

TABLE 1
SOILS OF ANEITYUM (After Quantin, 1979. Traditional use is based on Spriggs' fieldwork)

FAO CLASSIFICATION	SOIL TYPE AND NUMBER	CLIMATIC ZONE	AREA IN SQ KM	% OF TOTAL SURFACE AREA	AGRICULTURAL APTITUDE (from 1 [high] to 5 [very low])	PLACEMENT	TRADITIONAL USE
A. MAIN SOIL TYPES							
EUTRIC REGOSOLS	1 Poorly Developed Brown Soils of Erosional Origin.	1, 3	5.4	3.4	5	On steep slopes and old volcanic flanks.	Rarely used. Occasional terraced dry gardens where slope permitted.
RENZINAS	2 Grey Calcareous Sandy Soils and Indurated Calcareous soils, derived from the mixing of beach deposits and Alluvium.	1, 3	4.0	2.5	2	On Recent reef platform.	Coconut belt, dry gardens, houses and lowest ends of irrigation systems. Grades into and less fertile than type 3.
EUTRIC CAMBISOLS	3 Reddish-brown Eutrophic Ferruginous Clayey-Sandy soils, with Halloysite.	1, 3	7.4	4.62	1	On Recent alluvial terraces.	Largest irrigation systems, dry gardens.
RHODIC OR XANTHIC FERRALSOLS	4 Humic Moderately Leached Red-brown Ferrallitic soils, with Halloysite and Goethite.	1	1.4	0.88	2	On Pleistocene alluvial terraces.	Important inland areas of terraced dry and irrigated gardens.
RHODIC OR XANTHIC FERRALSOLS	<u>STRONGLY LEACHED FERRALLITIC SOILS</u> (a) <u>'Humid' Southern Climatic Series, lower and middle altitude</u>	1-3	140.7	87.94	3-5	On basalt	
	5a Red Soils of Fine Structure and fairly high Humic Content, with Kaolinite and Haemetite)	1	27.85	17.41	3		Some inland dry and irrigated gardens; forest products collected.
	5b Moderately eroded phase)						" "
	5c Deeply eroded phase, deeply truncated)	1	70.15	43.84	4	On old volcanic flanks	
	(b) <u>Perihumid Climatic Series</u> Extremely Humic Red-brown and Gibbsite soils, deeply eroded.	2	21.15	13.22	5	ridge crests > 500m.	Not used except for collecting forest products.
	(c) <u>North and West Climatic Series, 'Seasonal', low and middle altitude</u>						
	7 Very Red Soils of coarse structure and low Humic Content, with Kaolinite and Haemetite. Subject to superficial Gully Erosion	3	21.55	13.47	4		Generally not used, 'Red Ground', some wild tubers and berries collected.
B. MINOR SOIL TYPES							
EUTRIC FLUVISOLS	8 Poorly Developed Well-Drained Recent Sandy or Sandy-Clay soils.)					On Recent alluvium of mainly volcanic material	Of very limited areal extent. Dry gardens or irrigated gardens (Anauwau)
EUTRIC GLEYSOLS	9 Hydromorphic Gleyed soils.)	1, 3	0.75	0.47	2	In depressions on Recent alluvium, etc.	Area underestimated by Quantin. Nearly all used for taro swamps (Inhenou)
EUTRIC VERTIC-CAMBISOLS	10 Humic Weakly-leached Reddish-brown soils, with Montmorillonite and Metahalloysite.	3	0.30	0.19	2	On hard calcareous plateau at Anauwau.	Extremely limited area. Dry land gardens.

TABLE 2

VEGETATION COMPLEXES OF ANEIITYUM (After Schmid 1975 and Quantin 1979.
Traditional Use is based on Spriggs' fieldwork)

No.	VEGETATION COMPLEX	CLIMATIC ZONE	SOIL TYPE	TRADITIONAL USE
A. MAJOR COMPLEXES				
1	<u>TALL FOREST OF CALOPHYLLUM-ACATHIS.</u> Kauri (<i>Agathis obtusa</i>) and Tamanou (<i>Calophyllum</i> sp.) with open upper canopy of Kauri. Generally between 200 and 500m a.s.l., covers much of the island.	1	4-5	Gathering of forest products, with lower areas (generally below 300m) often used for dry land and irrigated gardens, especially in the Anusej area.
2	<u>LOW CLOUD FOREST OF METROSIDEROS-WEINMANNIA-CLINOSTICMA,</u> rich in ferns and epiphytes, usually above 500m on ridge crests but extending lower along some ridges.	2	6	Gathering of forest products only.
3	<u>SAVANNA OR PRAIRIE OF MISCANTHUS, IMPERATA, CYPERACEAE AND FERNS</u> Under repeated burning replaced by a fire-resistant complex of <i>Acacia</i> , <i>Commersonia</i> and <i>Glochidion</i> or transformed into 'Maquis'. When not regularly burned a succession to secondary forest occurs, similar to complex 6 succession.	1, 3	1, 5	A frequent succession after burning or in fallow gardens. Frequently covers former irrigated or dry land gardens, particularly in the leeward zone and Port Patrick area.
4	'MAQUIS': <u>LOW SCATTERED SCRUB OF CUNONIACEAE, METROSIDEROS, STYPHELIA AND VACCINIUM,</u> with occasional <i>Casuarina</i> .	3, occasionally 1	7, occasionally 1, 5	Some wild food gathering, otherwise not used. Vegetation caused by frequent burning of complex 3.
5	<u>COASTAL BELT OF COCONUT PLANTATIONS.</u> Sometimes directly behind the beach is a thin littoral screen of <i>Casuarina</i> .	1, 3	2, 8	A favoured habitation zone with dry land gardens and seaward edges of irrigation systems. Dense stands of coconut trees a post-contact phenomenon.
6	<u>SHIFTING CULTIVATION PLOTS, FALLOW AND DISPERSED COCONUTS AND FRUIT TREES.</u> In the south woody regrowth occurs with large monocotyledons and ferns, especially further inland along the valleys.	1, 3	3	Main dry land and irrigated garden areas. At Port Patrick in particular are areas of fruit-tree forest consisting of species originally introduced by man but which have become naturalized such as <i>Inocarpus edulis</i> .
B. MINOR COMPLEXES				
7	<u>LEUCAENA THICKETS,</u> limited area at Anau-unse. An introduced American plant, witness of a dry climate.	3	10	Small dry land garden area.
8	<u>SECONDARY OPEN FOREST AND THICKET REGROWTH WITH OCCASIONAL COCONUTS.</u> Limited area of coastal fringe at Anau-unse.	3	2, 3	Dry land garden area.
9	<u>SECONDARY OPEN FOREST OF ACACIA SPIROBIS.</u> Limited area behind the coast of Anau-unse.	3	7	Dry land gardens in valleys, otherwise not used.
10	<u>EXTREMELY STEEP SLOPES DENUDED OF VEGETATION.</u> Found particularly in the Ijipdav, Anvotau, and Anauwau Valleys.	3	1, 7	Not used.
11	<u>SWAMPS WITH TALL CYPERACEAE.</u> Dispersed in small patches throughout the island.	1, 3	9	Used as taro swamps (<i>inhenu</i>)
12	<u>MANGROVES.</u> Very limited areas at Port Patrick and at one or two stream mouths near Anelcauhat. They consist of species of <i>Bruguiera</i> , <i>Sonneratia</i> and <i>Avicennia</i> .	1, 3	-	Exploitation of associated Marine resources.

