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A STUDY OF A DEVELOPMENT SCHEME IN A
POLYNESIAN COMMUNITY: THE CITRUS
REPLANTING SCHEME ON ATIU, COOK ISLANDS.

A Thesis Presented in Partial Fulfilment of the
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By

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PREFACE

Economic development is usually considered to be increasing levels of output per capita and in the past programmes aimed at improving economic conditions in undeveloped and underdeveloped nations have been formulated on this basic premise. However, recent experience has shown this to be a somewhat narrow definition, and economic development is increasingly being viewed as being but part of a broad process of social development involving basic changes in the underlying value systems of communities. Rising levels of output and income per capita show increases in productivity and wealth, but in many instances a prerequisite for attaining this or an outcome of it is change in social values.

Therefore it is essential development be seen in its broadest context, as merely one element in the processes of social change and social evolution of man. Economic change cannot be divorced from other spheres of life as any alteration in this has ramifications elsewhere in the social system. Life in any culture is multidimensional in nature. The ability to perceive this is essential for development programmes in order that any social discordance and possible cultural lag associated with development be minimised.

As much economic development today is consciously induced, it is desirable that aims be explicitly stated, the programme laid down and the possible effects of associated change be projected and comprehended. Responsible innovation should be the prerequisite of any development scheme. Change should be viewed in its total environment - social, economic, political, religious or otherwise.

The aim of this thesis is to show that social change and especially economic development involves complex processes and, if induced, should involve preliminary research and acquisition of a deep understanding of the value system and cognitive orientation of

the community concerned. The Citrus Replanting Scheme (C.R.S.) on Atiu, Cook Islands serves as an example of this. Its history and recent success exemplify the need for an enlightened and responsible approach to development programmes.

The research has been mainly historical in nature and has involved not only study of the Cook Islands citrus industry, but also the social, political, administrative, religious, judicial and demographic history of Atiu. The work is divided into three sections. The first describes the physical and social background into which the Citrus Replanting Scheme was introduced. The second section involves tracing the rise of the scheme within the Cook Islands and specifically Atiu and the history of its workings on Atiu. The third section aims to give some insight into the impact of the scheme on social life on the island dealing with the more direct influences the scheme has had within the community. It is not intended to probe deeply into social change which involves numerous factors, of which the C.R.S. is but one. The data for the research included Cook Island Administration Records, New Zealand Government records, early reports made by traders and missionaries, and numerous periodicals and texts including those of R.G. Crocombe, many of which were based on research in Atiu. In addition, a questionnaire was administered to a selected portion of the population involving forty per cent of the households and a land use survey was carried out along similar lines to those already completed on Rarotonga, Aitutaki and Mangaia.

Field work was carried out between April and July 1969 after preliminary planning under the guidance of Mr I.G. Bassett and Mr B.J. Allen, both of the Department of Geography, Massey University. To these two people and to Professor K.W. Thomson, Massey University, who has also assisted in an advisory capacity throughout the work, I wish to express my gratitude.

I also wish to acknowledge the assistance of, and thank the following Government Departments without whom this work would

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GLOSSARY OF TERMS

Absenteeed plots:	Citrus Replanting Scheme plots subjected to absentee ownership, usually involving owners who have migrated.
Akaere:	lit. 'Speaker of the Ariki.'
Anane:	Orange
Ara:	Pineapple, <u>ananus comosus</u> .
'are:	House
Ariki	High chief. Traditionally the highest ascribed position on Atiu.
Atinga:	Tribute
Au:	Hibiscus.
Citrus Producers:	Those with producing plots. The non-producing sector includes those with new/unproductive plots as well as those without plots.
Citrus Producing Islands:	Refers to the Islands of Rarotonga, Atiu, Aitutaki and Mauke where the Citrus Replanting Scheme operates.
C.R.S.	Citrus Replanting Scheme.
C.I.C.C.	Cook Islands Congregational Church formerly the London Missionary Society (L.M.S. Church)
Cognitive orientation:	Mental approach/viewpoint (inculcated by society).
Economic Development:	An increase in the level of aggregate output per head.
Feeding Child:	A child who is brought up in a household, other than that of birth, usually by a relative or close friend of the parents of birth.
Karakia:	Chant. Also Master of Ceremonies.
Kikau:	A coconut palm frond.
Kiriau:	Local rope made from the bark of Hibiscus.
Koka:	Banana.
Ku'ara:	Kumara.
Kuava:	A shrub commonly found on the central fernland of Atiu.
Kura:	Breadfruit.
Makatea:	The limestone rock belt of the raised coral reef.
Mamio:	Taro (<u>Colacassia</u> sp.) Raised under water
Mana:	Pride, prestige.

