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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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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  $8^{\circ}\text{S}$ ) to Mangaia (latitude  $23^{\circ}\text{S}$ ), and from Mauke (longitude  $156^{\circ}\text{W}$ ) to Pukapuka (longitude  $167^{\circ}\text{W}$ ).

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  $8^{\circ}\text{S}$  to  $17^{\circ}\text{S}$ . 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

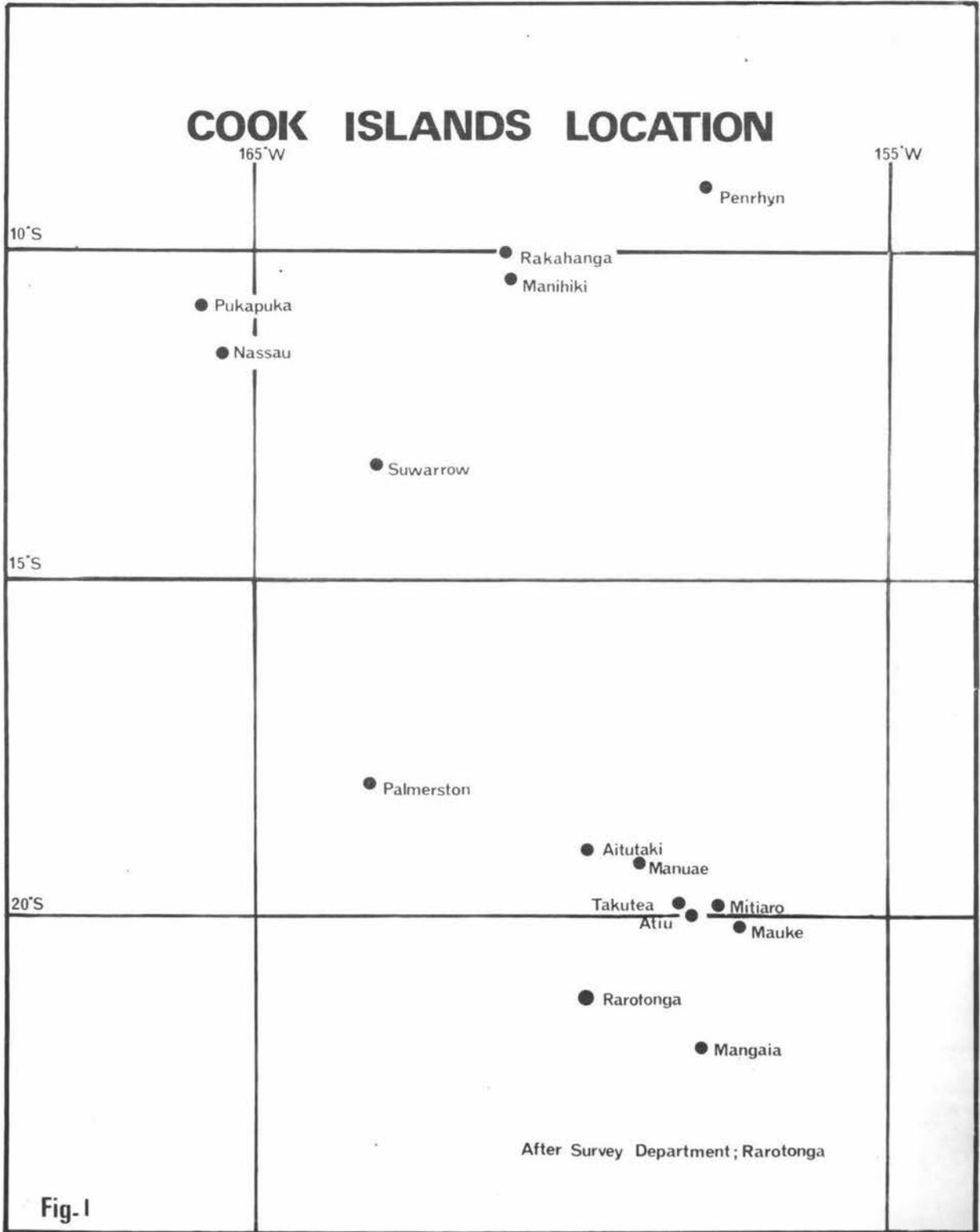
<u>Island</u>	<u>Area (Acres)</u>	<u>Percentage of Total Area</u>	<u>Distance (Nautical miles) from Rarotonga</u>
(a) <u>Northern Group</u>			
Palmerston	500	.84	270
Pukapuka	1,250	2.10	715
Nassau	300	.50	673
Manihiki	1,344	2.26	650
Rakahanga	1,000	1.68	674
Penrhyn	2,432	4.09	737
Suvarrow	100	.16	513
(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.<sup>2</sup>

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.<sup>3</sup>

## 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.<sup>4</sup> Accurate assessment of Atiu's geological age has proved difficult but it is believed to be of early tertiary origin.<sup>5</sup>

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

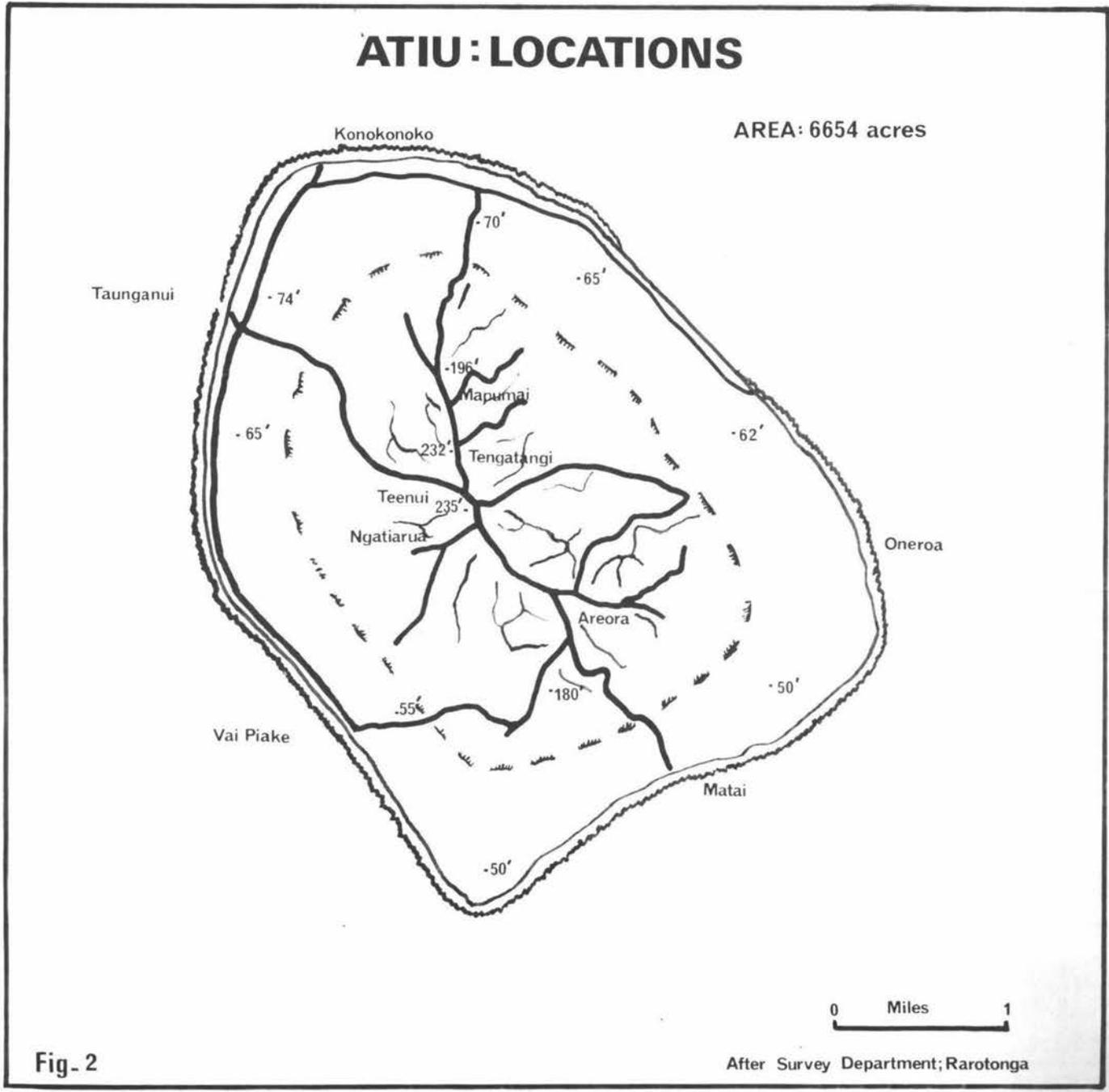


Fig-2

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.<sup>6</sup>

### 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	2.21	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.<sup>7</sup>

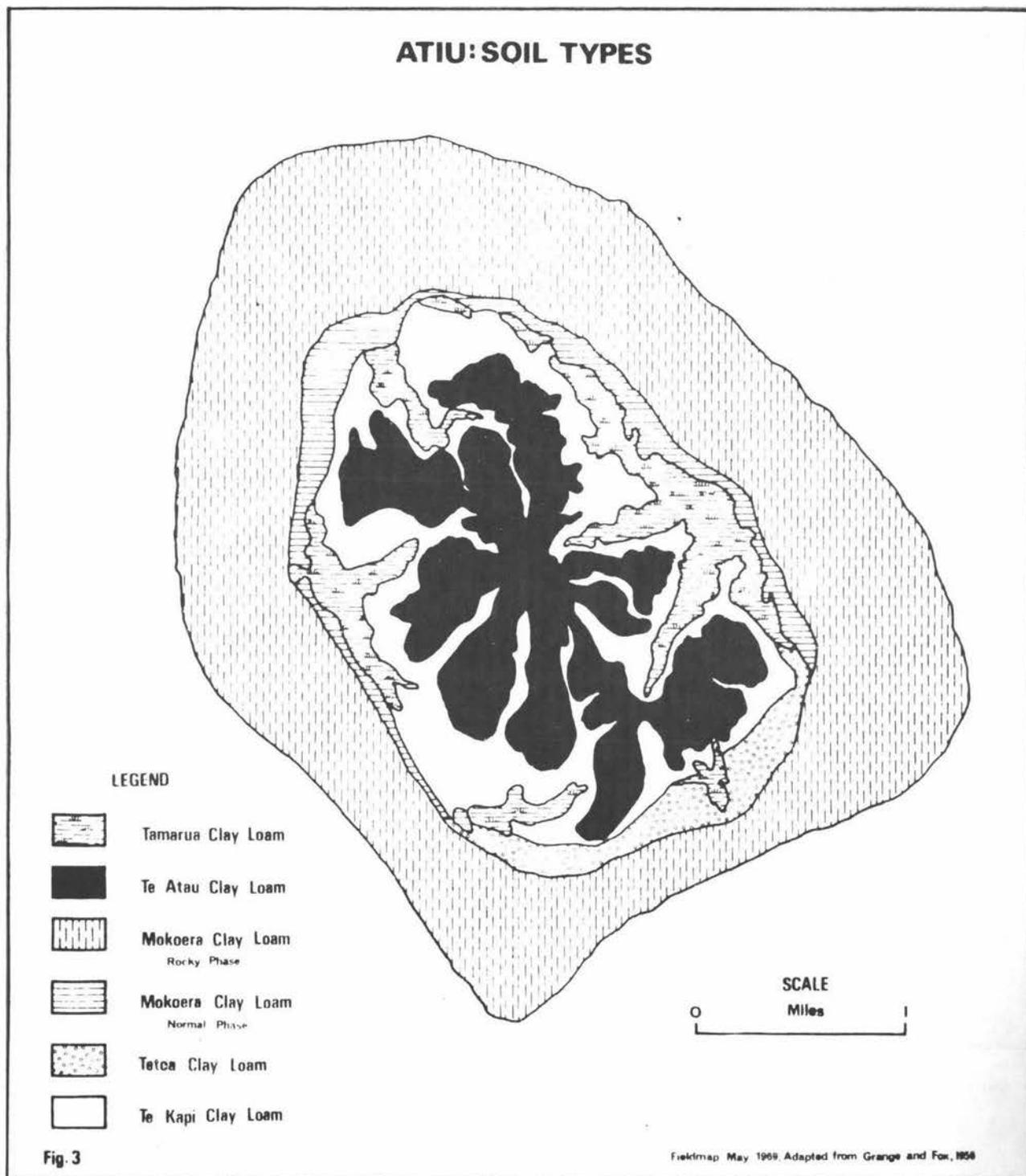
#### Soils (See Figure 3)