TABLE 3 : SOME TRADITIONAL ANEITYUMESE FOOD PLANTS

Botanical Name	Family	English or bislama name	Aneityumese name	Number of Cultivars named by Aneityumese
<u>Abelmoschus manihot</u>	Malvaceae	Native or Island cabbage, cabbage aelan	nasieŋ	9
<u>Alocasia macrorrhiza</u>	Araceae	Horse Taro, Elephant Ear Taro, wael taro	nehei	11
<u>Amorphophallus campanulatus</u>	Araceae	Elephant Yam	nomyac	5
<u>Artocarpus altiiis</u>	Moraceae	Breadfruit	inma	45
<u>Barringtonia edulis</u>	Barringtoniaceae	feto fetu	feto fetu	1 (probably a recent introduction)
<u>Canarium commune</u>	Burseraceae	Kanari, nangae	nagaehos	2 (one of them a recent introduction)
<u>Cocos nucifera</u>	Palmae	Coconut	neaiŋ	6+
<u>Colocasia esculenta</u>	Araceae	Taro	intal	100+
<u>Cordyline fruticosum</u>	Liliaceae	Ti	inrouud	35
<u>Curcuma domestica</u>	Zingerberaceae	Turmeric	incouos	9
<u>Cyathea sp.</u>	Cyatheaceae	Tree Fern, black palm	nusŋeu	?
<u>Cyrtosperma chamissonis</u>	Araceae	Giant Swamp Taro, wael taro	kidie	?
<u>Dioscorea alata</u>	Dioscoreaceae	Greater Yam, long yam	nu	15
<u>Dioscorea bulbifera</u>	Dioscoreaceae	Bitter Yam, Potato Yam, wael yam	naho	1
<u>Dioscorea esculenta</u>	Dioscoreaceae	Lesser Yam	wale	1
<u>Dioscorea pentaphylla</u>	Dioscoreaceae	-	nomodeŋ	1
<u>Ficus neo-hebridarum</u>	Moraceae	Wild Fig, fig	natec	?
<u>Hibiscus tiliaceus</u>	Malvaceae	Cottonwood, burao	inhou	? (sapwood eaten)
<u>Inocarpus edulis</u>	Leguminosae	Tahitian Chestnut, Horse Chestnut, namambe, aelan chestnut	inmop	'several' or 'many'
<u>Ipomoea batatas</u>	Convolvulaceae	Sweet Potato, Kumera, kumala	inwametek	?
<u>Metroxylon sp.</u>	Palmae	Sago, natanggura	nopot	1
<u>Musa paradisiaca</u>	Musaceae	Banana	nohos	66
<u>Musa paradisiaca</u> , L., subsp. <u>espiantum</u> , Kuntze., var. <u>oleracea</u> , Baker	Musaceae	-	ninya	1 (only rhizome eaten)
<u>Musa troglodytarum</u>	Musaceae	Plantain, Banana	nalak	9
<u>Piper methysticum</u>	Piperaceae	Kava	kava	20
<u>Pometia pinnata</u>	Sapindaceae	-	netva	1
<u>Puararia thunbergiana</u>	Leguminosae	Kudzu, wael yam	inyac	9
<u>Saccharum edule</u>	Gramineae	Pitpit, navisa, asparagus	netohas (?)	?
<u>Saccharum officinarum</u>	Gramineae	Sugarcane	neto	40+
<u>Tacca</u>	Taccaceae	Arrowroot	nupnyinec or masoa	2
<u>Leontopetaloides</u>				
<u>Terminalia catappa</u>	Combretaceae	Almond	intijid	2

TABLE 4

TARO CULTIVATION ON ANEITYUM (STEEL AND PRE-STEEL)

Incauwai Labour Inputs

(a) <u>Untilled</u> (4 weeding, 18,750 plants/ha)			(b) <u>Tilled</u> (3 weeding, 22,000 plants/ha)		
(Steel)	(Pre-steel)		(Steel)	(Pre-steel)	
263	483	Initial Preparation	6574	7652	
391	391	Planting	245	245	
2426	2426	Weeding, etc.	2004	2004	
312	312	Harvest	367	367	
<u>3392</u>	<u>3612</u>	Person-hours/ha/year	<u>9190</u>	<u>10268</u>	
<u><u> </u></u>	<u><u> </u></u>	total	<u><u> </u></u>	<u><u> </u></u>	

