5 | 24 | 7 | 157 | MIRIMAS | 6 | 28 | 4 | 231 |
| MERAPO | 5 | 24 | 8 | 158 | NENAMO | 6 | 28 | 5 | 179 |
| MOIWA | 5 | 24 | 17 | 158 | OKAVAI | 6 | 28 | 6 | 211 |
| MUTUA | 5 | 24 | 9 | 157 | PARATA | 6 | 28 | 7 | 179 |
| NANGONAI | 5 | 23 | 5 | 158 | PUTEI | 6 | 28 | 8 | 179 |
| ONDA | 4 | 25 | 5 | 158 | SYSTEM 0214 | | | | |
| PAINA | 5 | 24 | 10 | 157 | APANAIPI OR AFAGAIFI | 6 | 30 | 952 | 221 |
| PIO | 5 | 20 | 6 | 158 | | | | | |
| SAMMANGGWEPA | 6 | 28 | 953 | 169 | | | | | |
| TAMDEKENGO | 5 | 20 | 7 | 158 | | | | | |
| TIAWA | 5 | 24 | 11 | 158 | | | | | |
| TIMBAINGAWA | 4 | 25 | 8 | 158 | | | | | |
| TITIKAMINA | 5 | 24 | 12 | 157 | | | | | |
| UKUMINA | 5 | 24 | 13 | 158 | | | | | |
| UYEIWATA | 6 | 28 | 954 | 169 | | | | | |
| WAMDE | 4 | 25 | 11 | 158 | | | | | |
| WANDI | 6 | 28 | 955 | 169 | | | | | |
| WAUWA | 5 | 24 | 14 | 158 | | | | | |
| YANKI-DANGA | 5 | 24 | 15 | 158 | | | | | |
| SYSTEM 0209 | | | | | | | | | |
| ATA | 5 | 22 | 21 | 162 | | | | | |
| EPANANGO | 5 | 21 | 1 | 158 | | | | | |
| EWAINYA | 5 | 21 | 2 | 158 | | | | | |
| EWAU | 5 | 22 | 3 | 162 | | | | | |
| HAMBIA | 5 | 22 | 4 | 162 | | | | | |
| HAUABANGA | 5 | 22 | 6 | 162 | | | | | |
| HUWAWIAR | 5 | 22 | 7 | 162 | | | | | |
| IEMEPANGO | 5 | 22 | 8 | 162 | | | | | |
| KAINGO | 5 | 22 | 9 | 161 | | | | | |
| KARANGIA | 5 | 22 | 10 | 162 | | | | | |
| KOMAKO | 5 | 21 | 6 | 158 | | | | | |
| KWAIYU | 5 | 21 | 8 | 158 | | | | | |
| KWEMGA | 5 | 21 | 9 | 158 | | | | | |
| KWOI'AMUNGA | 5 | 22 | 11 | 161 | | | | | |
| MEMEWA | 5 | 21 | 11 | 158 | | | | | |
| MENEMANGO | 5 | 21 | 10 | 158 | | | | | |
| TETAMANGA | 5 | 22 | 13 | 161 | | | | | |

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 (North Solomons) | NSP | 20 |

APPENDIX A.2

NATIONAL POPULATION CENSUS CODES FOR DISTRICTS AND CENSUS DIVISIONS, GULF PROVINCE¹

| Code | Division | Code | Division |
|-----------|-------------------------|-----------|--------------------------|
| 01 | KIKORI DISTRICT | 03 | IHU DISTRICT |
| 01 | UPPER TURAMA | 17 | UPPER VAILALA |
| 02 | LOWER TURAMA | 18 | WEST COAST VAILALA |
| 03 | IKOBI-KAIRI | 19 | EAST COAST VAILALA |
| 04 | PEPIKE | | |
| 05 | KIKORI-KAIRI | 04 | KEREMA DISTRICT |
| 06 | GOARIBARI | 25 | KABEROPE |
| 07 | GOPE | 26 | KEREMA BAY |
| 08 | URAMA | | |
| | | 05 | KAINTIBA DISTRICT |
| 02 | BAIMURU DISTRICT | 20 | IVORE SWANSON |
| 09 | ERA | 21 | WENTA |
| 10 | UPPER PURARI | 22 | HAMDEI |
| 11 | BAIMURU | 23 | WEIABI |
| 12 | BAROI | 24 | HANGOIA |
| 13 | KORIKI | | |
| 14 | KAIMARI | 06 | MALALAU DISTRICT |
| 15 | IARE | 27 | KAIFI |
| 16 | MAIPUA | 28 | KOVIO |
| | | 29 | TOARIPI |
| | | 30 | MORIFI |

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

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