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), Gaolphyllum (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 nutriment 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.<sup>8</sup>

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/> 1,158	<hr/> 3,386	<hr/> 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

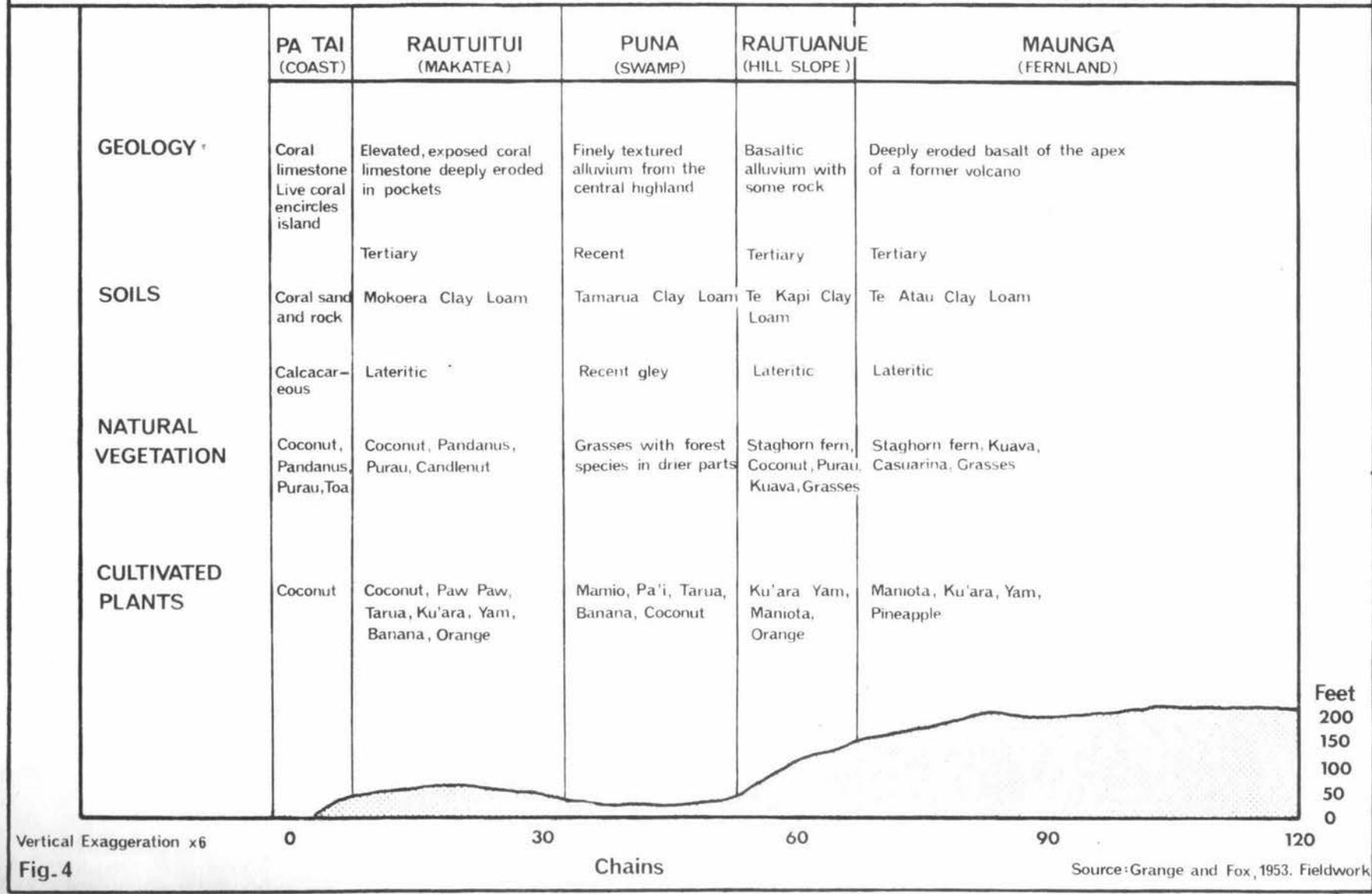


Fig. 4

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.

## CHAPTER II

ATIUAN SOCIETY: PRE-CONTACT TO CONTEMPORARYPre-Contact History and Social Organisation

The history of Atiu prior to contact with Europeans was one of internal conflict and external success in the conquest and domination of neighbouring Manuae, Mauke and Mitiaro. Manuae was subjected to Atiuan overlordship in 1777, while Mauke and Mitiaro were subservient to Atiu well before missionary arrival. There is little evidence of Atiu having a stable political environment in the pre-contact era as

"verbal tradition and literary references agree that during the early period of settlement overall power did not rest exclusively with any one group for long without being challenged."

(Crocombe, 1967,97)

Traditional Atiuan society was characterised by a clearly differentiated class structure, by primogeniture and by patrilineal descent. The leading social position was that of ariki, in whom was vested title to land. The ariki was supported by the mataiapo, heads of the main sub-tribal lineages. They in turn were supported by the heads of the minor lineages or rangitira, whose main role was the delegation of land to the metua, heads of individual households or kainga tangata. Yet although hierarchical and fundamentally ascriptive in nature, power within the social system waxed and waned according to the relative strength of personalities involved and their ability to repel challenges to their leadership.

The period immediately preceding missionary arrival was one of comparative stability. The fact that Manuae, Mitiaro and Mauke were subjected to Atiuan overlordship would appear to substantiate this. The au o mokoero (the rule of mokoero), which lasted the duration of twelve chiefs but which may have been discontinuous,

was the political establishment when Williams the missionary, arrived in 1823.

"Tradition describes the island divided into seven groups, six of which were headed by a mataiapo and a seventh by the chief of mokoero"

(Crocombe, 1967,97)

who met in council in matters concerning the island as a whole. In the latter years of the eighteenth century the mokoero line divided and three ariki titles were created - the Ngamaru, Rongomatane and Parua ariki. New mataiapo were appointed under these ariki. The mataiapo still exist but their power has decreased relative to that of the ariki as society has aligned itself under the three ariki, according to kinship ties. Hence, a somewhat ambivalent socio-economic structure emerged, based firstly upon the village and later increasingly upon the alignment of the population under the three ariki.

Although of common ancestry, the three ariki lines engaged in continual struggle for ascendancy on Atiu. The balance of power constantly altered as inter-tribal allegiances changed. Ngamaru ariki, the first created, was generally the most powerful, although challenged by Rongomatane ariki. Parua ariki, the last to emerge was much weaker than the other two. The ariki appointed "mataiapo"<sup>1</sup> in each village to act as intermediaries in dealings with the heads of other villages and tapere. Each ariki also had an akaere (speaker of the ariki) or intermediary between ariki and kinsmen. In addition, at island level there existed a chief akaere who acted as an intermediary between the three ariki when they met in council and the village akaere who were responsible for dissemination of promulgations from the ariki in council. A karakia (master of ceremonies) important in installation of ariki, was another dignitary in the traditional social system. Thus, in 1823, when Williams arrived in Atiu, three social hierarchies existed, although there

was a loose form of confederation based upon kinship and village.

### Land Tenure<sup>2</sup>

The intricate relationship between traditional Atiuan society and the environment is reflected in the system of land tenure and so Crocombe, 1961, 55, states that

"as in other parts of Polynesia, the indigenous land tenure system of the Cook Islands was intimately related to its social organisation - so much so that a knowledge of the social system is a pre-requisite to an understanding of the system of land tenure."

Title to land was vested in the ariki, who in tracing descent from the gods, shrouded the system of land tenure in religious belief. Land tenure was religiously sanctioned and this gave validity to rights in land. Both group and individual land rights existed, the latter being the more significant on an areal basis. Land rights traditionally stressed the identity of tapere, village and descent group as well as the position of the metua in the major lineage, for descent was strongly patrilineal.

Communal land rights were limited in Atiu and were confined to the koutu (tribal meeting place) and the marae (the religious centre) which were controlled at tribal level. In addition, there was free access over tribal lands in periods of peace "provided known pathways were used and activities were legitimate." (Crocombe, 1961, 55).

In addition, the ariki had the right to impose a ra'ui (c.f. New Zealand maori tapu) over tribal lands if deemed necessary. In times of necessity the tribal interest over-rode individual rights.

The basic unit of land in traditional Atiuan land tenure was the tapere, which, in traversing all the different resource zones provided each lineage with equitable land resources. The ariki delegated land to mataiapo, who as heads of the major lineages

were responsible for delegation of land to the rangitira, or heads of the minor lineages. From this level, land was allotted to each kiato (or family branch) and thence to the metua of the kainga tangata. Once land was delegated from the mataiapo to the rangitira, the rights of the major lineage were limited to right of reversion in case a minor lineage became extinct, right of participation in any matters concerning the tapere as a whole, and lastly a symbolic right to consider the land as its own.

There were four traditional land rights.

- (i) Primary rights were based upon direct descent from a member of the major lineage involved, which in general was patrilineal but in some cases matrilineal.
- (ii) Contingent rights were those which involved people who had left their born lineage and joined another, but whose rights to land in the lineage of birth could only be conferred on return to that lineage except under exceptional circumstances. In most instances this involved women who had married into other lineages or males who had married uxorilocally.
- (iii) Contingent offspring rights involved offspring of contingent members of a lineage who could, if they so desired, return to the lineage of their contingent parent and become primary members of it (e.g. feeding children). Grandchildren could return to the lineage of contingent grand-parents and also gain rights, but the more distant the relationship the weaker the rights became.
- (iv) Alien rights were rights of non-primary members of a lineage, usually involving females who had married a primary right holder of the lineage, uxorilocally

married males or less frequently, aliens. These rights, however, were not transferrable and lasted only the duration of a lifetime.

Superimposed on these customary rights is the activity of the Land Court founded in 1902, which has surveyed the boundaries of the customary tenure system and granted Occupation Rights, providing security of tenure to individuals wishing to utilise land for some permanent means, usually building a home or establishing a citrus plot (Appendix II).

Although on an areal basis the activities of the Land Court have been limited, economically and socially its activities have been formidable. Both the cash and subsistence sectors of the economy have been affected as a legal mechanism has replaced lineage membership as the basis of the man/land relationship. There has been a move from a genealogical to an areal delimitation of land. The inbuilt flexibility of the traditional land tenure system has been lost as boundaries have been rigidly plotted on survey maps, and subsequently has tended to encourage inequitable distribution of land both quantitatively and qualitatively. During the early surveys, some Atiuans better versed in English exploited the language difficulty to increase their lands to the detriment of other families.

The Land Court first visited Atiu in August, 1919 and on eleven subsequent visits, the last being in 1958. To date, approximately 350 Occupation Rights have been granted of which 60 per cent have been for citrus plots, the remainder being for house sites.

Land disputes which cannot be solved either at metua or rangitira levels are referred to the Land Court which hears submissions on its infrequent visits to Atiu. The decentralised nature of the Cook Islands makes for a fundamental weakness in the present system owing to the time lag involved between petitions to the Court and effective judgement. At the 31st March, 1968

there were 792 outstanding applications for Land Court hearings in the Cook group. However, at present, there are few outstanding claims on Atiu.<sup>3</sup>

#### Atiuan Society 1823-1901

In 1823 John Williams arrived in Atiu from Aitutaki, a year after having sent Papehia, a Tahitian convert to the Island to instruct the "natives" in the gospel teachings prior to his arrival. However, mission successes on Atiu were minimal in the nineteenth century. The main problem confronting the missionaries was the power of the ariki, who successfully resisted the majority of attempts by the missionaries (orometua) to usurp their prerogatives. The Atiuan ariki remained supreme and missionaries tended to become mere puppets in the power struggle on the Island. This was the result of two main factors:

- (i) Most of the nineteenth century orometua on Atiu were Polynesians (Tahitian or Cook Islanders) who did not have the same degree of influence as the European (papa'a orometua). In Aitutaki and Rarotonga where papa'a orometua were stationed, far greater impact was made and 1901 Bourke noted that mission activity was probably at its lowest in Atiu. Crocombe (1967,99) writes

"Opposition to external authority and resentment of any implication of inferiority were probably strengthened by Atiu's tradition of successful conquest and colonisation."