Inhenou Labour Inputs

(a) 16,000 plants/ha			(b) 40,000 plants/ha		
(Steel)	(Pre-steel)		(Steel)	(Pre-steel)	
2856	5998	Pre-planting preparation	2856	5998	
151	151	Planting	377	377	
1695	1695	Weeding, etc.	2095	2095	
267	267	Harvesting	667	667	
<u>4969</u>	<u>8111</u>	Person-hours/ha/year	<u>5995</u>	<u>9137</u>	
<u><u> </u></u>	<u><u> </u></u>	total	<u><u> </u></u>	<u><u> </u></u>	

Dryland Labour Inputs

(assume 12,480 plants/ha)

<u>Untilled</u>			<u>Tilled</u>		
(Steel)	(Pre-Steel)		(Steel)	(Pre-steel)	
263	483	Pre-planting preparation	6574	7652	
260	260	Planting	139	139	
1636	1636	Weeding, etc.	1636	1636	
208	208	Harvesting	208	208	
<u>3160*</u>	<u>3449*</u>	Person-hours/ha/year	<u>8557</u>	<u>9635</u>	
<u><u> </u></u>	<u><u> </u></u>	total	<u><u> </u></u>	<u><u> </u></u>	

* Inputs are for 9 months growth period, adjusted to give yearly total

TABLE 5 : TARO CULTIVATION IN PACIFIC SOCIETIES

Society	Labour Hrs/Ha [Steel]	Labour Hrs/Ha [Pre-Steel]	Yield (Metric Tonnes/ Ha/Year)	Yield (10 ⁶ Kcal/ Ha/Year)	Productivity (Kcal/Hour) [Steel]	Productivity (Kcal/Hour) [Pre-Steel]	Relative Steel Efficiency (Times)	Remarks
A. MAEWO ISLAND, VANUATU								
1. Low Yield, 1 cycle	3296	4947	40.1	33.474	10156	6766	1.5	Canal-fed Fondfield irrigation
2. High Yield, 1 cycle	3296	4947	65.3	54.509	16538	11019	1.5	
B. ANRITUM ISLAND VANUATU								
1. Tilled, <u>incauwa</u>	9190	10268	29.0 approx.	a. 24.208 b. 19.597	a. 2634 b. 2132	a. 2358 b. 1909	1.1	Canal-fed Furrow irrigation
2. Untilled, <u>incauwa</u>	3392	3612	26.0 approx.	a. 21.704 b. 17.570	a. 6399 b. 5180	a. 6008 b. 4864	1.1	Canal-fed Furrow irrigation
3. Maximum yield <u>inhenou</u>	5995	9137	52.0	a. 43.407 b. 35.357	a. 7241 b. 5898	a. 4751 b. 3870	1.5	Swampland gardens (terraced or island beds)
4. Minimum yield <u>inhenou</u>	4969	8111	30.0	a. 25.043 b. 20.698	a. 5040 b. 4165	a. 3088 b. 2552	1.6	Swampland gardens (terraced or island beds)
5. Tilled dry land garden	8557	9635	23.0	a. 17.215 b. 12.408	a. 2012 b. 1450	a. 1787 b. 1288	1.1	Tilled dry land garden
6. Untilled dry land garden	3160	3449	23.0	a. 17.215 b. 12.408	a. 5448 b. 3927	a. 4991 b. 3598	1.1	Untilled dry land garden
C. COL DE LA PIROGUE (NEW CALEDONIA)								
1. Maximum labour, 1 cycle	5296	10403	n.d.	n.d.	n.d.	n.d.	1.8	Canal-fed Fondfield irrigation
2. Maximum labour, 2 cycles	3891	6130	n.d.	n.d.	n.d.	n.d.	1.6	
3. Minimum labour, 1 cycle	4816	8072	n.d.	n.d.	n.d.	n.d.	1.7	
4. Minimum labour, 2 cycles	3336	4964	n.d.	n.d.	n.d.	n.d.	1.5	
D. LAKEBA (FIJI)								
1. Tilled	6775	12055	35.3	29.467	4396	2444	1.8	Swampland island beds
2. Untilled	4120	4648	12.4	10.351	2597	2227	1.1	Swampland island beds
E. BELLONA (SOLOMONS)								
1. Dry land	1565	2298	4.4 approx.	8.480	5419	3690	1.5	Dry land
F. TAVEUNI (FIJI)								
1. Dry land	3429	4228	20.6 average	14.570	4255	3451	1.2	
G. AWA (E. HIGHLANDS, PNG)								
1. Tilled	4822	8083	18.4	15.640	2934	1935	1.7	Simple flooding canal-fed
2. Untilled	3556	4854	21.8	18.530	4798	3817	1.4	Simple flooding canal-fed
H. TSEMBAGA MARING (W. HIGHLANDS, PNG)								
Dry land	627	941	2.6	5.050	8054	5367	1.5	Dry land
I. KAPAIKU (WEST NEW GUINEA)								
Swampland gardens	2225	3205	12.8	10.854	4878	3386	1.4	Swampland island beds

Data sources given in Chapter 7, Appendix 4,5. Travel time not included in labour inputs.