Manamanata:	Problem, "big trouble."
Maniota:	Arrowroot.
Market Economy:	An economy whose underlying principle is scarcity and in which all components of production are transacted through a single price mechanism in addition to produced commodities. It is associated with relatively sophisticated technology, maximisation of capital input (as compared to the present economy), and in which money plays an all pervasive role.
Mataiapo:	Heads of the major family lineages who administered the tapere.
Matavai:	Man-made irrigation channel.
Meika:	Small banana.
M.L.A.	Member of the Legislative Assembly.
Northern Group:	Refers to the Islands of Rakahanga, Manihiki, Pukapuka, Nassau, Penrhyn, Suvarrow and Palmerston.
Nu:	Coconut.
Outer Islands:	All Islands in the southern Cook Group with the exception of Rarotonga.
Pa'i:	Taro (<u>Colocassia sp.</u>) Grown on raised beds between matavai.
Papa'a:	lit. Stranger, European.
Peasant Economy:	A transitional economic stage between a primitive subsistence economy and the market economy and having features of both incorporated. A part market, part subsistence oriented economy characterised by a relatively primitive technology, maximisation of labour input, use of the family as the productive unit with the household head operating as "chef d'enterprise" and notable for its extreme conservatism.
Pia:	Native arrowroot.
Puna:	Taro Swamp.
Puaka:	Pig or pork.
Rangitira:	Heads of the minor family lineages responsible for delegation of land in the traditional land tenure system to individual households.
Social Change:	A change in the accepted patterns of behaviour. Belshaw, C.S. (1964, 137) "Culture change means that the norm, or perhaps the average or the ideal behaviour shifts."

- Social Organisation:** Conceptualised as the means by which a community directs and controls its members, channels their activities and utilisation of resources towards ends acceptable to the group as a whole. Firth, R. (1951, 45) "One may describe social organisation....as the working arrangements of society."
- Social Structure:** An abstract model and interpreted as a major pattern of relationships which form a systematic arrangement, and which serve to further action along the same lines. This structural element of society may be of a formal nature and explicitly recognised by the people involved or may be informal and explicit in nature. Social structure thus provides the infrastructure on which action takes place while social organisation, dealing with the "working arrangements" of society, is concerned with the day to day demands of individuals in a given situation. These demands may change and thus exert pressure on the social structure - a conservative element of society. If the innovation or new demand is strong enough it may change the social structure and social change is the end result. Yet social structure and social organisation must not be viewed as opposed forces but as complementary abstractions upon which a society operates.
- Southern Group:** Refers to the Islands of Rarotonga, Aitutaki, Mangaia, Atiu, Manuae, Mauke, Mitiaro and Takutea.
- Subsistence Economy:** An economy geared solely to food production for the family unit.
- Syncretism:** A distinctive feature of cultural interaction involving adoption of ideas and material items by one culture from another without any significant alteration to the underlying value system of the innovating culture or in the nature of the "borrowed" item - reinterpretation with retention of original function.
- Tapere:** The unit of land basic to the traditional land tenure system, including all the various types of land in the island. On Atiu they were wedge shaped extending from the reef to the centre of the island and administered by the mataiapo.
- Taro:** The local name for plants of the Colcassia, Xanthosoma, Alocasia species.

Taro tarua:	Taro (<u>Xanthosoma</u>) grown on dry land.
Toa:	Ironwood.
Tutaka:	Inspection.
Ui:	Yam.
Umu:	Oven of traditional style.
Umu'kai:	Feast.
Uri anana:	Young orange seedlings.
Village	In the context of this thesis reference is made to the "villages" in Atiu, which actually form part of one settlement. They are not villages in the sense that they represent small, individual communities, but rather, are parts of one large urban grouping and are differentiated according to the village district in which they are located, since having been removed from the lowland to the apex of the districts in the centre of the island.

SECTION I

CHAPTER I

THE PHYSICAL AND SOCIAL SETTINGTHE COOK ISLANDS

The Cook Islands comprise fifteen relatively isolated islands in the central South Pacific, totalling 88 square miles in area and located in 850,000 square miles of ocean. The group extends from Penrhyn (latitude 8°S) to Mangaia (latitude 23°S), and from Mauke (longitude 156°W) to Pukapuka (longitude 167°W).

Isolation within the group varies considerably, Penrhyn being the farthest from Rarotonga, the principal island and Administrative centre of the Cook group (Table 1). This isolation may decrease with the extension of air services at present limited to three islands, Rarotonga, Aitutaki and Penrhyn. Isolation is also reflected in the relative position of the Cook Islands within the Pacific. Although midway between the Samoan and Society Islands (600 miles east and west respectively) the Cook Islands are 1200 miles from Fiji, roughly the geographical centre of the South Pacific islands. Rarotonga is 1633 miles from Auckland, the nearest metropolitan centre of significance to the group.

Although none of the islands are large, great diversity in size and population exists within the group. They can be divided into two groups, the northern and southern as shown in Table 1. The northern group of islands comprising a microscopic land area in a vast expanse of ocean is widely scattered in a triangular shape from 8°S to 17°S . The outer islands of the southern group are found in a compact area within 150 nautical miles south-east to north of Rarotonga and have a much larger land area (Figure 1).