- (ii) Because orometua were aliens, they had no claim to land and were rendered completely dependant upon the hospitality of one of the ariki for livelihood. They were puppets of the host ariki who manipulated the Church to increase their mana.

The first real mission success was the conversion of Ngakaara Rongomatane ariki who appears to have been the dominant ariki in Atiu in the early mission period, but evidence suggests that

"even Rongomatane was unable to persuade all Atiuans to become Christians until some Tahitian Christians were miraculously saved from a storm by being cast adrift at Atiu."

(Crocombe, 1967, 99)

Following his conversion, Rongomatane went with the orometua to the subject islands of Mitiaro and Mauke (where in 1819 he had led a slaughter) and demanded that the local ariki, as agents of their Atiuan overlords, embrace the Christian faith along with their people.

The first major impact of mission activity was the resettling of the entire population in one settlement in the centre of the island. Formerly the population had lived in separate settlements on tribal land near the swamps (puna) where the staple food, taro, was grown. The move was accomplished without land tenure problems, hastened the process of conversion by easing the demands on the orometua and made for a religiously focussed settlement on a site more suited to European occupation. Nightingale in 1852 wrote (Rene, 96)

"The fifteenth day of July brought us to Atiu, another of the Hervey islands. The landing was affected with some difficulty and danger, the inhabitants being obliged to carry us over the surf and rocks on their shoulders. The native settlement is erected on the most elevated part of this island, almost three miles from the beach, and is exposed to the sea breeze, which renders the situation sulubrious and delightful in the extreme. In the centre of the town stands a neat stuccoed Church, and scattered over the adjacent hills are scattered huts."

Atiu does not appear to have suffered from a population

decline in the nineteenth century as was the case in Aitutaki and Rarotonga, probably because contacts with the outside world were limited. The first recorded census seems to have been that of Gill (1879, 41) who wrote that

"The population of Atiu is 960, subject to three Chiefs of equal authority, and living in a village built on the high table land in the centre of the island."

By 1902 when a census was taken the population was 918 and this reduction was probably due to inter-island migration as much as any other factor. Crocombe (1967, 99) notes migration of Atiuans in the nineteenth century, and many settled in Tahiti from 1878 onwards on land they had purchased there after having worked on sugar plantations. Table IV shows migration figures for Atiuans as at 1901.

TABLE IV

ATIUAN MIGRATION BY AGE AND SEX UNTIL 1901

<u>Age</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
1-15	9	3	12
16-40	16	26	42
40+	10	16	26
			<u>80</u>

Source: AJHR, A<sub>3</sub> 1901,11.

Although the extent of missionary induced social change in nineteenth century Atiu was limited, some significant trends were initiated. Notable amongst these was a comparative decline in the degree of Atiuan domination of Mauke and Mitiaro. Maukians stopped paying tribute (atinga) to the Atiuan ariki as early as

the 1840's. Two attacks were made on Mitiaro in the pre-protectorate era while as late as 1895 Paulo Ngamaru ariki intervened in Maukian affairs annulling leases of land to a German trader, Frauheim and divesting the Maukian ariki involved of his title.

As elsewhere in Polynesia abolition of polygamy as a social institution was one of the first tangible results of missionary activity. Associated with this was a rise in social status of females who had traditionally held an inferior position within the community. Women had not been able to assume high rank within the community, but at the end of the nineteenth century both Parua ariki and Rongomatane ariki were women. Finally, missionary activity caused the loss of the "divine right" of Atiuan ariki, who had traced descent to the Gods and were believed to be intermediary between the Gods and the tribe. The orometua displaced the ariki as the intermediary, although this affected ariki mana little, for as hosts of the orometua they were given status within the Church. Even as late as 1882 Paster G.A. Harris wrote of the ariki - "Most of the power is in their hands." (Crocombe, 1967, 99). In 1878 an Aitutakian orometua in challenging ariki power was threatened with expulsion and replacement by the ariki. The end results was his transfer and replacement by a native Atiuan, by birth subject to one of the three ariki. The interference of ariki in religious affairs reached a climax with Paulo Ngamaru ariki who demanded that all money given to the orometua or sent to L.M.S. Headquarters in Rarotonga should be first given to the ariki. In 1882 Ngamaru was censured by the Church for administering the sacrament of marriage and granting divorces and so Gill wrote in 1879 that

"it must not be imagined that Atiu is an island of saints. Very far from that. Native pastors are altogether far too lax in their ideas of Church government, and the chiefs are very despotic, continually trying to interfere in church matters."

The establishment of a nucleated settlement tended to increase ariki mana as they were given status in the Church which was

increasingly becoming the focus of village life.<sup>4</sup> However, the greatest social change in the nineteenth century was the increase of ariki power in economics. Trading activity began in Atiu following missionary arrival and this marked the introduction of money to Atiuan subsistence economy. Traditionally the ariki was the central pivot of the reciprocal exchange system, being responsible for collection and distribution of all commodities of tribal importance. The kainga tangata traditionally paid atinga to the ariki. A subsistence economy, however, differs from a market economy in one major aspect - the commodities exchanged usually lack a store function significant in the market economy. Money can be stored; food, the major item involved in the traditional Atiuan reciprocity system could not be effectively stored for long periods. The effect of trading was that the ariki began to collect wealth at the expense of the remainder of the tribe through "tapping" atinga. Thus the ariki attracted to Atiu traders like Lamont, Nightingale, Exham, Von Nagel and others. When the trader Lamont visited the island in 1852 he found two market-places at the landing place, both under the control of the chiefs, and the only permanent European on the island at that time was an English trader who lived in a house belonging to, and next to that of the chief. From about 1863 Richard Exham, another English trader, spent fourteen years in the same relationship to Ngamaru Rongotini. (Crocombe, 1967, 100).

In Ngamaru ariki, manipulation of the Atiuan economy and political power reached a zenith. He built a two-storied mansion at a cost of £600, and in 1895 purchased a boat renamed "Ngamaru Ariki" from Tahiti in the name of the people. His power rested on the fact that he was supported by the other two ariki on Atiu who in the latter part of the century were women, and the fact that he was married to Makea Takau, head of the Federal Government under the Protectorate. The Act of 1891 by which Atiu became part of the

Protectorate reinforced ariki power by supporting its continuance. Ngamaru appointed members for Mauke and Mitiaro to the Central Council under the Protectorate, and as dominant ariki on Atiu was responsible for placing puppets in the minor bureaucracy which was established in 1891. Although not resident in Atiu for the latter part of his life, Ngamaru's power remained supreme.

In the period 1823-1901, apart from minor innovations which in general served disproportionately to increase ariki power relative to the remainder of the community, there was little significant change in Atiuan life. Syncretism rather than change characterises the period.

#### Atiuan Society 1901-1950

Atiuan history reached a watershed in 1901 for Atiu

"became part of New Zealand in June that year. This was a turning point in the island's history, for annexation made Atiu a small part of a small dependency of a small nation, subordinate in political, economic and religious affairs to more powerful forces."

(Crocombe, 1967, 109)

The period is notable for a conscious policy of disrupting the existing Atiuan leadership, imposition of an exogenous, impersonal, externally orientad administration centred in Rarotonga, poor development policy and resource appraisal and as a consequence economic stagnation and social anomie (Table V).

TABLE V  
ATIUAN EXPORTS, 1905-1918

<u>Year</u>	<u>Oranges</u> <u>(cases)</u>	<u>Coffee</u> <u>(lbs)</u>	<u>Candlenuts</u> <u>(Ton)</u>	<u>Copra</u> <u>(Ton)</u>	<u>Lime Juice</u> <u>(Gals)</u>	<u>Bananas</u> <u>(cases)</u>
1905	3,141	2,073		144	3,150	
1906	9,333	10,900	64	30	3,780	
1907	13,762	5,162	36	41	540	
1908	No Records					
1909	4,614			204		
1910	13,566	203	45	103		198
1911	14,072	11,000		170		
1912	14,722	900	31	149		28
1913	8,975	2,000		260		4
1914	2,196			43		
1915	5,604	2,600		1		
1916	5,716		27	27		
1917	2,258			150		27
1918	2,240	3,000		106		

Source: Compiled from AJHR, A<sub>3</sub>, 1905-1918

With annexation came Colonel Gudgeon who regarded ariki power as the chief impediment to development and consciously sought to undermine it. In 1908 he claimed that the people of Atiu

"suffer from the fact that they have not made any progress towards civilisation during the last forty years. They are still savages, and the arikis are supreme. In the case of Mauke I had a sound excuse for ordering that all the lands should be surveyed, for the people of that island were always quarrelling; but in Atiu the chiefs and arikis govern with a strong hand, and if there be quarrels they are hidden from me. The people are used to submission, and even though I may advise the chiefs to have the tribal boundaries surveyed it will be of little benefit to the lower ranks of people, in whose fortune I am most concerned.

Source: (AJHR A<sub>3</sub>, 1908, 11)

In 1902 he established the Land Court and by making this the effective legal mechanism of land tenure, believed he would undermine ariki power. Gudgeon sought to abolish the custom of paying atinga to the ariki, and believed that by defining rights to land, disrupting tribal land tenure and communal agriculture (which he thought inefficient) and by encouraging individualisation of agriculture on which trade was based, the Land Court would increase production. But in attacking the ariki system, Gudgeon was striking at the very core of traditional Atiuan life, for - "it is difficult to disassociate traditional subsistence agriculture from its social background." (Barrau, 1958, 2). The ariki was not merely the distributor of land, but the pivot of the system of reciprocal exchange and the supreme administrative, judicial and to some extent religious leader. The fall of the ariki would herald the fall of the traditional social life. The arrival of the Land Court in 1919 ensured this occurrence.

Annexation established a new political system on Atiu, externally oriented and notable for a lack of involvement with the

people themselves. An impersonal, bureaucratic political system replaced the ariki and judicial, economic, religious and political power became differentiated. In the new system the people had no real access to the Administration and no sanctions against it. In 1902, Adolf Von Nagel was appointed part-time Resident Agent of Atiu and in 1909 a full-time Resident Agent was appointed and Captain Large took up duties on the island. In 1901, Gudgeon as chief judge, assumed responsibility for cases of murder and manslaughter, civil cases against foreigners and those between maori and papa'a. In 1899 he had ordered that all fines be paid to the Federal Treasury and not the ariki.

Ariki political, economic and judicial power waned, being usurped by the Resident Agent, while control of land tenure gradually passed into the sphere of the Land Court. Stripped of these powers, ariki influence in religious matters decreased in proportion to the decline of orometua dependance upon ariki patronage. With the death of Paulo Ngamaru ariki in 1903 and the undermining of ariki power, effective control of trading fell into the hands of European and Chinese traders. Atiuans had lost control of virtually all powers formerly vested in the ariki.

The situation continued up until recent years. Crocombe, (1967, 111), described the New Zealand administration as "a passive but benevolent paternalism, the authoritarian Government of a leaderless people."