TABLE 6 CHIEFDOMS AND DISTRICTS ON ANEITYUM

<u>District name</u>	<u>Total Area</u>	<u>Area under 300m</u>	<u>1850s Schoolhouses</u>	<u>Comments</u>
<u>ANAU-UNJAI CHIEFDOM [Inglis' Parish]</u>				
1. ISIA	329.2	245.6	1	
2. IMTANIA	420.2	261.5	1	
3. IGAREI	106.1	93.7	1	Possibly part of Imtania.
4. IJASSIS	272.3	174.4	1	
5. UEA	303.9	240.7	1	
6. AHAIJ	253.7	119.8	1	<u>nopotan natimarid</u>
7. AHAIJITOH	213.0	191.2	1	Possibly part of Ahaij.
Totals	1898.4	1326.9	7	
<u>ANETCHO AND IJIPDAV CHIEFDOMS [Inglis' Parish]</u>				
1. ANAIA	348.5	266.1	1	
2. IVANIPEK	(77.8	77.8	1) Probably make up a) single district: Anetcho Ecsina.
3. ANEMTANAHIE	(1	
4. ANEJPOU	359.4	199.5	1(?)	Possibly part of Antina.
5. ANTINA	95.2	95.2	1	
6. IPIJCAU	624.2	247.8	1	
7. OHUUL	451.2	154.2	1 or 2	
8. UMKA	220.0	215.2	1	
9. ANETCHO/IDUMU	62.3	62.3	1	<u>nopotan natimarid</u>
10. ITAD-ANARED	85.1	85.1	1 or 2	Possibly two separate districts.
11. ISAV	69.6	69.6	1(?)	May have attended Aname school.
12. ANAME	483.1	299.5	1	
13. EPEKE	278.3	231.2	1(?)	May have attended Aname school.
14. ANAMANJOP	122.2	112.5	1	
15. ANPEKE	224.9	148.4	1	
16. ISEI	204.7	110.4	1	
17. IJIPDAV (inland)	550.1	183.6	2	Possibly two separate districts.
18. IJIPDAV (coastal)	91.0	91.0	1	
Totals	4347.6	2649.4	16-21	
<u>ANAU-UNSE CHIEFDOM [Inglis' Parish]</u>				
1. ITAU	322.7	247.1	1	<u>nopotan natimarid</u>
2. EHESJEI	241.9	186.8	1	
<u>[Geddie's Parish]</u>				
3. ANAUWAW	487.0	245.8	2-4	Probably two or more districts.
	1051.6	679.7	4-6	

ANELCAUHAT CHIEFDOM [Geddie's Parish]

UMANID-ANWUNYAT	439.6	249.2	1 or 2	
IMKALAU	355.0	220.5	1	
ITEG	161.8	149.1	1	
INWA RAKA	231.6	129.3	1	
UCHE	377.2	328.6	1	
ANPAK	399.2	132.9	1	Possibly part of Uche.
ANELCAUHAT	514.9	499.4	1	<u>nopotan natimarid</u>
NIJIEMHANG	418.4	258.1	1	
ITEC [Total]	737.8	122.0	1	District may only
(ITEC [Neropno Valley only])	(327.3)	(80.9)	(1)	include Neropno valley with other valleys uninhabited.
ANAPARIJO	563.7	318.8	1	
ANIJAWÉ	140.8	140.8	1	Possibly part of Anadauai.
ANADAUAI	154.2	153.4	1	
ANIBLIDAI	304.4	255.0	1	
Totals	4798.6	2957.1	13-14	

UMEJ CHIEFDOM [Geddie's Parish]

ANAUAYAC	353.7	316.9	1	
ANANPEKE-IHILI	239.7	232.1	1	
ANOA	117.0	87.9	1) Possibly 1 district.
IPATA	203.2	104.3	1	
ANAHAIJINUMO	271.0	189.0	1	
UMEJ	194.6	179.1	1	<u>nopotan natimarid</u>
AHAIJOM	248.6	197.3	1	
Totals	1627.8	1306.5	7	

ANUMEJ-ANEKRO CHIEFDOM [Geddie's Parish]

ANEKRO	286.1	188.2	1	<u>nopotan natimarid</u>
ANUMEJ	1217.6	523.0	1 or 2	Probably two or more districts.
INIAMET	469.6	342.8	1	
IDEC	338.5	228.2	1	
Totals	2311.8	1282.2	4-5	
ANEITYUM Totals	16,035.8	10,201.8	51-60	56 in late 1850s: 30 in Inglis' Parish, 26 in Geddie's.

TABLE 7 : NORTHERN ANEITYUM : LAND AREA AND LAND USE IN 1830

District Name	Total Area (Hectares)	Land Below 300m (ha)	Dryland Gardens* (ha)	Canal-fed Gardens (ha)	Other Wetland Gardens (ha)	Garden Land as a Percentage of all Land Under 300m †
Anaicauhat Chiefdom						
1. IMKALAU	355.0	220.5	25.64	-	-	12
2. UMANID-ANWUNYAT	439.6	249.2	22.12	-	0.1145	9
Anau-unse Chiefdom						
3. ANUONOPUL-INYADPOIG- ANAUWAU	487.0	245.8	97.36	3.044	0.8222	41
4. EHESJEI	241.9	186.8	33.01	-	0.0475	18
5. ITAU	322.7	247.1	54.48	0.040	0.6595	22
Anau-unse Total	1051.6	679.7	184.85	3.084	1.5292	28
Ijipdav and Anetcho Chiefdoms						
6. IJIPDAV (coastal)	91.0	91.0	17.27	0.850	1.058	21
7. IJIPDAV (inland)	550.1	183.6	52.37	0.130	0.3154	29
8. ISEI	204.7	110.4	27.04	0.100	0.0875	25
9. ANPEKE	224.9	148.4	22.14	-	0.3120	15
10. ANAMANJOP	122.2	112.5	17.95	-	0.2990	16
11. EPEKE	278.3	231.2	56.17	1.525	0.3921	25
12. ANAME	483.1	299.5	52.67	6.095	0.1872	20
13. ISAV	69.6	69.6	16.25	7.000	0.2860	34
14. ITAD-ANARED	85.1	85.1	52.67	8.500	1.3155	73
15. ANETCHO/IDUMU	62.3	62.3	46.00	4.750	0.0750	82
16. UMKA	220.0	215.2	38.52	15.500	0.5795	25
17. OHUUL	451.2	154.2	23.52	9.450	0.3249	61
18. IPIJCAU	624.2	247.8	37.67	7.800	-	18
19a. ANTINA (Lower Valley)	95.2	95.2	26.98	7.600	-	36
19b. ANTINA-ANEJPOU	359.4	199.5	25.90	1.075	0.3100	14
20a. ANEMTANAHIE } ANETCHO- 20b. IVANIEPEK } ECSINA	77.8	77.8	7.61	21.000	0.658	38
21. ANAIA	348.5	266.1	54.31	8.750	0.9678	24
Ijipdav and Anetcho Total	4347.6	2649.4	575.04	100.125	7.1679	26
Anau-unjai Chiefdom						
22a. AHAIJ	213.0	191.2	16.35	12.000	1.8402	16
22b. AHAIJITOHO	253.7	119.8	23.60	2.250	0.5620	22
23. UEA	303.9	240.7	53.79	14.425	2.0077	29
24. IJASSIS	272.3	174.4	31.00	12.125	0.2407	25
25. IGAREI	106.1	93.7	6.15	5.075	0.4531	12
26. IMTANIA	420.2	261.5	36.95	8.250	0.4284	17
27. ISIA	329.2	245.6	39.47	3.135	0.2405	17
Anau-unjai Total	1898.4	1326.9	207.31	57.260	5.7726	20
Anau-unse, Ijipdav, Anetcho and Anau-unjai Totals	7297.6	4656.0	967.20	160.469	14.4697	25
Imkalau to Isei Totals	2691.9	1534.3	329.28	4.164	3.1046	22
Epeke, Aname, Isav Totals	831.0	600.3	125.09	14.62	0.8653	23

* 20% has been deducted for unusable land within garden area.