Structurally the two groups can be differentiated. The

TABLE I

COOK ISLANDS: AREA AND DISTANCE FROM RAROTONGA

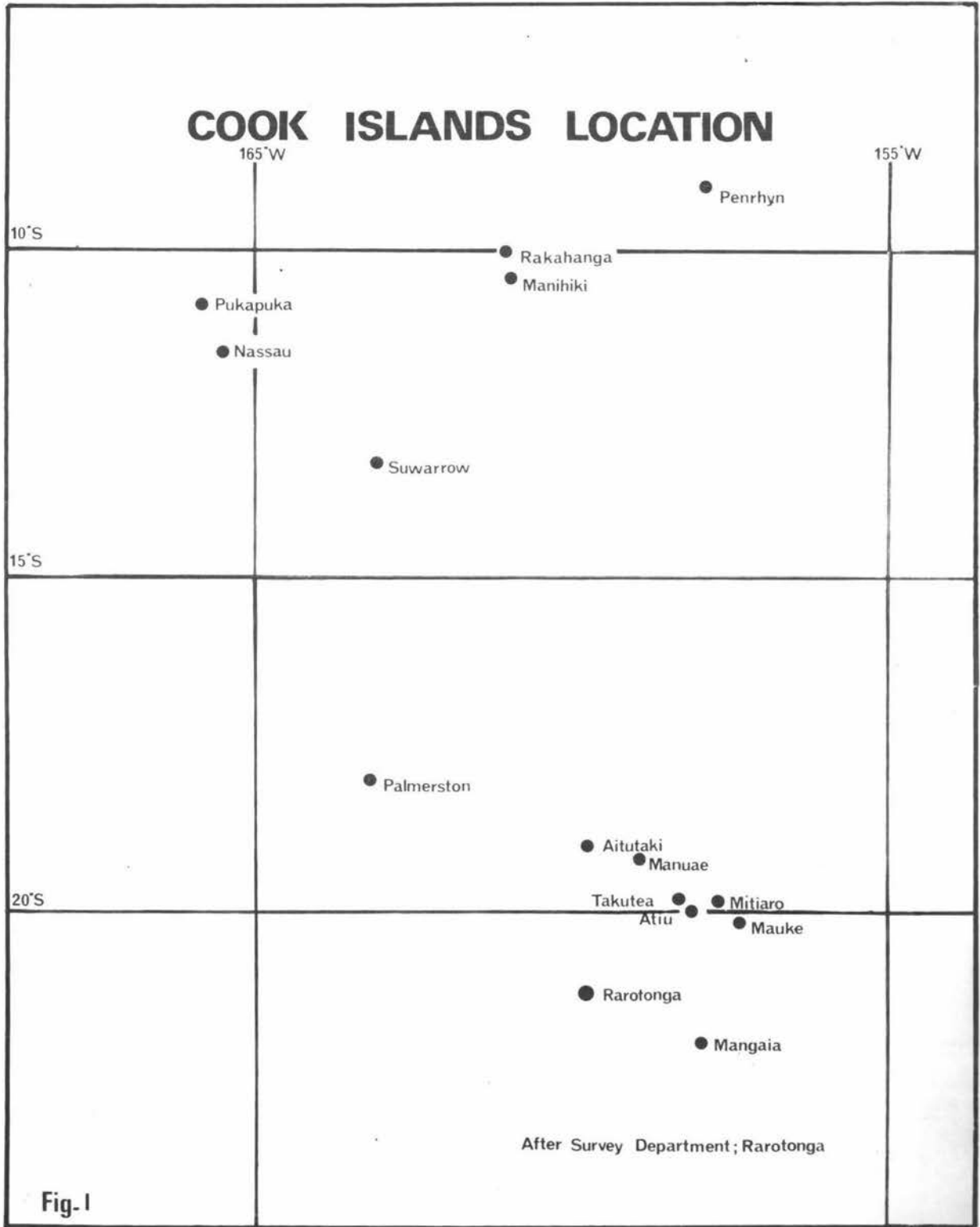
<u>Island</u>	<u>Area (Acres)</u>	<u>Percentage of Total Area</u>	<u>Distance (Nautical miles) from Rarotonga</u>
(a) <u>Northern Group</u>			
Palmerston	500	.84	270
Pukapuka	1,250	2.10	715
Nassau	300	.50	673
Manihiki	1,344	2.26	650
Rakahanga	1,000	1.68	674
Penrhyn	2,432	4.09	737
Suvarrow	100	.16	513
(b) <u>Southern Group</u>			
Aitutaki	4,461	7.52	140
Ati'i	6,654	11.21	114
Mangaia	12,800	21.57	110
Manuae	1,524	2.56	124
Nauke	4,552	7.67	150
Mitiaro	5,500	9.27	142
Takutea	302	.50	118
Rarotonga	16,602	27.98	

Source: Survey Department Booklet, 2

Notes: Total Land Area: = 59,321 acres of which

Northern group: 6,926 acres
Southern group: 52,395 acres

The average distance of the Islands of the two groups
to Rarotonga is: Northern group: 604.57 nautical miles
Southern group: 128.57 nautical miles



northern are all coral atolls with the exception of Nassau which like Takutea in the southern group is a sand cay on a coral reef substructure. The southern in contrast, is basically of volcanic nature, featuring one high mountainous island (Rarotonga), four 'Makatea' type islands (Atiu, Mangaia, Mauke, Mitiaro), one atoll (Manuae), one part atoll/part volcanic island (Aitutaki) and Takutea.²

The Cook group lies in the tropical belt but small climatic variations occur from island to island depending much on latitude. The major climatic influence is the south-east trade wind system which oscillates north and south of the equator causing seasonality which increases with latitude. There is also a marked influence tending to reduce the degree of seasonality.