Parallel to socio-economic disintegration on Atiu came another force tending to complicate matters - religious splintering. In 1919 the Atiuan Roman Catholic Church was founded by a Maukian priest who, en route to Rarotonga was put ashore at Atiu. Approached by the Rongomatane ariki to establish a school on Atiu, the priest obtained church approval and founded both a school and a church, members of which came predominantly from Areora village where the priest initially resided. Thus, educationally and religiously the

island became splintered and the situation deteriorated later when the Seventh Day Adventists (S.D.A.) Church was founded. Inter-denominational antagonism became rampant and only tended to aggravate the prevailing social climate. In 1947 the occurrence of a cargo cult amongst some members of the L.M.S. Church would indicate that this was a period of intense social anomie in Atiu.<sup>5</sup>

It is against this political and social background that the general decline of the Atiuan cash economy, particularly in the post-1920 period, must be viewed (Table VI). Coffee, copra, oranges, limejuice and later bananas and kapok were the main cash crops. The earliest available report shows that in 1903, 5 tons of coffee, 118 tons of copra, 4,000 boxes of oranges and 50 barrels of limejuice were exported. The erroneous belief in the great fertility of tropical environments was reiterated in early reports of Atiu, and to a great degree influenced early twentieth century policy (Appendix III). Administrators like Gudgeon, unaware of the nature of the environment blamed the social system for the comparatively low productivity. The Report of the Cook Islands and Nuie (1903) says of Atiu

"Coffee, pineapples, bananas and vanilla grow luxuriantly.....a considerable area of land on this island is well adapted for the cultivation of oranges, limes and coconuts still remain to be planted. Atiu is a valuable island, and exports good quantities of copra, oranges, coffee and limejuice. All the usual island fruits grow well, but a fuller development of the resources of the island is retarded through lack of proper facilities for shipping produce."

(AJHR, 1903, A<sub>3</sub>, 15)

The period 1902-1953 shows continual fluctuations in the amount and value of exports due to natural factors, changes in economic situations, but perhaps most importantly to the lack of adequate infrastructure as the above quotation implies. In 1934

"owing to a lack of shipping facilities less than 3,000 cases of oranges were shipped for the season and thousands of cases of excellent fruit were able to rot."

(AJHR, 1935, A<sub>3</sub>, 12)

Oranges were the main export of the period and up until 1937 when the Government Fruit Control Organisation was established to control all aspects of the industry, broad fluctuations in exports were experienced under private traders on the island. Export production of wild "Maori" oranges reached record levels during the second World war but thereafter as normal world trade recommenced, Atiuan export production fell away due also to the aging and non-replacement of trees.

TABLE VI

ATIUAN CITRUS EXPORTS AS A PERCENTAGE OF TOTAL COOK ISLAND  
EXPORTS FOR SELECTED YEARS, 1903-1953

<u>Year</u>	<u>Atiu</u> <u>(cases)</u>	<u>Cook Islands</u> <u>(cases)</u>	<u>Atiuan Percentage</u> <u>of total</u>
1903	4,000	60,346	6.62
1910	13,566	94,024	14.42
1918	2,240	84,178	2.66
1927	14,509	123,021	11.79
1934	1,689	79,730	2.11
1935	7,831	48,812	16.04
1939	21,196	55,064	38.49
1942	29,437	52,763	55.79
1945	11,801	24,833	47.52
1950	1,731	33,173	5.21
1953	505	38,616	1.30

Source: Fruit Control and Treasury Records

Throughout the post-1900 period and up until the mid

1950's production of cash crops had not been by accepted modern practises, but was founded on the traditional, unscientific and somewhat haphazard methods of subsistence agriculture, which by modern criteria proved inefficient both economically and temporally. The problem of relative isolation, comparatively irregular links to markets, and the arrival of competitors on the New Zealand citrus market necessitated a revision of cash cropping throughout the Cook group in general. This came in the post-1945 era and has involved major agrarian reform on Atiu. Three major schemes were initiated, two, those for coffee and forestry having been relative failures, while the Citrus Replanting Scheme, although initially unsuccessful has rejuvenated to such a degree that Atiu now ranks as the most successful citrus producing island outside Rarotonga. Alongside the recent success of the Atiuan C.R.S. and inversely related to it, has been the re-emergence of social coherence under enlightened and trusted local leadership - something the island had lacked for half a century.

#### Contemporary Atiuan Society

Despite 146 years of contact with more advanced civilisations, syncretism rather than social change has characterised the period. Changes have taken place but the cognitive orientation of the people has remained basically unaltered.

The family remains the basic unit of life on Atiu, although within it change is taking place as people are tending to live increasingly in nuclear rather than extended family groups. This is part of the individualising impact of development.

The village is the focus of family life although with the introduction of uxori-local descent, the synonymity between village and lineage has been shrouded.<sup>6</sup> Despite the distinctive nucleated settlement pattern, inter-village rivalry persists and has not been replaced by social amorphousness. Each village elects its own Council, which is responsible for implementing directives from the Island Council.

The Church remains the pre-eminent force in the villages and island as a whole (Plate 2). Despite the introduction of the Roman Catholic and Seventh Day Adventist (S.D.A.) Churches, the L.M.S. Church (now called the Cook Islands Congregational Church C.I.C.C.) remains the predominant religious denomination on Atiu (Table VII).

TABLE VII

ATIUAN CHURCH AFFILIATION BY VILLAGES, 1968

	<u>C.I.C.C.</u>	<u>R.C.</u>	<u>S.D.A.</u>
Ngatiarua	108	8	15
Tangatangi	257	1	0
Mapumai	139	22	11
Areora	137	197	64
Teenui	410	17	16
	-----	---	---
	1,051	245	106

Source: C.I.C.C. Annual Census Record of Atiu

Membership of the other two Churches is concentrated heavily on Areora village. Recently the relations between the three denominations have undergone a detente, and antagonism has declined.<sup>7</sup> Although Roman Catholic children are educated by the Church and each church organisation has its own Youth Movements, recent events have reflected emerging religious tolerance on Atiu.<sup>8</sup> The three churches have so far successfully resisted efforts to establish a Mormon Church on the island.

The tribe in Atiu has undergone an eclipse parallel to the fall of the ariki. Uxorilocal descent has reduced the concentration of tribes, although Atiuans still affiliate themselves under an ariki, usually on a patrilineal basis. The tribe today like the ariki, is really only of ceremonial significance.<sup>9</sup>

The relationship of villages to their districts (puna)

PLATE 2.

THE ATIUAN C.I.C.C, TEENUI



The C.I.C.C. dominates the settlement on Atiu and its central location reflects its social role. The church is the largest in the Cook group and its significance as an agent of social cohesion is reflected in the fact that the bell-tower was built communally and largely financed by Atiuans resident in New Zealand.

has also undergone a change since the altering of the system of land tenure. Uxoral descent has led to cross village ownership of land. The former synonymity of village membership and possession of land rights in the contiguous puna has decreased and many people living in one village cultivate land in puna of other villages.

Yet despite existing social differentiation, there exists in Atiu an over-riding sense of unity. Centralisation has undoubtedly been one of the main factors in the recent re-emergence of social cohesion on Atiu, which is not so evident on many of the other islands of the Cook group.

#### Contemporary Atiuan Agricultural Economy

The Atiuan economy has a dual quality characteristic of most peasant societies in the Pacific. A large subsistence sector providing the staple foods has a smaller, but expanding cash sector superimposed upon it. Individuals within the society are located at various points along a continuum of socio-cultural evolution. Economically, movement on this continuum involves a move from a kin-based system of reciprocal **exchange to the impersonal price** mechanism in which security, not lineage membership is the underlying principle. "Society and economy are held together in different historical epochs." (Belshaw, 1968, 97).

Subsistence agriculture on Atiu is concerned mainly with the production of taro, the staple food which is supplemented by dry land cultivation of taro tarua, maniota, kumera, yam, coconut, banana and pawpaw and by fishing. Taro is grown in the lowland swamps, while the majority of dry land cropping is practised on the lowland margins on either side of the swamps, although some cultivation is beginning to take place in the central highland and a little in the makatea.

This sector of the economy is notable for its entrenched quality, typical of most isolated Pacific peasantry. Change proves difficult to implement in the Atiuan subsistence economy

which is one area of traditional Atiuan life which has undergone minimal change. Subsistence agriculture provides the security in peasant life and until an alternative is found, it is unlikely to alter. Relatively primitive technology, involving use of the ubiquitous machete and digging stick, and labour intensiveness characterise this sector of the economy.

At present commercial agriculture in Atiu is confined to three main crops, citrus, coffee and copra. Maniota and pineapples also can be included but they are relatively insignificant in both production and monetary value. Of all these crops, citrus has been the most successful.

Coffee is grown especially by those people who have no access to land suitable for citrus production, or who are unable to obtain Occupation Rights from their families (as a non-permanent crop coffee does not require long term security of tenure). However some citrus plot owners also produce coffee which provides a source of income in the citrus off-season from December to February. Coffee occupies 25 acres and much is interplanted with bananas, coconuts and arrowroot. This, plus the fact that coffee is a short-term labour intensive crop, has meant that it has not resulted in as much agrarian reform as citriculture.

Copra is produced annually and exported to Rarotonga, although production since 1967 has been interrupted as a result of hurricane damage. With the recommencement of copra production in 1969 and the maturation of coconut plantations on Takutea and around the Atiuan coast, the receipts from commercial agriculture should be more evenly distributed throughout the year.

Maniota is utilised for the making of starch mainly in the citrus off-season and is largely the responsibility of the women who work communally. Starch is sent via the Atiu Co-operative Society or privately to Rarotonga.

It is mooted that pineapple production should be commenced

on the island, Atiuan private industry and the Agricultural Department being involved in this proposal. Successful introduction of pineapple production would further reduce the seasonality of receipts from commercial agriculture in Atiu. At present there is a marked period of subsistence from October to March, followed by a period of comparative wealth throughout the remainder of the year. Pineapple production would alleviate this economic problem which has disturbing social ramifications, and is obviously an important factor in promoting migration. Moreover, it would increase shipping frequency in the October to March period, as well as increasing pineapple intake to the New Zealand owned juicing plant in Rarotonga (Island Foods Ltd). Few planters produce pineapples because of the present policy of concentrating production on Mangaia where the Land Court does not operate and the difficulty of obtaining pineapple shoots (uri ana).

Despite the orientation of commercial agriculture to provide cash income, it still has a subsistence quality as growers divert to varying degrees some production to domestic consumption. This applies even to the C.R.S. and as a result output from commercial agricultural crops is higher than actual exports figures indicate.

Citrus, the most important commercial crop, occupies 100 acres, 25 of which are unproductive since the trees have only been planted since 1967. Further expansion is being thwarted by lack of seedlings (uri anane) and machinery capable of clearing land. Island Foods Ltd have expressed interest in establishing under European management, a two hundred acre plantation on the central fernland if land can be leased and a more efficient harbouring system provided. Such a development would involve modern production techniques, mechanisation where possible and would utilise Atiuan labour where necessary. If this materialises, a traditionally neglected part of the Atiuan environment would become productive, labour opportunities and shipping links to Rarotonga increased and an important demonstration effect of modern agricultural practice

injected into the island. However, this would decrease Government control of the Atiuan citrus industry which was begun in 1937 and has ensured that no exploitation of local growers takes place. Moreover, such a move would accentuate Atiuan dependence on one crop. On the other hand, a paid labour force would be maintained through the year in plantation and maintenance.

An important policy decision must be made concerning the Atiuan commercial agricultural economy, upon which the majority of people depend for an income. A diversified economy can be encouraged which would reduce the boom/slump nature of a highly specialised, basically monocultural economy. However, the size of the population and the limited area of suitable land would render this difficult. The alternative is to establish a specialised, quasi-monocultural tree crop economy for which a chequered future could be forecast.

Thus, within the realm of Atiuan agriculture there exist two different economies, each with its own institutional framework and superimposed on this is a small bureaucracy of central Government employees. The large subsistence sector is still grounded in traditional cultural foundations - the family-based, village oriented reciprocity system. It is characterised by labour intensiveness, functional diffuseness of the "chef d'entreprise", conservative attitudes, local orientation and the subsistence motivation. Alongside this is the cash sector based on scarcity, commercially sophisticated, externally oriented, specialised, more individualised, capital intensive and profit motivated.

The two economies cannot be divorced as the majority of the people are engaged in both. The basic difference between them lies in their institutional foundations. Both are investors in that they plan, organise and attempt to maximise resource utilisation and both are achievement oriented. The difference lies in the direction the respective institutional complexes channel activity. All societies have their own systems of

exchange, moral values for judging worth and sanctions to induce conformity for "primitive economy is different from market economy, not in degree but in kind." (Dalton, 1961, 2).