† Some garden areas are found above 300m and this slightly distorts some figures.

TABLE 8: GARDEN LABOUR AND PRODUCTIVITY ON ANEITYUM IN 1830.

GARDEN TYPE	LABOUR HOURS/HA	PERCENTAGE MALE LABOUR	PERCENTAGE FEMALE LABOUR	ENERGY EXPENDITURE/ HA * (kcal)	(10 ⁶ YIELD kcal/ha/year	PRODUCTIVITY (kcal/hour)
<u>INHENOUI</u>						
[Swampland garden] (maximum yield)	9137	33%	67%	1,598,975	(a) 43.407 (b) 35.357	(a) 4751 (b) 3870
<u>INHENOUI</u>						
[Swampland garden] (minimum yield)	8111	37%	63%	1,419,425	(a) 25.043 (b) 20.698	(a) 3088 (b) 1798
<u>INCAUWAI</u>						
[Canal-fed garden] (tilled)	10,628	37%	63%	1,796,900	(a) 24.208 (b) 19.597	(a) 2358 (b) 1909
<u>INCAUWAI</u>						
[Canal-fed garden] (untilled)	3612	13%	87%	632,100	(a) 21.704 (b) 17.570	(a) 6008 (b) 4864
Dry land garden (tilled)**	9635	40%	60%	1,686,125	(a) 17.215 (b) 12.408	(a) 1787 (b) 1288
Dry land garden (untilled)**	3449	19%	81%	603,575	(a) 17.215 (b) 12.408	(a) 4991 (b) 3598
Dry land garden: average (half tilled, half untilled)***	6542	35%	65%	1,144,850	(a) 17.215 (b) 12.408	(a) 3389 (b) 2443

* Following Bayliss-Smith (1980) average energy expenditure in garden tasks is taken to be 175 kcal/hour.

** The growth period is generally less than a year (c. 9 months); adjustment has been made to give yearly totals.

*** This is of course a purely notional technique. It can be taken to represent a situation where in one district both tilled and untilled beds may be found depending on micro-environmental conditions.

(a) - Yield from corms and cormels.

(b) - Yield from corms only.

TABLE 9: ANEITYUMESE AGE AND SEX STRUCTURE MODELS

(Based on McArthur 1974:Table 5.1 simulations for the 1850s,
with figures converted to percentage of total population)

Age range (years)	Population model			
	B*	D	E	F
Less than 15 (male and female) (non-workers)	40%	34%	32%	31%
Over 15 (female) (productive workers)	26%	30%	30%	29%
Over 15 (male) (productive workers)	34%	36%	38%	40%

TABLE 10

ANEITYUM : Population in 1830

(Percentage surplus in brackets) [number obtained by subtraction]

	mean minimum population	mean maximum population	minimum population	maximum population	missionary population
Whole Island	4600 (55)	5800 (45)	3500 (70)	12000 (30)	3500-3800
Northern chiefdoms	2410 (55)	3070 (45)	1840 (70)	6300 (30)	[1841]-2000
Ijipdav and Anetcho	1455 (60)	1895 (50)	1150 (55)	2410 (50)	[1150]-[1250]
Anau-unjai	580 (60)	790 (50)	450 (55)	1513 (35)	450
Anau-unse	375 (60)	505 (45)	300 (65)	1032 (25)	300
Isei→Imkalau	750 (55)	1010 (40)	650 (45)	1850 (25)	approx. 700
Aname, Epeke, Isav	235 (65)	300 (55)	175 (60)	465 (55)	120
Ohuul district	80 (60)	85 (55)	80 (70)	121 (70)	70
Ipijcau district	80 (60)	95 (55)	70 (70)	147 (55)	80

Table 11: Radiocarbon dates from Aneityum

All dates processed by the ANU Radiocarbon Laboratory.