Cook Islanders are Polynesians, descended from the same older east Polynesian culture as the New Zealand Maoris. Although a general cultural conformity exists throughout the group, local cultural differences have arisen over time so that Belshaw and Stace (1955, 1) can write

"the islands vary greatly, not only in size, population and natural resources, and in the ratio of resources to people, but also in attitudes and social organisation."

The first European contact with the group came in 1595 when a Spaniard, Mendana, discovered Pukapuka. Within the next 220 years the whole group had been discovered, most of the southern by James Cook, after whom the islands were named. Subsequently

"European contacts have followed the general pattern established in Polynesia, of explorer, missionary, trader and colonial Administrator."
(Allen, 1969, 1).

Following the discovery of the islands, came the London Missionary Society (L.M.S.) and then the traders who provided the necessary

infrastructure on which commercial cropping began. The L.M.S. was the main law enforcing body in the Cook Islands until 1890.

The southern group became a British Protectorate in 1888 and responsibility for their administration was handed to New Zealand in 1900. In 1901, both the northern and southern groups were included in New Zealand boundaries, and this was followed by formal annexation in 1906. This remained the political state until 1965 when as a result of increasing pressure in the United Nations for autonomy of colonial areas and local political activity, the Cook Islands were granted internal self-government in full association with New Zealand.³

ATIU

Location and Physical Structure

Located 116 miles north-east of Rarotonga Atiu represents only the apex of a past emergent volcano rising over 10,000 feet from the ocean floor. The island is roughly heart-shaped, approximately four miles long north-south and three miles wide east-west and comprises 6,654 acres or about 10 square miles.

Structurally, Atiu has often been compared to Mangaia although its landscape is not as old, as weathered or as pronounced. Like the other makatea islands of the group, Atiu consists of a central cone of basalt which has been deeply eroded and a surrounding belt of exposed coral reef (the makatea) which has either been uplifted by seismic activity or left exposed by a drop in eustatic level. A new fringing reef has developed in the warm coastal waters.⁴ Accurate assessment of Atiu's geological age has proved difficult but it is believed to be of early tertiary origin.⁵

The present topography of Atiu closely reflects its geology as Figure 2 indicates. The centre of the island consists of a series of flat-topped ridges reaching a maximum height of 235 feet and deeply incised by sinuous gullies extending from the centre of the island.

"Unlike the makatea the central volcanic rock has been deeply eroded and is rarely found unweathered, is mainly tuff, basaltic breccia and devine red clay containing limonitic modules and black manganese veins up to three inches thick."

(Wood, 1967, 1437).

Drainage from the central highland is radial via deep gullies extending to the lowland swamps on the inner margins of the makatea. Some of these swamps drain beneath the makatea to the sea, as does Lake Tiroto in the south-west of the island.

The next major physical unit is a structural depression between the makatea and the central highland in which are located