As the Atiuan economy develops and the cash sector expands, there will be a move away from reciprocal exchange to that of the modern market mechanism through which land and labour, in addition to commodities produced, will pass. This will necessitate parallel social adjustments as fundamental principles of economy are incorporated into the new institutional framework for as Belshaw (1968, 110) writes

"The task of modernisation is to harness these principles to a new institutional complex, and to put them to work in an altered context."

#### References

1. These "mataiapo" are distinct from the mataiapo, heads of the major family lineages under the ariki.
2. For more detail on land tenure refer to Bohanan, 1962 and Crocombe, 1966.
3. In 1966 the contemporary Resident Agent on Atiu was instructed to hold a Court to clear the backlog of Atiuan petitions to the Land Court. Decisions were ratified by officials in Rarotonga.
4. Even today arikis have special boxes at the front of the Church, segregated from the remainder of the congregation.
5. More detailed treatment of this occurrence is obtainable in Crocombe, 1961, 2.
6. Sport is played on an inter-village basis, village inspections (tutaka) are held monthly on an inter-village basis to determine the tidiest village. Each village also provides a boat and crew for boating and reefing on ship days.
7. A recently established Teachers' Association includes both Catholic and State Primary Schools plus the Junior High School in its organisation and has a Catholic Priest as Chairman. A kindergarten, formed in June 1969 was similarly run on an interdenominational basis. A Boys' Brigade Camp in May 1969 included both the Boy Scout and Junior Missionary Volunteers,

and religious instruction throughout was shared by all Atiuan religious denominations.

8. The S.D.A. Church has the J.M.V., the Roman Catholic Church the Boy Scout Movement, while the C.I.C.C. organises the Boys' Brigade.
9. During the fieldwork in 1969 the Rongomatane tribe was preparing for the installation of a new "ariki."

## CHAPTER III

ATIUAN POPULATION SINCE 1900Population Trends in the Twentieth Century

The total Cook Island population underwent an increase of 58 per cent in the period 1902-1966. Atiuan population during the same years increased at a slower rate of 44 per cent although a decline was recorded between 1906-1916. This was caused primarily through migration and to a lesser extent by disease. Numerically the population growth on the island, 1902-1966, has involved an addition of only 409 people, having risen from 819 to 1,327. Of all the southern group only Mangaia experienced a slower rate of population growth, registering a 40 per cent increase over the same period.<sup>1</sup> The effect of this comparatively slow rate of population growth has been that the proportion of the population of the Cook Islands resident in Atiu has decreased from 11.17 per cent in 1902 to 6.89 per cent in 1966, which is the highest decrease amongst all islands in the southern Cooks, with the exception of Mangaia. In the intercensal period 1961-1966, however, these two Outer Islands were the only two to increase their proportion of total Cook Island population (Table VIII). Numerous factors have accounted for the low rate of population increase, notably migration, but perhaps more significantly high rates of infant mortality. By 1968 infant mortality had dropped to 34.2 per thousand live births, a considerable improvement on past rates which have been in excess of 250 deaths per thousand live births (Table IX). Improved medical facilities and attention, regular medical inspections of children, maternal education, and a reduction in the level of malnutrition on the island have all been responsible for this falling infant mortality rate.

The twentieth century has also been notable for increasing birth rates and decreasing death rates mainly owing to the

TABLE VIII

PERCENTAGE OF TOTAL POPULATION OF THE SIX MAIN SOUTHERN GROUP ISLANDS

<u>Year</u>	<u>Atiu</u>	<u>Mauke</u>	<u>Mitiaro</u>	<u>Mangaia</u>	<u>Aitutaki</u>	<u>Rarotonga</u>	<u>Total Cook Population</u>
1902	11.17	4.50	2.00	18.76	14.24	25.1	8,213
1906	10.77	5.23	2.46	17.97	13.64	28.7	8,518
1911	9.83	5.28	2.29	16.99	14.29	31.9	8,655
1916	8.62	5.56	2.69	14.13	14.78	34.8	8,805
1921	8.84	6.11	2.18	13.00	14.51	37.0	9,459
1926	9.25	5.06	2.36	12.38	14.19	37.0	10,082
1935	8.86	5.32	2.16	11.91	14.03	41.3	12,246
1945	7.90	5.70	1.62	13.09	16.72	40.0	14,088
1951	8.42	5.54	2.02	12.13	15.88	40.1	15,079
1956	7.83	4.88	1.64	11.81	15.37	43.2	16,680
1961	6.88	4.27	1.67	10.21	14.04	47.2	18,378
1966	6.89	3.48	1.52	10.40	13.39	51.8	19,247

Source: Cook Islands Census 1966.

TABLE IX

SOME DEMOGRAPHIC CHARACTERISTICS OF THE POPULATION OF ATIU(A) INFANT MORTALITY RATES FOR SELECTED YEARS PER 1000 LIVE BIRTHS

<u>Year</u>	<u>Rate - 1000 of population</u>
1935	102.55
1936	190.47
1937	260.86
1938	148.22
1966	200.00
1967	72.70
1968	34.20

(B) CRUDE DEATH AND BIRTH RATES FOR SELECTED YEARS

<u>Year</u>	<u>Birth Rate</u>	<u>Death Rate</u>
1907	27.60	52.18
1935	17.70	37.22
1936	34.07	27.64
1937	33.43	20.42
1938	47.17	30.88
1966	40.77	7.46

(C) FERTILITY RATES FOR SELECTED YEARS

<u>Year</u>	<u>Rate</u>
1935	7.5
1936	15.17
1938	21.66
1966	29.43
1968	31.50

Source: Demographic Records, Atiu. AJHR, A<sub>3</sub> 1907-1938. Report on the Health Department in Papers presented to the Cook Islands Legislative Assembly, 1966 and 1967.

Note: The above tables are not consistent in the years for which data has been compiled but this represents the available information on population for the period in question.

introduction of modern medicine on the island. The crude birth rate of Atiu in 1907 was 27.6 but by 1966 this had risen to 40.77 per cent. In the same period the crude death rate dropped from 52.18 to 7.46 per thousand of population. The fertility rate on Atiu has doubled in the past thirty years from 15.17 per cent in 1936 to 31.5 per cent in 1968 (Table IX).

With the establishment in 1964 of a hospital operated by trained medical staff, improvements in housing and water supply, health education and active campaigns against endemic diseases such as yaws, tuberculosis, filariasis and leprosy, the general level of health of the Atiuan community has greatly improved. Immunisation has successfully combatted tuberculosis and by 1965 there were only nineteen reported cases of tuberculosis on the island. In 1964 five cases of leprosy were recorded, but by 1965 there were no reported cases of this disease. The introduction of "Methozen" has resulted in the successful combatting of filariasis, formerly rampant on Atiu. Only limited malnutrition is evident on contemporary Atiu, although the majority of the population lack adequate protein in their diet. Today the health standards compare favourably with those of the Cook group as a whole (Table X).

TABLE X

COMPARISONS OF BIRTH AND DEATH RATES OF ATIU  
TO THOSE OF THE TOTAL COOK ISLANDS

	<u>Cook Islands</u>	<u>Atiu</u>	
	<u>1967</u>	<u>1967</u>	<u>1968</u>
Death Rate per thousand of population	8.10	8.13	4.70
Birth Rate per thousand of population	40.53	41.52	50.00
Infant mortality per thousand live births	72.70	56.30	34.20

Source: Reports of the Health Department in papers to the Cook Islands Legislative Assembly, 1967, 68.

### Population Structure

The most notable feature of the age distribution of population in Atiu since 1936 has been the marked increase which has taken place in the proportion of population in the under 14 age group (Figure 5). For most of the period this has been a steady increase and reflects improving health conditions and decreasing infant mortality rates, but the acceleration in the past decade is primarily a result of increased migration. The population structure in 1936 was more pyramidal than was the case in 1966, and the intervening years show the changing nature of percentage age distribution. The combined result of lower rates of infantile mortality and migration emerges in the lowest quinquennial age grouping between 1936 and 1966.

Since 1945 there appears to have been an alteration in the sex structure of Atiu as the population has become increasingly masculine (Table XI). The higher proportion of females on Atiu in 1945 was possibly the result of the movement of many Atiuan men to phosphate mining on Makatea island in the Society group. However, since then the population has increased in masculinity, until in 1966 there were 111.44 males per 100 females. Inter-island movement either of Atiuans to other islands in the Cook group or of other Cook Islanders to Atiu shows no significant sexual differentiation. The net Atiuan loss of females was 195 and of males 204, while departures of Atiuans to New Zealand in selected years showed that 43 per cent were females. Thus, migration does not account for all this increasing masculinity of the population, and only a higher male birth rate and perhaps higher female infant mortality could account for this feature of contemporary Atiuan population.

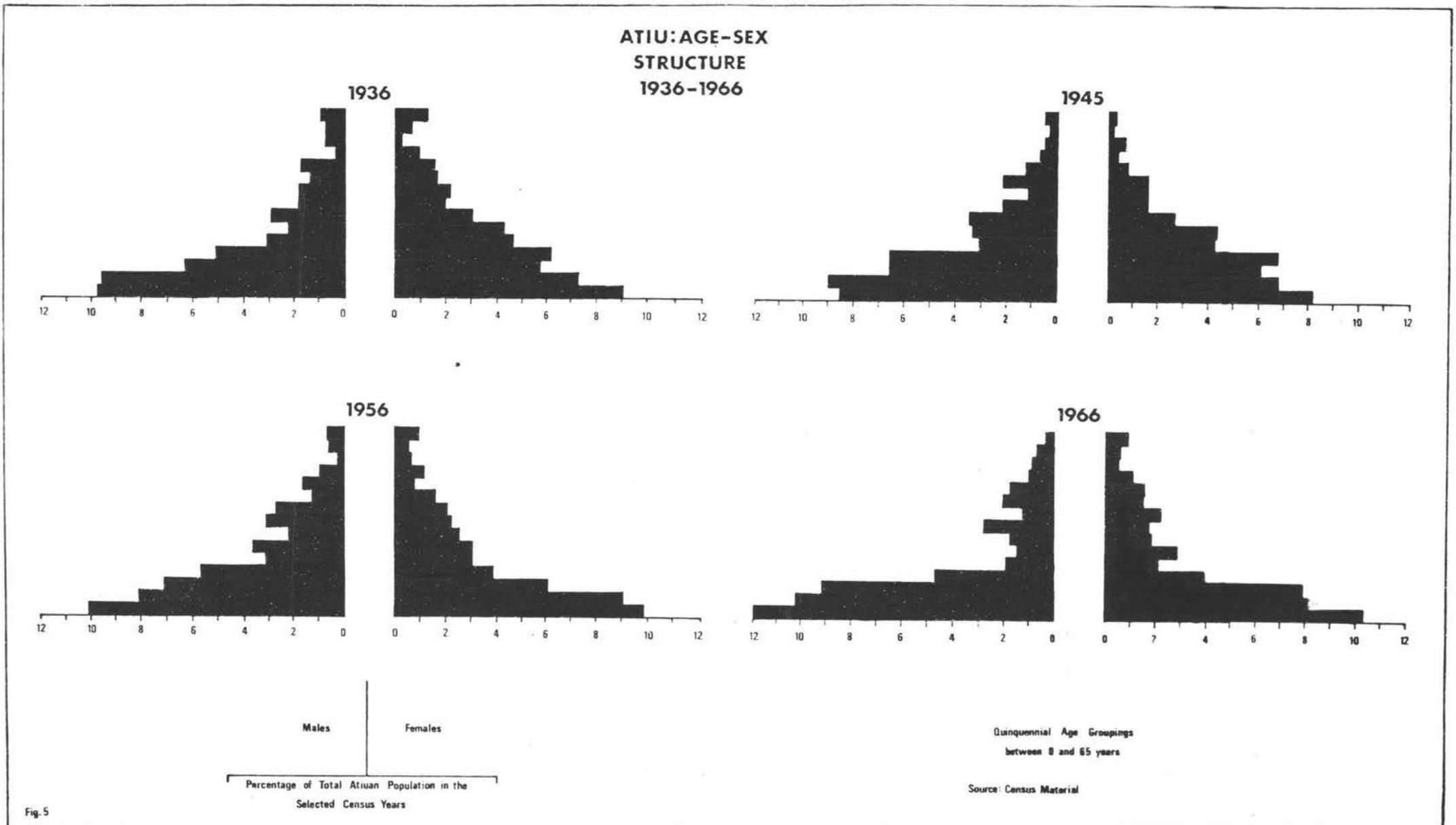


Fig. 5

TABLE XI

ATIUAN NUMERICAL SEX STRUCTURE, 1936-1966

<u>Year</u>	<u>Male</u>	<u>Female</u>	<u>Males per hundred females</u>
1936	559	515	108.55
1945	535	548	97.57
1956	688	619	111.15
1961	657	609	107.63
1966	700	627	111.44

Source: Cook Islands Censuses, 1936-1966  
Department of Maori and Island Affairs.