ANU number	Delta C-13 ± σ	Delta C-14 ± σ	Radiocarbon Age ± σ	% Modern ± σ	% Required Sample	Comments
<u>AT556, ANAWAU SWAMP, ANELCAUHAT</u>						
2417	-24.0	2.0	5040 ± 370	-	10.6	Layer 6.
2418	"	"	5420 ± 90	-	100	Layer 5.
2419	"	"	5410 ± 100	-	79.6	Layer 4.
2420	"	"	3740 ± 170	-	17.5	Layer 3.
2421-A	"	"	5070 ± 410	-	?	Preliminary Result Layer 2 (wood fragments).
2421-B	"	"	2490 ± 80	-	?	Preliminary Result Layer 2 (mud fines).
<u>AT217, ANAWAU SWAMP MARGIN, ANELCAUHAT</u>						
2632	0.0	2.0	470 ± 75	-	100	Eroding midden on swamp edge. Shell date, corrects to 20 ± 80 BP.
<u>AT555, LELCEI RIVER RIGHT BANK, ANELCAUHAT</u>						
2367	-24.0	2.0	1570 ± 140	-	28.7	Layer III:2.
2368	"	"	540 ± 75	-	100	Layer II oven.
<u>AT31, NIJIEMHANG RIVER RIGHT BANK, NIJIEMHANG</u>						
2364	-24.0	2.0	240 ± 80	-	25.2	Layer III:2.
2365	"	"	-	103.9	2.7	Layer III:1.
<u>AT32, NIJIEMHANG RIVER LEFT BANK, NIJIEMHANG</u>						
2653	-24.0	2.0	22,400 ± 250	-	100	At base of Pleistocene alluvial terrace.
<u>AT37, IMKALAU CREEK, IMKALAU</u>						
1062	-24.0	2.0	2180 ± 80	-	100	Sample collected by L.M. Groube. Layer V:1.
1063	"	"	1950 ± 100	-	50.0	Sample collected by L.M. Groube. Layers IV:1-IV:3.
2188	"	"	1880 ± 100	-	65.4	Layer IV:2.
2654	0.9	0.4	1690 ± 70	-	100	Layer III:4 Shell date, corrects to 1240 ± 80 BP.
2369	0.0	2.0	1200 ± 80	-	100	AT37B, equivalent to Layer III:3. Shell date, corrects to 750 ± 85 BP.
1069	-24.0	2.0	1060 ± 70	-	100	Sample collected by L.M. Groube. Layer III:1.
1064	"	"	870 ± 70	-	100	Sample collected by L.M. Groube. Layer III:1.
2242	"	"	720 ± 75	-	60.0	Layer III:1.
2241	"	"	500 ± 80	-	55.6	Layer III:1.
2656	"	"	34.2	103.4	2.5	Horizon II.
2655	2.6	0.4	1140 ± 70	-	100	Horizon II. Shell date.) Paired corrects to 690 ± 80 BP.) samples.
<u>AT38, IMKALAU</u>						
1066	-24.0	2.0	220 ± 110	-	31.0	Earth Oven in settlement site.
1065	"	"	120 ± 80	-	48.0	Earth Oven in settlement site.

Table 11: (cont'd)

<u>AT196 (RIVER SECTION ONE), ANAME RIVER RIGHT BANK, ANAME-EPEKE</u>									
2362	-24.0	2.0	-67.7	10.4	560 ± 90	-	-	21.2	Layer III:1.
2363	"	"	-37.1	19.5	300 ± 170	-	-	9.7	Layer II:3.
<u>AT196 (RIVER SECTION TWO), ANAME RIVER LEFT BANK, ANAME-EPEKE</u>									
2358	3.6	0.4	-244.8	7.6	2260 ± 80	-	-	84.0	Layer III:2. Shell date, corrects to 1810 ± 85 BP.
2359	-24.0	2.0	-223.4	7.8	2030 ± 90	-	-	100	Layer III:1. Shell date, corrects to 1580 ± 95) Paired Layer III:1.) samples.
2361	"	"	-185.3	29.1	1650 ± 290	-	-	6.0	Layer IV:1.
AT196 (RIVER SECTION THREE), ANAME RIVER LEFT BANK, ANAME-EPEKE	-24.0	2.0	-68.5	9.3	570 ± 80	-	-	24.6	
<u>AT196 (TEST PIT 1), ANAME IRRIGATION SYSTEM, ANAME</u>									
2183	-24.0	2.0	93.7	24.2	-	109.4	2.4	15.1	Layer II:1.
2184	"	"	157.8	18.5	-	115.8	1.9	33.0	Intrusive(?) oven.
<u>AT188, ANETCHO RIVER RIGHT BANK, UMKA</u>									
2354	-24.0	2.0	-111.0	17.6	940 ± 160	-	-	10.3	Layer IV:2.
2356	-24.0	2.0	-119.8	12.1	1020 ± 110	-	-	17.2	Layer III:1.
<u>AT143, ANINA RIVER, RIGHT BANK, ANINA</u>									
2185	-24.0	2.0	19.2	13.1	-	101.9	1.3	43.0	Layer II:1.
2357	"	"	35.9	14.8	-	103.6	1.5	23.9	Layer II:1.
2187	"	"	39.8	14.8	-	104.0	1.5	34.6	Layer I:2.
<u>AT181, AQUEDUCT/EMBANKMENT (NATAWAI), ITAD</u>									
2348	-24.0	2.0	107.9	24.6	-	110.8	2.5	8.1	Layer 6C. 'Natural' beneath embankment.
2347	"	"	12.6	10.1	-	101.3	1.0	29.0	Layer 6A. 'Natural' beneath embankment.
2349	0.0	2.0	-57.7	8.6	480 ± 75	-	-	77.0	Layer 6, outer bank material. Shell date, corrects to 30 ± 80 BP.
<u>AT149, ANETCHO RIVER LEFT BANK, UMKA</u>									
2186	-24.0	2.0	6.0	13.9	-	100.6	1.4	51.9	Horizon II.
<u>AT202, ANAIA RIVER, LEFT BANK, ANAIA</u>									
2350	-24.0	2.0	-57.1	22.0	470 ± 190	-	-	12.7	Layer V.
2352	"	"	9.4	62.5	-	100.9	6.3	4.4	Layer IV:1.

TABLE 12

RATES OF EROSION AND DEPOSITION: NEW GUINEA HIGHLANDS AND FIJI COMPARED

<u>Date BP</u>	<u>Sediment Type</u>	<u>Rates of Erosion</u> <u>(cm/1000 yr)</u>	<u>Rates of Deposition</u> <u>in swamp (cm/1000yr)</u>
<u>Kuk, W. Highlands, PNG</u>			
<50,000 - 20,000	Organic rich muds	0.2	
20,000 - 9000	Organic rich muds	0.4	3.0 (30,000. -9000 BP)
9000 - 6000	Grey clay	3.0	10.0
<u>Waitabu Swamp, Lakeba, Fiji</u>			
1900 - 1750	Grey silty sandy clay	173	2300
1750 - 900	Brown-greyish brown sandy silty clay	20	270
900 - 0	Grey sandy silty clay	7	90

Data from Golson and Hughes (1976), Hughes et al. (1979).

TABLE 13: THE DISTRIBUTION OF TRUE IRRIGATION IN THE PACIFIC

A - Simple Flooding, B - Island Beds, C - Pondfields, D - Furrow Irrigation,
E - Method Unclear.