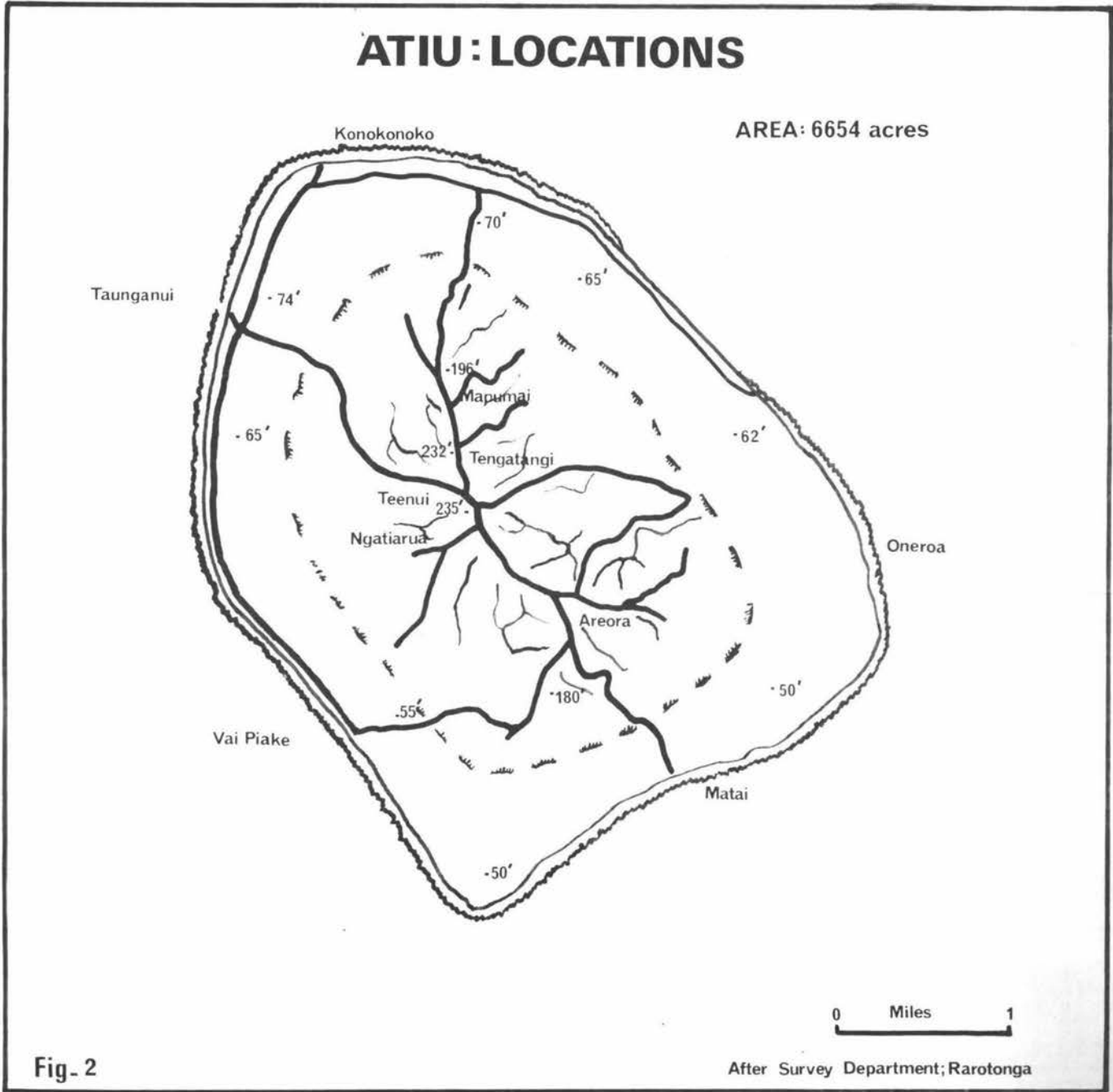


Fig-2

After Survey Department; Rarotonga

the lowland swamps vital in the subsistence economy. Finger-like extensions of these swamps occupy the radial gullies. In general they are low lying between two and fifteen feet above sea level.

The makatea is perhaps the most prominent physical feature of the present Atiuan landscape varying between one half and one mile in width and rising to a maximum height of 75 feet in the north and west, while in the south it is generally lower, reaching 60 feet in height. In the north-east the outer margins of the Makatea are cliffed and drop twenty to thirty feet into the sea. Although ostensibly flat-topped, the actual surface of the makatea is broken, being studded with resistant limestone pinnacles, depressions and sink holes and has extensive subterranean drainage. Only small isolated pockets of cultivable soil exist in the makatea.

The coastlands is the next major physical zone and is notable for its regularity. This is in part due to the island being the apex of a volcano but also because the submerged flanks of the volcano are comparatively steep allowing for little accumulation except in embayments on the western coast. The eastern coast in contrast is notable for a lack of deposition because it is exposed to the prevailing south-easterly weather and ocean currents. Here wave cut platforms, beaches and vegetative denudation owing to salt spray is evident. The coastline is encircled by a fringing reef and an intertidal one about 300 feet in width. This is however, almost non-existent on the coastal stretch between Totiko and Tarapakau Landings in the east.⁶

Climate

There is a lack of any detailed climatological data on Atiu. A rainfall record was kept from 1932 until 1940. Recording has recently been recommenced, but the figures in Table III refer to the 1932-40 period. These showed Atiu to have one of the highest rainfall averages in the Cook group, and although seasonal variation exists the island has comparatively few dry spells

TABLE II

AVERAGE RAINFALL AND RAINDAYS FOR SELECTED PERIODS

<u>Islands</u>		<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Year</u>
Atiu (1932-40)	Rainfall	8.52	11.42	16.78	8.61	7.02	5.06	3.56	5.69	3.24	4.21	6.68	11.65	92.44
	Raindays	11.90	14.00	14.40	10.60	9.10	7.40	7.70	8.60	6.70	8.70	9.60	15.00	123.70
Aitutaki (1923-50)	Rainfall	8.71	9.48	8.35	4.88	5.12	2.91	2.76	2.81	2.76	4.42	7.34	9.90	69.50
	Raindays	12.90	13.90	9.80	10.30	8.80	7.90	8.90	7.00	7.60	9.60	10.90	13.30	120.30
Mangaia (1914-53)	Rainfall	10.11	8.97	9.49	6.49	5.30	4.91	4.56	4.72	4.37	5.38	5.53	6.49	76.32
	Raindays	13.50	13.80	14.20	11.50	10.30	9.10	9.40	9.20	9.00	10.00	10.30	10.80	131.10

Source: Gerlach, 20

compared with the other islands. Yet water supply remains a problem on the island especially in the winter months. Approximately 69 per cent of rain fell between December and May. The number of rain days averaged 123.7 which was below the average for the group as a whole. Artificial water catchments have been erected in the villages and along with proposed wells, should improve the water supply.