Migration

As in other Outer Islands of the Cook group, migration has a significant influence upon the demography of Atiu. Atiuans had been migrating to Mauke and Mitiaro in pre-contact times and had moved within the Cook group and to Tahiti in significant numbers in the nineteenth century. Since annexation however, apart from the brief movement to Makatea, movements have become concentrated to Rarotonga and New Zealand.

(i) Inter Cook Island

Table XII indicates that no significant difference between male and female rates of migration exists in movement of Atiuans within the Cook group. Three hundred and nineteen males and 310 females were located on other islands of the Cook group in 1966, although females show a slightly higher tendency to move to Rarotonga than males. Of Atiuian migration 97 per cent was confined to the southern group, 91 per cent of movements being to Rarotonga. The effect of Outer Island migration to Rarotonga has been to assist a

TABLE XII

ATIUI AND INTER-ISLAND MIGRATION, 1966(A) Location of Atiuan Emigrants, 1960

<u>Sex</u>	<u>Rarotonga</u>	<u>Aitutaki</u>	<u>Mangaia</u>	<u>Mauke</u>	<u>Mitiaro</u>
Male	276	12	11	9	1
Female	272	7	10	8	3
	<u>Manuae</u>	<u>Nassau</u>	<u>Manihiki</u>	<u>Rakahanga</u>	<u>Penrhyn</u>
Male	2	-	5	2	1
Female	-	1	5	2	2
	<u>Total Atiuan Population</u>		<u>In Atiu</u>	<u>Other Islands</u>	<u>Total</u>
Male			580	319	899
Female			514	310	824
Total			1,094	629	1,723

(B) Origin of Islanders settled in Atiu

<u>Sex</u>	<u>Islands of Birth</u>				
	<u>Rarotonga</u>	<u>Aitutaki</u>	<u>Mangaia</u>	<u>Mauke</u>	<u>Mitiaro</u>
Male	58	12	6	12	14
Female	57	13	11	8	12
	<u>Pukapuka</u>	<u>Manihiki</u>	<u>Penrhyn</u>		
Male	-	1	-	Male	103
Female	1	2	1	Female	105
				Total	208

(C) Balance of Migration

Net loss of Atiuans to Rarotonga	433
Net gain from other Islands	12
Net loss of Atiuans to all Cook Islands	421

Source: Cook Islands Population Census, 1966, 25.

250 per cent increase in population on that island between 1902-1966 compared to the 44 per cent increase for Atiu in the same period. In 1966 the total Atiuan born population in the Cook Islands was 1,723 which represented 8.9 per cent of the total population. Of these, 496 people or 36.4 per cent were located outside Atiu itself, 35.4 per cent of Atiuan males and 37.4 of Atiuan females.

There is little imbalance in the numbers of males and female immigrants to Atiu. In 1966, 105 females and 103 males had settled on Atiu and, Mauke and Mangaia excepted, there was little sexual differentiation of immigrants. Of all non-Atiuan born people living in Atiu in 1966 97.5 were southern Cook islanders by birth and 56 per cent were Rarotongan.

As at 1966 Atiu had suffered a net migration loss of 421 people to other islands in the group and 50.8 per cent of these were males. The net migration loss to Rarotonga exceeds net loss to the group as a whole if net gain from other islands is subtracted from the total net loss.

(ii) Outside the Cook Group

Since 1956 Atiuans have been migrating to New Zealand in significant numbers as part of the general Cook Island movement. Analysis of departure cards showed that for selected years Atiuan emigration to New Zealand was roughly proportionate to the percentage of Atiuan born people in the Cook group. In 1966, 8.9 per cent of the total population was Atiuan born and in 1967 and 1968 Atiuans accounted for 8.2 per cent and 8.13 per cent of total departures from the Cook Islands. There appears to be a greater propensity

for males to migrate from the Cook Islands and in the selected years 54 per cent of migrants were males (Table XIII) which corresponds to the general pattern amongst Cook Islanders as a whole.

Analysis of age distribution shows that the majority of migrants fall into the productive age groups from 15 to 64 years and especially the 15 to 45 year age group, the most productive segment of the population. The relatively high rate of migration amongst this age group causes dependency rates to increase although the labour force is already depleted by inter-island movement, especially to Rarotonga. Of the net Cook Island migration loss to New Zealand in 1966, 68.24 per cent fell into the 15-64 age grouping, and 60.34 per cent into the 21-44 age bracket.

However, Atiuan migration displays a more critical situation as 73.75 per cent of migrants fell into the age grouping from 15-64 years, and 66 per cent fell into the 15-44 age bracket. Thus, in the selected years Atiu has suffered a migration loss to New Zealand which in social impact is more serious than that for the Cook group in general. There has been a 106 per cent increase in the departure of Cook Islanders to New Zealand in the period 1960-1966. This combined with movement of Atiuans to other islands in the group has had a significant effect upon the demography of Atiu, and if permitted to continue could adversely effect economic development.

### Dependency

Increasing rates of dependency are a feature of all Outer Islands of the Cook group, but that on Atiu is higher than the average for the Cook Islands as a whole (Table XIV).

TABLE XIII

TOTAL DEPARTURES OF ATIUANS FROM THE COOK ISLANDS FOR SELECTED YEARS (A) AND THE ATIUAN PERCENTAGE OF TOTAL COOK ISLANDS DEPARTURES (B)

(A) Total Departures of Atiuans from the Cook Group

<u>Age Group</u>	<u>Years</u>														
	<u>1956</u>			<u>1959</u>			<u>1964</u>			<u>1967</u>			<u>1968</u>		
	<u>M.</u>	<u>F.</u>	<u>T.</u>	<u>M.</u>	<u>F.</u>	<u>T.</u>	<u>M.</u>	<u>F.</u>	<u>T.</u>	<u>M.</u>	<u>F.</u>	<u>T.</u>	<u>M.</u>	<u>F.</u>	<u>T.</u>
Under 15	4	2	6	4	4	8	6	7	13	10	11	21	6	4	10
15-44	11	8	19	7	5	12	22	15	37	33	18	51	21	18	39
45-64	1	1	2	1	-	1	-	3	3	1	3	4	3	4	7
	16	11	27	12	9	21	28	25	53	44	32	76	30	26	56

(B) Atiuan Percentage of Total Cook Island Departures

	<u>1956</u>	<u>1959</u>	<u>1964</u>	<u>1967</u>	<u>1968</u>
Total Cook Island Departures	325	378	836	878	688
Atiuan Percentage of Total	8.07	5.55	6.33	8.20	8.13

Source: Official Departure Cards

Note:

1. The irregular nature of the selected years is the result of these years being the only ones for which complete records were available.
2. Atiuan in the context of this Table includes not only Atiuan born people but also people who were born out of Atiu, of Atiuan parents, but who designate their home island as Atiu.

TABLE XIV  
COMPARISON OF PERCENTAGE DEPENDENCY OF  
ATIUI WITH THAT FOR THE TOTAL COOK ISLANDS

<u>Year</u>	<u>Cook Islands</u>	<u>Atiu</u>
1936	-	46.31
1945	48.7	51.49
1951	48.8	-
1956	48.7	54.39
1961	51.6	-
1966	54.26	60.73

Source: Census Material.

Note: Dependent population in this context has been confined to people outside the 15-64 years age grouping (i.e. people between 0-14 and over 65 years of age)

Atiu is placed in a similar position to other Outer Islands where the C.R.S. operates in this respect, as in 1966 Aitutaki had a dependency rate of 60.50 per cent and Mauke 64.52 per cent. However, the fact that the majority of the dependent emigrants are in the 10-14 age group accentuates the problem as the older children in this group play a significant part-time role in the productive processes.

#### Village Populations

As the five villages on Atiu form one continuous settlement no marked variations exist in living conditions and populations between individual villages. Centralisation has tended to create an over-riding homogeneity in Atiu (Figure 6). The percentage of Atiuan population in the various villages has remained similar throughout the period 1936-1966 although the larger villages of Teenui, Areora and Tengtangi have undergone far greater numerical

# ATIU: DISTRIBUTION OF POPULATION 1969

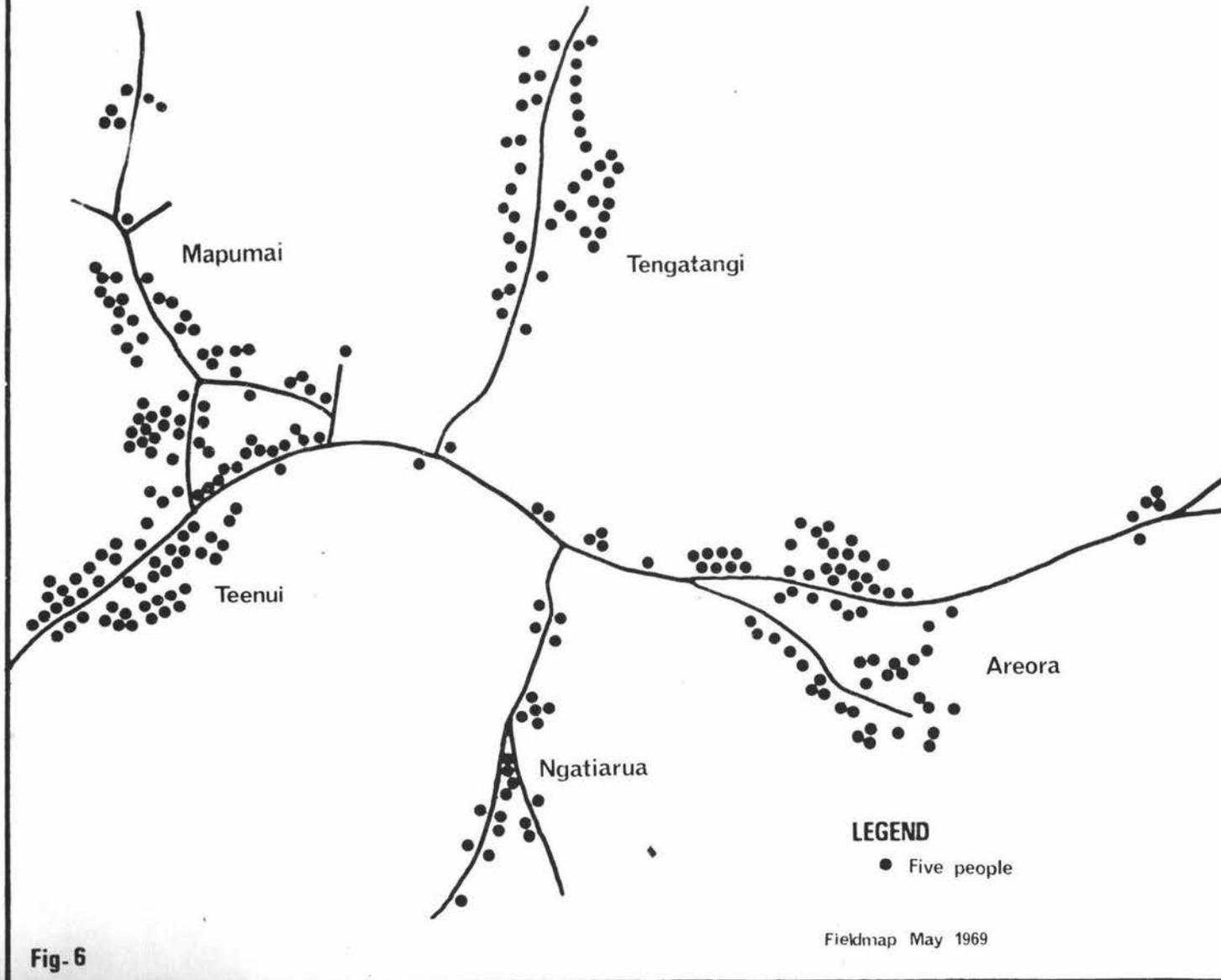


TABLE XV

ATIUI: VILLAGE POPULATIONS AND PERCENTAGE  
OF TOTAL POPULATION FOR SELECTED CENSUS  
YEARS

<u>Villages</u>	<u>1936</u>	<u>%</u>	<u>1945</u>	<u>%</u>	<u>1956</u>	<u>%</u>	<u>1961</u>	<u>%</u>	<u>1966</u>	<u>%</u>
Ngatiarua	119	11.1	132	12.1	139	10.6	137	10.3	135	10.2
Mapumai	136	12.7	156	14.4	180	13.8	182	13.7	168	12.7
Tengatangi	171	15.9	123	12.8	229	17.5	237	17.9	220	16.6
Areora	359	33.4	350	32.3	382	29.2	361	27.3	379	28.6
Teenui	305	28.0	322	29.7	377	28.1	349	26.3	445	32.5

increase than Ngatiarua and Mapumai (Table XV). Teenui village in the intercensal period 1961-1966 displaced Areora as the largest village on the island and now contains one-third of the entire population. Teenui and Areora villages together account for over 62 per cent of the population and the last intercensal period reversed a trend begun in 1945 for their proportion of total Atiuan population to decline.