Area	Method	Major references
<u>MELANESIA</u>		
<u>West New Guinea (West Irian)</u>		
Lake Sentani	E	Moolenburgh (1904:180)
Damal area (Highlands)	A(?)	Ellenberger (1962)
<u>Papua New Guinea (Provinces)</u>		
Enga	A	Lacey (1979)
Madang	A	Burnett (1963)
Western Highlands	A	Clarke (1977), Gorecki (1979a)
Eastern Highlands	A	Boyd (1975), Godelier (1977), Loving (1976)
Morobe	A	Conroy and Bridgland (1950), M. Bourke (pers. comm.)
Central	A(?)	Chinnery (1920)
Milne Bay	B	Kahn (1979, 1980), Newton (1914), Seligman and Strong (1906), Territory of Papua (1919/20:42-3; 1925/6:43-4; 1927/8:17)
East New Britain	E	Territory of New Guinea (1937:429)
New Ireland (Mussau Island)	C	Dicks Rae Thomas (pers. comm.)
North Solomons (Bougainville Is)	E	Parkinson (1887:257)
<u>Solomon Islands</u>		
Kolombangara	C	Miller (1979), Yen (1973b, 1976)
New Georgia	C	Chikamori (1966), Miller (1979), Tedder (1977)
Rendova	C	Yen (1976)
Guadalcanal	C	Amherst and Thomson (1901(II):306)
<u>Vanuatu</u>		
Vanua Lava	C	de la Rue (1945), Ward (1979)
Gaua (Santa Maria)	C	Ward (1979)
Motalava	C	Ward (1979)
Ureparapara	C	Ward (1979)
Santo	C	Guiart (1958), Speiser (1913, 1923)
Maewo	C	Bonnemaison (1974)
Aoba	C	M. Allen (pers. comm.), Speiser (1923)
Pentecost	C	de la Rue (1945), Speiser (1913, 1923)
Malekula	E	Deacon (1934), Rivers (1926)
Aneityum	D	See text
<u>New Caledonia</u>	B,C	Barrau (1956), Curry (1962), Glaumont (1897)
<u>Fiji</u>		
Viti Levu	C	Rivers (1926), Ward (1960, 1965)
Vanua Levu	C	Ward (1965)

TABLE 13 (cont'd)

Area	Method	Major references
Taveuni	C	Brookfield (1978), Rivers (1926)
Koro	E	Bayliss-Smith (1977)
Ovalau	C	Erskine (1853), Rivers (1926)
Batiki	B	Bayliss-Smith (1978b)
Gau	C	Anderson (1880)
Lakeba	B,C(?)	M. Brookfield (1979)
Moala	B	Sahlins (1962)
Kadavu	C	Thomson (1889), Ward (1965)
<u>POLYNESIA</u>		
<u>Futuna (Horne Islands)</u>	B,C	Burrows (1936), Kirch (1975)
<u>Samoa Islands</u>	E(?)	Brown (1910), Farrell and Ward (1962) suggest irrigation
<u>Cook Islands</u>		
Mangaia	B,C	Allen (1969, 1971), Buck (1944)
Rarotonga	B,C	Bellwood (1978b), Buck (1944)
<u>Society Islands (Tahiti)</u>		
Ra'iatea	C(?)	Vérin (1969)
Taha'a	C(?)	Vérin (1969)
Mo'orea	C	Green (1961)
Tahiti	C	Oliver (1974)
<u>Austral Islands</u>		
Rurutu	C	Vérin (1969)
Tupuai	C	Aitken (1930)
Rapa	C	Hanson (1973)
<u>Gambier Islands</u>		
Mangareva	C	Buck (1938), Moniod (1974)
<u>Marquesas Islands</u>		
Nuku Hiva	C	Handy (1923)
Huahuka	C	Kellum-Ottino (1971)
Hiva Hoa	C	Handy (1923)
Ua Pou	C	Handy (1923)
Fatu Hiva	C(?)	No clear reference
<u>Hawaiian Islands</u>	B,C	Literature summarised in Earle (1978, 1980), Handy and Handy (1972), Kirch (1977)