As with the other islands in the southern Cook group, the dominant climatic influence on Atiu is the south-east trade wind system, although the frequency varies seasonally as the inter-tropical front moves north and south of the equator. From October to April wind variability increases and north and north-easterly winds become significant. Occasional hurricanes pass over Atiu especially during the October to March period. Although no figures are available, Atiu experiences marked seasonal variations in humidity levels, the summer months being characterised by high humidity.⁷

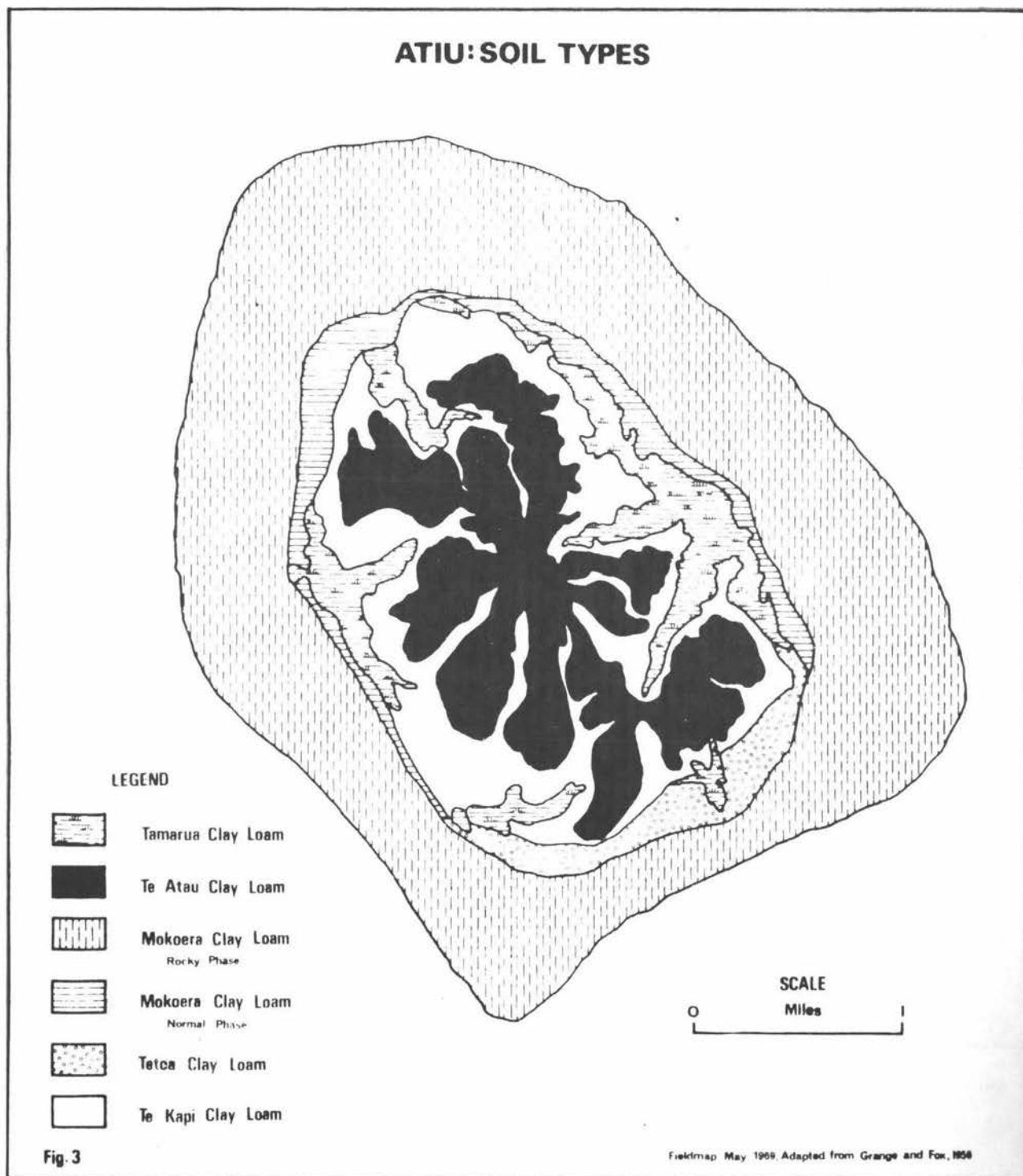
Soils (See Figure 3)

Five main soil types are found on Atiu and these broadly correspond to the basic geology. The soil on the central flat-topped ridges is the relatively infertile, gritty, red-brown Te Autua clay loam on which Psidium guayava (kuava) staghorn fern (annu'e) and occasional Casuarina grow with the recent addition of albizzia. This area has been traditionally believed useless for agriculture and has been subject to extensive burning.

Te Kapi clay loam occupies the areas of moderately steep slopes extending from the lowland valleys to the margin of the central Atiuan plateau. Though more fertile than the Te Autua plateau soils, it is nevertheless a relatively infertile deep red-brown loam. Staghorn fern and guava predominate on the upper slopes and generally give way to coconut on the lower margins.

Tamarua alluvial soil occupies the valleys in the structural depression between the central highland and makatea.