Figure 7 shows Areora and Teenui villages to have comparatively more regular sex/age distributions than the other three villages, although because of size, even small variations in Ngatiarua and Mapumai may result in significant percentage changes. Mapumai village appears to have pronounced masculinity in its population. Appendix IV provides a village breakdown of age/sex structure for 1956 and 1966 and shows village dependency rates as a percentage of total island population. With the exception of Areora and Mapumai dependency rates have tended to increase throughout this period in all villages. Teenui village registered a percentage increase from 55.4 to 63.2, Ngatiarua from 50.5 to 60.7, Tengtangi from 54.2 to 64.9, while Areora village decreased from 57.6 to 56.6 and Mapumai from 57.6 to 56.4.

#### References

1. Refer to Cook Island Population Census 1966, 5.
2. Children, raised by household other than that of their birth and usually involving a relative or close friend of parents of the household of birth.

ATIU: AGE - SEX STRUCTURE

BY VILLAGES

1966

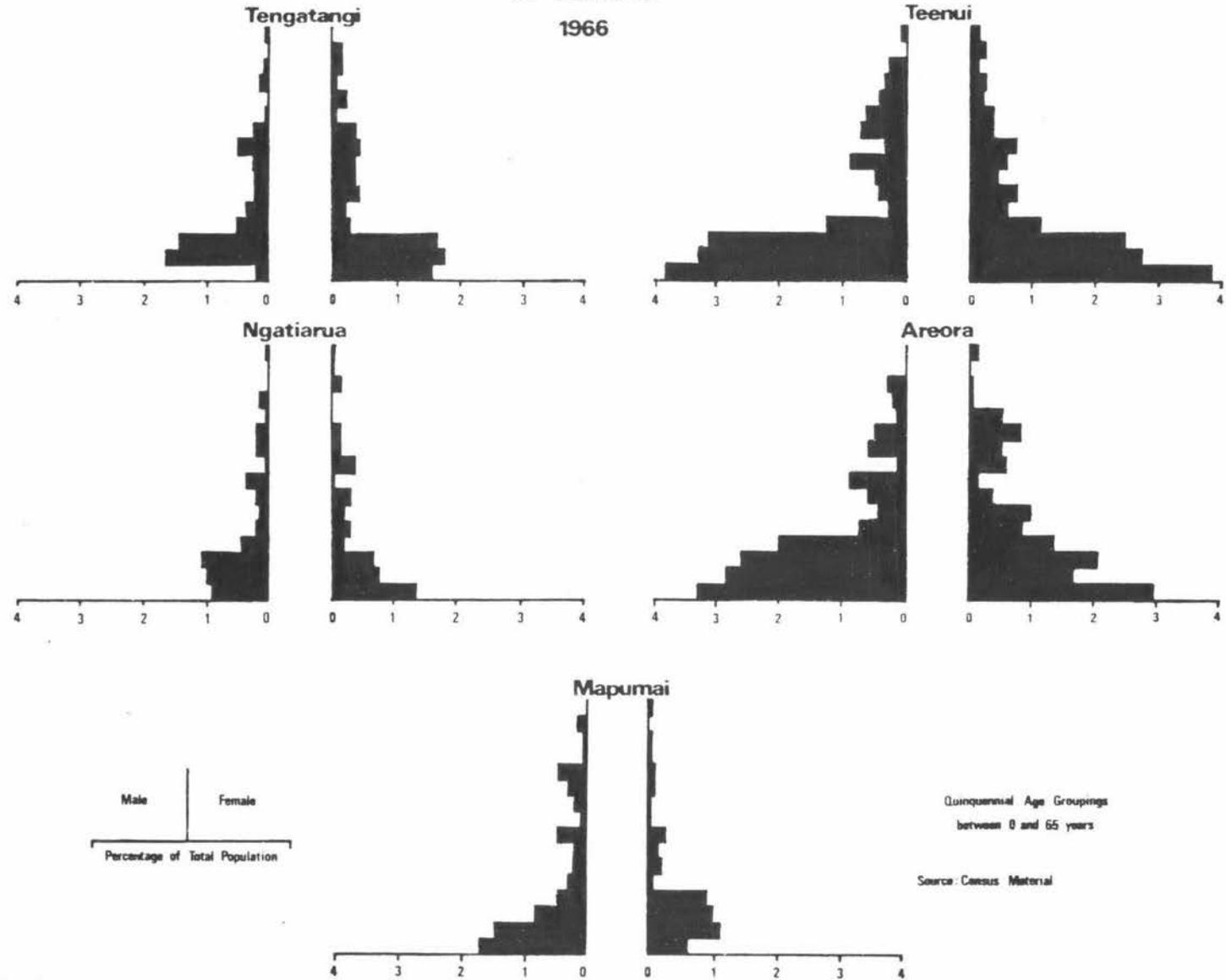


Fig. 7

## SECTION II

## CHAPTER IV

THE CITRUS REPLANTING SCHEME

The C.R.S. represented an attempt by the New Zealand Administration to re-establish the citrus industry in the Cook Islands on a sound economic foundation consistent with the demands of modern citriculture. The aim was to provide the Cook Islands with a valuable export crop capable of at least assisting the group to a greater degree of economic self-sufficiency. The move was prompted by a serious fall in the production of citrus in the Cook Group from 1926, and, after several proposed schemes proved abortive, the present Replanting Scheme commenced in 1945.

The Scheme was financed by a \$60,000 interest bearing loan from the New Zealand Government, of which \$31,250 was to be utilised in establishing and maintaining plots for the early unproductive period of their existence. Initial investment in establishing plots was to be regained when they became productive through deduction of two-thirds of the proceeds of receipts from sale of fruit. This 66 per cent deduction was expected to cover annual maintenance costs and gradually to repay outstanding advances incurred in establishment of plots. In fact on none of the islands and particularly on Atiu and Mauke was the deduction sufficient to meet even annual costs.

Background to the Inauguration of the C.R.S.

The actual beginnings of the Cook Island citrus industry is unknown. Popular opinion has linked its origin to the visit of the Bounty to Rarotonga, although it appears more likely that orange growing did not begin until the arrival of John Williams and Mission activity in 1823.

The first cash crops of note produced in the Cook Islands were coffee and cotton and both according to early reports appear

to have been well established by the 1870's. Local foods, fruits and some introduced crops were undoubtedly traded, but cotton and to a lesser extent coffee, were the first examples of real commercial agriculture in the Cook Islands. Yet both were doomed for a relatively rapid decline as prices for both fell in the latter nineteenth century. Cotton in particular was subject to a rapid fall when the American Civil War ceased and cheap cotton began to be produced in the Nile Delta. An expanding orange trade gradually eclipsed that in both cotton and coffee, and by 1902, 26,652 cases of fruit were being exported to New Zealand. This export production expanded to 107,612 cases in 1911 and culminated in a record 169,663 cases in 1926. Until 1915 citrus exports were confined to oranges, but after this date lemons and later mandarin and grapefruit became significant. The industry was diversifying.

Citrus exports in general rose until 1926 and thereafter declined rapidly. Citrus growing was practised along haphazard, unscientific and unplanned lines which, although oriented to earning cash still rested on a subsistence foundation with regard to technology, work patterns, labour input and producer attitudes. Prices remained relatively high, despite substantial losses incurred while fruit was in transit to New Zealand and at times through lack of adequate and regular shipping. Consequently there was little incentive to modernise the industry.

However, this situation could not last permanently and as trees began to age and disease became more prevalent, production began to wane. The quality of Cook Island citrus fruits and their consumer attraction in New Zealand began to decline. This was probably due more to the emergence of competition from the modern commercially sophisticated citrus industries of California and Australia than to a marked decrease in the quality of Cook Island production.

The worsening situation prompted action designed to

revitalise the Cook Island citrus industry lest the market in New Zealand be lost. An investigation in 1927 sought improvement in packing and grading of fruit and packers were encouraged to operate in central packing sheds under the supervision of fruit inspectors appointed from New Zealand. A Conference in 1928 adopted these recommendations which were immediately implemented, the result being that fruit exports increased in 1928. Encouragement was also given to the introduction of new varieties of citrus fruits to the Cook Group and for accurate production records to be kept. The Conference stated its aims as being

"to place the industry on a sounder basis in order to permit competition with California and Australia on the New Zealand market, by improving the quality and bulk of export fruit, and by improving methods of planting and cultivation."

(Report on the Citrus Industry, 1962, 18).

This Conference in 1928 represents the first significant attempt to modernise the Cook Island citrus industry. The world economic depression hindered most attempts to implement its aims, but nurseries were established and seedlings distributed to growers in 1931 and 1932. Encouragement given to the establishment of new citrus plantings was accompanied by moves to renovate and improve existing plots. New regulations in 1933 and 1934 unsuccessfully attempted to coerce growers into renovating their plots and lack of finance hindered any possible implementation of a 1934 scheme seeking to overhaul and revitalise the citrus industry. Growers refused to carry out Agriculture Department advice as returns remained relatively high from citrus. Good prices merely reinforced the subsistence base of the economy while stringency only served to encourage retreat into the subsistence economy. The problem lay in the entrenched quality and solidarity of the peasant economy, the basic values of which had not yet been eroded by contact with the outside world.

The visit of a New Zealand Parliamentary delegation in 1936 culminated in the promulgation of the Fruit Control Regulations of 1937 which vested responsibility for most aspects of the citrus industry in the Administration. Further attempts to overhaul the industry subsequent to this development were thwarted by the problem of land tenure. A proposal in 1938 aiming at amalgamating family lands suitable for citrus planting was unsuccessful as it proved difficult to obtain family agreement. Similarly a proposal in 1944 which sought to institute individualised plantings was unsuccessful as families were generally opposed to vesting lands in an individual member. Moreover potential planting was thwarted because there was no means of gaining security of tenure over land. In 1945 the Director of Agriculture proposed that the Administration lease land at a given rent to establish plots and to operate them along lines consistent with the demands of modern citriculture, until the initial investment had been recouped (estimated to take fifteen years) when they could be returned to the land owners. But this too, failed to gain hold. The conservatism of the Cook Islanders coupled with the problem of land tenure was proving difficult to overcome as family solidarity remained.

The situation, however, was overcome in 1945 when Judge Harvey of the Maori Land Court devised the system of Occupation Rights, by which individuals, through general family agreement, could obtain security of tenure over land. With this innovation, a Cook Islands citrus replanting scheme appeared possible.