TABLE 14 RAINFALL DATA FROM STATIONS IN AREAS OF TRUE IRRIGATION: MELANESIA AND POLYNESIA

STATION	LAT.	LONG.	ASL	YRS REC.	REF.	MEAN MONTHLY RAINFALL (mm)												TOTAL
						J	F	M	A	M	J	J	A	S	O	N	D	
1. NEW GUINEA																		
Sentani 2	2°30'E	140°31'E	80m	13	1	207	174	227	155	112	93	100	101	114	96	169	180	1728
a. Laigag	5°32'E	143°29'E	2139m	11	2	194	234	255	230	149	95	88	121	170	207	190	207	2162
b. Wapenamanda	5°39'E	143°49'E	1406m	14	2	234	259	297	242	165	104	111	164	214	206	204	241	2488
c. Kompian	5°21'S	143°56'E		12	2	281	350	398	343	245	165	176	205	308	292	315	386	3429
d. Simbai	5°17'S	144°31'E	1497m	12	2	381	404	362	291	193	116	117	163	234	257	287	386	3175
e. Okapa	6°32'S	145°37'E	1895m	8	2	283	242	265	209	151	95	85	130	212	215	185	247	2282
f. Wonenara	6°48'S	145°53'E		9	2	282	254	320	244	193	94	95	120	174	237	198	272	2507
g. Maravaka	6°58'S	145°54'E		2	2	246	273	273	171	131	36	94	64	182	255	262	332	2409
h. Menyama	7°13'S	146°01'E		16	2	156	182	175	170	128	84	80	96	151	158	175	186	1769
i. Mumeng	6°58'S	146°37'E	703m	16	2	176	143	153	130	86	64	84	81	98	114	156	204	1471
b. Wantoat	6°08'S	146°29'E	1161m	11	2	307	250	295	243	168	98	91	117	169	234	236	316	2490
Kabum	6°09'S	147°13'E		7	2	262	286	262	187	156	79	88	84	127	191	219	274	2196
Dogura	10°06'S	150°05'E	61m	44	2	232	221	222	149	91	93	76	65	77	79	88	120	1493
2. NEW GUINEA ISLANDS																		
1. Musseau Island	1°30'S	149°40'E		3	2	301	392	373	372	272	335	335	360	282	256	310	402	4276
Rabaul (W. New Britain)	4°13'S	152°12'E		23	2	230	244	256	209	129	114	104	103	94	118	173	238	2003
N. Bougainville	5°32'S	153°00'E		5	1	216	317	288	183	196	191	205	159	132	158	214	143	2401
3. SOLOMON ISLANDS																		
1. j. Arundel	8°10'S	157°10'E		29	1	389	363	332	267	228	222	261	289	249	254	224	195	3273
k. Munda (New Georgia)	8°20'S	157°15'E	9m	9	1	340	341	358	242	240	238	341	315	256	298	248	246	3462
k. Guadalcanal	9°25'S	159°58'E		14	1	288	265	381	231	142	85	95	86	101	146	135	226	2122
4. VANUATU																		
1. Vanua Lava	13°50'S	167°33'E	42m	10	1	399	432	406	394	454	278	211	218	366	339	294	314	4105
Tangoa (Santo)	15°36'S	167°03'E		37	1	275	238	326	266	198	156	145	153	142	172	234	223	2530
Aneityum	20°14'S	169°47'E	8m	13	1	392	204	358	209	212	138	145	139	131	109	178	230	2446
5. NEW CALEDONIA																		
1. Hienghene	20°49'S	164°59'E		27	1	316	278	393	226	140	146	66	126	89	65	125	131	2122
m. Tontouta	22°01'S	166°13'E	15m	12	1	155	130	138	97	98	84	91	77	58	45	32	96	1101
6. FIJIAN ISLANDS																		
n. Viti Levu (leeward)	18°09'S	177°30'E	3m	54	1	219	237	261	162	130	90	87	104	85	88	125	175	1765
o. Vanua Levu (nth coast)	16°35'S	178°55'E	5m	8	1	405	553	506	266	98	83	43	71	94	149	230	229	2726
p. Vanua Levu (sth coast)	16°46'S	179°21'E	5m	54	1	276	267	286	227	205	124	120	138	145	185	214	241	2429
q. Taveuni	16°48'S	179°60'W	61m	53	1	300	318	303	276	209	124	79	110	118	178	221	270	2506
r. Taveuni	16°43'S	179°55'W	53m	40	1	334	358	346	340	240	136	117	138	156	191	269	299	2923
s. Ovalau	17°41'S	178°51'E	2m	12	1	336	237	372	283	187	163	107	81	136	124	214	186	2427
t. Lakeba	18°14'S	178°08'W	2m	25	3	274	239	296	205	120	94	77	88	103	144	183	206	2026
u. Kadavu	19°04'S	176°10'W	30m	22	1	233	216	303	250	206	103	108	117	122	127	152	178	2115
7. POLYNESIA																		
s. Uvea (Wallis)	13°20'S	178°09'E		6	4	302	250	402	158	141	170	176	97	128	222	242	338	2600
Rarotonga (Cooks)	21°12'S	159°49'W	5m	27	5	234	257	284	196	150	122	112	119	127	135	163	206	2103
Mangaia (Cooks)	21°56'S	157°56'W		39	6	264	234	229	157	142	130	119	122	112	140	142	165	1956
t. Papeete (Tahiti)	17°32'S	149°34'W	92m	47	5	251	244	429	142	102	76	53	43	53	89	150	249	1628
Mangareva (Gambier)	23°15'S	134°45'W		2	5	132	168	196	107	218	193	122	140	229	307	168	234	2217
Rapa (Austral)	27°37'S	144°20'W	6m	19	7	304	202	262	265	262	191	243	232	232	186	201	231	2810
Rurutu (Austral)	22°27'S	151°20'W	1m	3	7	216	197	217	162	140	96	132	124	105	106	123	262	1879
Tubuai (Austral)	23°21'S	149°29'W	2m	6	7	214	216	231	190	138	92	131	163	147	102	137	267	2028
Hiva Hoa (Marquesas)	9°48'S	139°02'W	51m	34	7	91	88	113	96	92	184	115	89	91	65	54	78	1155
Ua Pou (Marquesas)	9°23'S	140°06'W	1m	10	7	62	55	46	75	50	90	48	48	41	46	45	42	647
u. Fatu Hiva (Marquesas)	10°27'S	138°39'W	3m	10	7	71	80	92	111	102	191	171	140	96	94	75	84	1304
Nuku Hiva (Marquesas)	8°55'S	140°05'W	12m	30	7	71	78	119	104	77	154	125	105	74	49	49	51	1056

Sources: 1. Brookfield and Hart (1966). 2. McAlpine, Keig and Short (1975). 3. Latham (1979). 4. De la Rue (1963). 5. HMSO (1958). 6. Allen (1969). 7. Wernstedt (1972). Kirch (1977:Table 1) gives details of rainfall for Hawaiian irrigation areas.

TABLE 14 NOTES

- a. Seen operating in June.
- b. Terracing observed in streambed.
- c. Seen operating in June.
- d. Irrigation in Asai Valley and Jimi tributaries, July to November/December.
- e. Irrigation late-February to mid-October/December.
- f. Seen operating July to September (Baruya Groups).
- g. Baruya 'homeland', probable irrigation.
- h. Extensive hydraulic technology, not used for irrigation.
- i. Assume local rainshadow effects.
- j. On island between Kolombangara and New Georgia.
- k. Honiara station. Irrigation reported north of here.
- l + m. Range of rainfall in areas where irrigation practised.
- n. Lawaqa station. Irrigation also practised in wetter areas.
- o. Dreketi station.)
- p. Valeci station.) Range of rainfall in areas where irrigation practised.
- q. Waiyevo station (central north coast).)
- r. Mua station (northern point).) Irrigation practised on this drier coast.
- s. Equivalent climate to Futuna ($14^{\circ}18'S$, $178^{\circ}09'W$) where irrigation practised.
- t. Drier side of the island.
- u. Irrigation practised?