ATIU: SOIL TYPES



It is in this soil, characterised by its dark brown colouring and relatively fine texture that the Island's staple food Colocassia (taro) is produced. This soil is relatively fertile and moist compared with the aforementioned soils.

Mokoera clay loam occupies the makatea and on the inner margins of the makatea it has mixed with alluvial materials transported from the central highland. The rocky phase of Mokoera clay loam is found in the makatea proper in isolated pockets between extensive limestone outcrops. Utilisation of these fertile soils has been restricted by scarcity and inaccessibility. These are the most fertile soils in Atiu. The wild (Maori) oranges grow profusely in these soils and the fact that a large proportion of C.R.S. plots are located on Mokoera clay loam and that much of dry-land cropping is practised, testifies to its relative fertility. It is basically finely textured although because of its ambivalent origin it sometimes contains limestone rocks. The vegetation on both phases of Mokoera clay loam is similar - Cocosnoferous (coconut palm), Hibiscus Tilliaceus (purau), Caolphyllum (tamaru), Casuarina equistifolia (toa), Oleurites moluccana (tui tui), although there is a marked belt of coconut palms on the soils on the inner margin of the makatea, coconut density is decreasing further into the makatea.

One other soil type is found on the island in scattered pockets, concentrated on the easy slopes in the south-east between the lowland valleys and central highland. This is the Tetoa clay loam notable for its granular texture and dark red-brown colouring. It is relatively fertile though not as well endowed with nutriments as Te Kapi clay loam but nevertheless suited to intensive forms of cultivation. Vegetation on this soil type is similar to that on Te Kapi and Te Autau clay loams.

Erosion on a serious level in Atiu is limited to the upper soils of the island especially Te Kapi and Te Autua clay loams. Table III shows an estimate of the suitability of soil types to different types of agricultural activity.⁸

TABLE III

AREAS OF SOIL TYPES AND THEIR POTENTIAL UTILISATION (acres)

<u>Soil Type</u>	<u>Suitable for Annual and Tree Crops</u>	<u>Suitable for Tree Crops</u>	<u>Problem Soils</u>
Tamarua	293	--	--
Mokoera	582	--	--
Mokoera Rocky Phase	--	3,386,	--
Tettoa	283	--	--
Te Autua	--	--	596
Te Kapi	--	--	1,514
	<hr/>	<hr/>	<hr/>
	1,158	3,386	2,110

Source: Grange and Fox 1956, 36

Concept of Ecological Zonation (Figure 4)

The distinctive physical structure of Atiu has influenced the pattern of human occupancy and the social system which has evolved shows an intricate relationship to the environment. Traditional Atiuan utilisation of the environment differed from zone to zone. In all, there are eight main ecological areas on Atiu, which like soils, reflect the underlying geology (Plate 1).

The first zone was the ocean. The important source of protein in the diet was fish, owing to a comparative lack of animal life on Atiu. Birds provided the only alternative. It was not until European contact that the goat, pig and horse were introduced. Fishing was a perennial activity though more popular in the period June to December when flying fish visit Atiuan shores to spawn and are accompanied by tuna. Each village had its own landings from

PLATE 1.

VIEW DOWN NGATIARUA SWAMP



The view shows the different ecological zones between central highland and the makatea. In the background the bushland makatea can be seen sloping towards the puna in which the staple food, taro is produced. The majority of orange plots are found either side of the swamp between the latter and the makatea or between the swamps and the central highland. The edge of the fernland on the central highland is visible in the immediate foreground in the left of the picture.

ATIU: CROSS - SECTION OF ECOLOGICAL ZONES

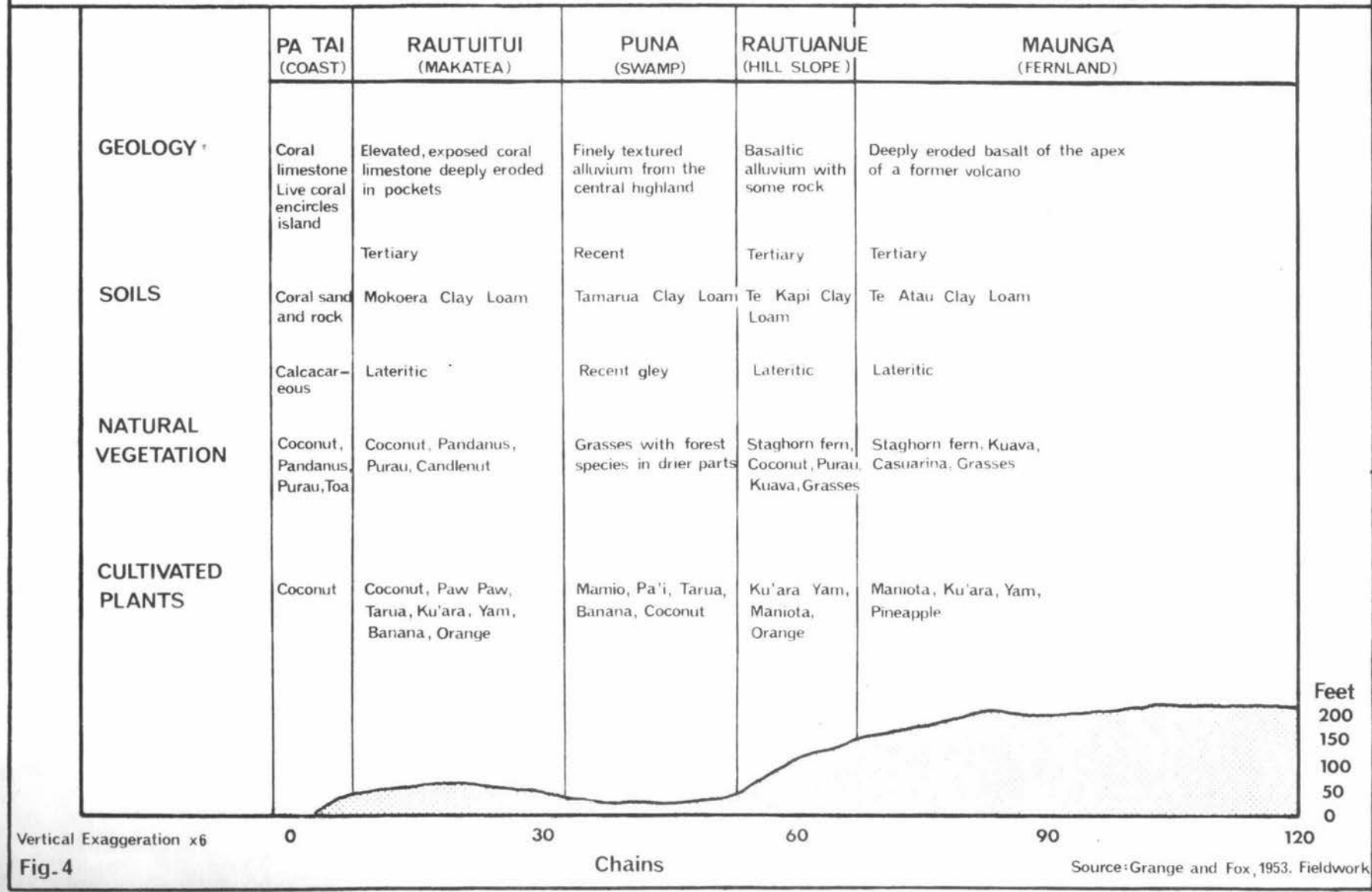


Fig. 4

which fishing took place. The tapere, or wedge shaped pieces of land extending from the reefs edge to the traditional centre of the island, were thus not terrestrial in extent. The ocean proper, however, was open to all.

Within the ocean zone was the intertidal reef which served as an important source of food and was intensively utilised. At times use of the reef was prohibited for reasons of conservation (ra'ui).

The coastlands were an important source of Pandanus tectorus (ara), one variety of which was utilised for roof thatching, purau, important in house wall construction and coconuts.

The next zone was the makatea. Here, purau, toa, pandanus, Artocarpus incisa (kura or breadfruit), Carica Papaya (pawpaw), were obtained. In small isolated pockets of cultivable soil Ipomoea batatus (Ku'ara or kumara) and Dioscorea (ui or yam) were grown. By its nature the makatea was exploited rather than utilised.

The inner margin of the makatea was a relatively fertile zone where intensive cropping took place - yams, kumara, Taccu pinifidia (pia or native arrowroot), Xanthosoma (taro tarua), Musa (koka or banana) in particular were grown here along with introduced Citrus aurantium (anane or orange) and Coffee arabica (coffee) which grew wild.

The lowland swamps inside the makatea comprised the most important resource zone in the traditional subsistence economy. Here were grown the various varieties of taro - mamio, grown under water in the matavai (irrigation channels) between the raised belts on which pa'i is produced - in a system of shifting cultivation. Food exchange, through the kin-based system of reciprocal exchange was one of the chief means by which status could be gained in Atiu and thus the swamps were heavily utilised. Warfare in pre-contact times often involved battles for these areas.

The area immediately inside the swamps, like that on the other side was an area of dry land gardening.

The central highland has traditionally been a neglected

area in Atiu as the people did not possess the technology to render it productive. It has been the scene of much burning.

Atiu had one other resource zone, the sand islet of Takutea thirteen miles to the north-west. Birds abounded on this island and were prized both as a source of decorative feathers and food, and coconuts too, may have been exploited. Since European contact Takutea has been planted in coconuts by the Atiuan people who produce the bulk of their copra exports here.

References:

1. For detailed information refer to Wood and Summerhayes, 1967, 1429-1445.
2. For more detailed treatment see Summerhayes, 1967, 1397.
3. More detailed political information can be obtained from works by Stone and Gilson.
4. For detailed treatment see Wood, 1967, 1443.
5. Marshall, 1930, provides additional information.
6. For more detail see Topographical map of Atiu, 1969, Otago University.
7. New Zealand Meteorological Notes on the Cook Islands, and Gerlach, 20, provide additional information.
8. For a more detailed account of the soils on Atiu refer to Grange and Fox, 1956.