#### The C.R.S.

Planting began in Rarotonga in 1945 and expanded at an accelerating rate, with the result that interest in the Scheme began to be shown on Aitutaki. Up until this time, attempts at reorganising the industry had generally been confined to Rarotonga, although minor attempts had been made to rejuvenate the already ailing industries on the Outer Islands. Declining Outer Island exports

and the successful introduction of the C.R.S. on Rarotonga led to the approval by the New Zealand Cabinet in December 1945 that

"the Citrus Replanting Scheme authorised by Cabinet on 23rd May 1945 for the island of Rarotonga be extended to include the Islands of Aitutaki, Atiu, Mangaia and Mauke in the Cook Group, provided that the total number of plots of land and the total cost previously authorised be not exceeded."

(Report on the Cook Island C.R.S., 1962, 25).

Outer Island planting commenced on Aitutaki in 1946 as seedling trees had been sent there as early as April 1945, but on other Outer Islands, nurseries had to be established before planting could begin. The Scheme faced intense social conservation especially in land tenure on Atiu and particularly on Mangaia where the kavana and other people of rank successfully opposed admission of the Land Court.

Planting began on Mauke in 1948, and on Atiu in 1950 after some delay because of opposition. By 1948 the originally planned 100 acre citrus extension in Rarotonga and the 100 half acre plots in Aitutaki had been virtually planted and permission was received to extend plantings by 50 acres on both islands. Meanwhile 47 Occupation Rights had been granted in Mauke and planting had commenced (Table XVI). In 1951 permission was granted for a further extension of fifty 90 tree plots for Rarotonga and for seventy-five 45 tree plots on Atiu, where planting had commenced. Planting continued at a rapid rate until 1954 when the total acreage under the Scheme reached over 400 acres. In addition to the C.R.S another 50 acres had been planted on a private basis. The success of the Scheme to this date prompted the Administration to make available loans to allow a further 200 acre extension in Rarotonga and 300 acre extension in the Outer Islands, but this did not fully materialise. Planting continued but at a much slower rate.

Difficulty in obtaining suitable areas of land in Atiu and Mauke in particular led to modifications in C.R.S. regulations. Originally the Scheme proposed establishment of 45 tree plots (half acre) in the Outer Islands and either 45 or 90 tree plots in Rarotonga. In cases where individuals could not obtain enough land to plant 45 trees, permission was granted for plantings of less than this number.

Production in the C.R.S. has generally not reached projected estimates, especially in the Outer Islands (Table XVII) and a notable differential in relative efficiency of the Scheme has emerged between Rarotonga and the Outer Islands. This is reflected in both production and indebtedness situations of the C.R.S. in individual islands (Figures 8 and 9).

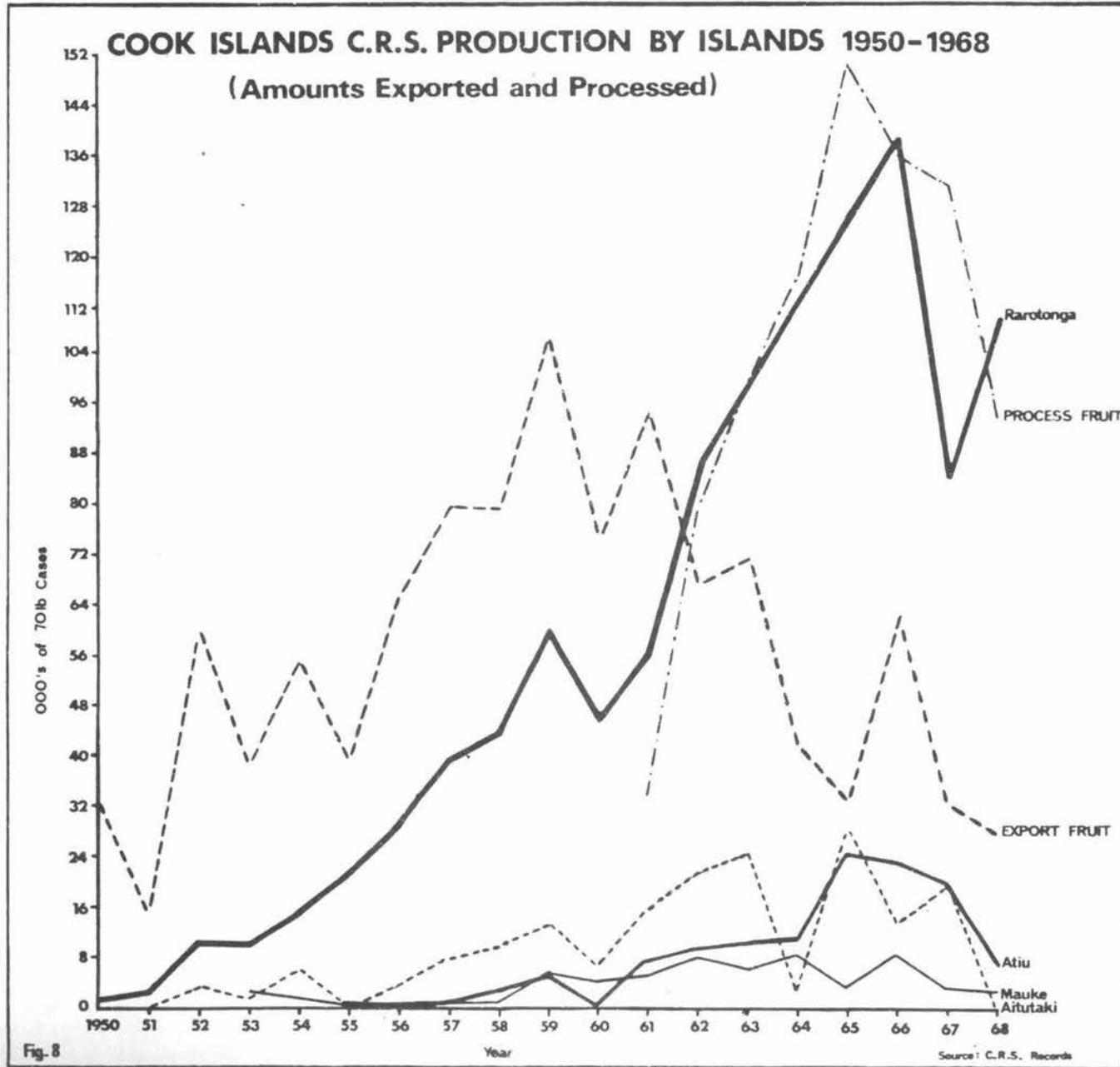
#### Extension of the C.R.S. to Atiu

The decision to extend the C.R.S. to Atiu came in 1947 and in 1948 the Agricultural Department established a nursery on the island, but planting was held up initially by local opposition to the Scheme and secondly because of delay in the arrival of the Land Court, as its activities at the time were concentrated on other islands.

In 1948 the Director of Agriculture, M.B. Baker, visited Atiu and suggested that the islanders adopt the C.R.S. to bolster and eventually supersede the ailing 'Maori' orange export trade. But the visit met with opposition from the majority of the population. Suspicion of innovation and distrust of papa'a motives rendered immediate introduction of the C.R.S. in Atiu difficult.

"Maybe the papa'a want to kill the Maori orange and plant for the plot orange. Maybe..... something like that."

The chief obstacle to adoption of the Scheme was a rumour that the Scheme was part of a government plot to take land from Atiuans. An elderly plot owner recalled the initial problem which



# COOK ISLAND C.R.S. TOTAL DEBT BY ISLANDS 1951-1968

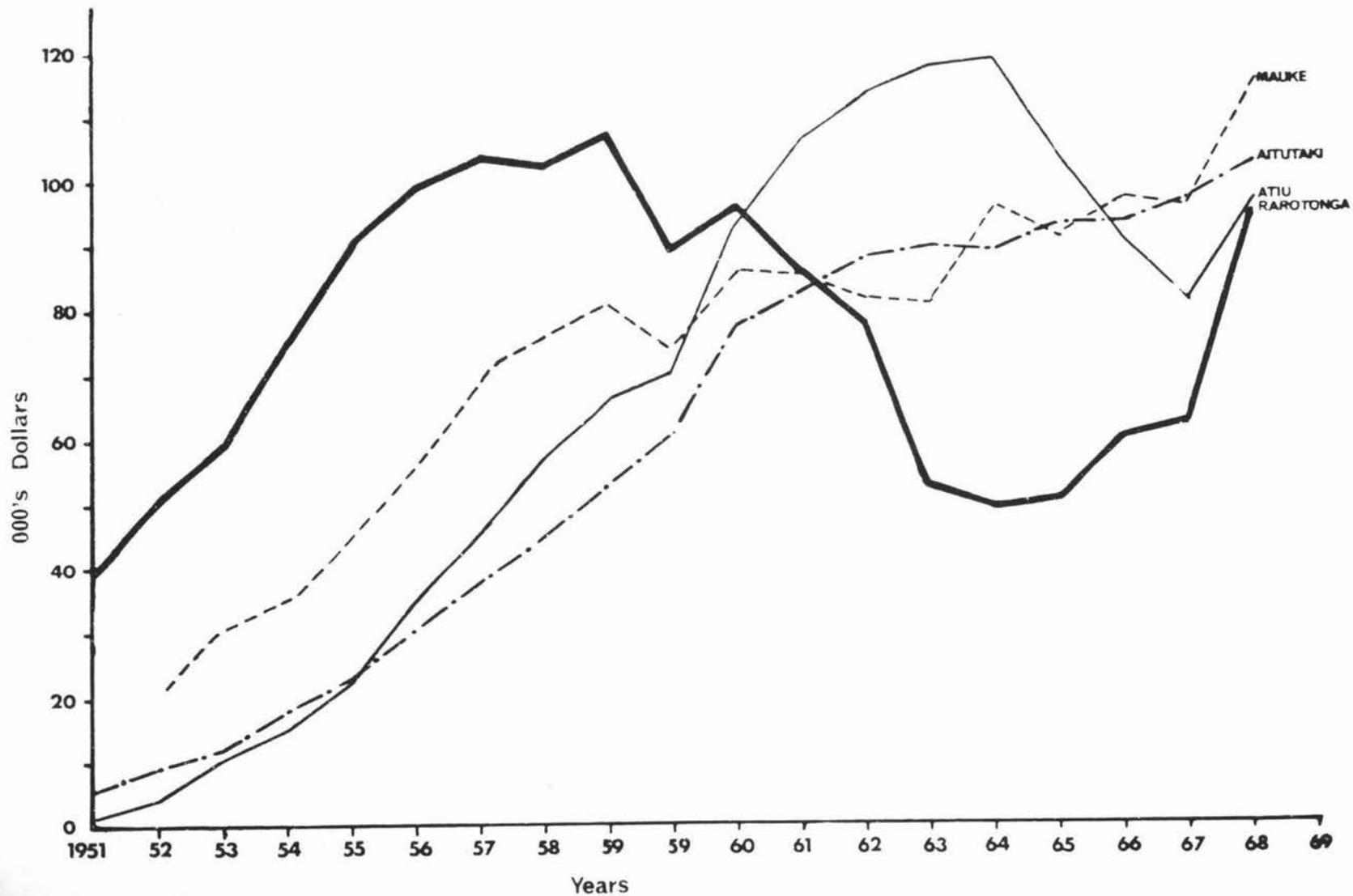


Fig-9

Source: C.R.S. Records

confronted Baker in introducing the C.R.S. to Atiu.

"Yes somebody trouble when he (Baker) came. Some people say don't plant. The papa'a, the Government will take the land. That the Maori talk. Now the Government not take over land. It is alright. The people who plant the big plot now make the big money. But me - only one plot not make much money. The people who plant get the money - the others too late to make the money. Tatarapa (sorry). Another trouble that time. The land not all surveyed. That a trouble that time. But just a few. The people who plant when Baker came, now get the money. The people who listen to the lies - the Maori talk, you know - no big money now."

Political opposition from the Cook Islands Progressive Association (C.I.P.A.) members in particular delayed introduction of the Scheme.

The underlying reason for the initial rejection of the C.R.S. and much of the suspicion of innovation was undoubtedly part of a general Cook Island reaction to the paternalistic, authoritarian administration which had existed for almost half a century. The fall of the Ariki had left Atiuans leaderless, subject to an alien and generally unenlightened administration and until 1937 to a great degree economically dependent upon private traders. Moves to innovate throughout the post-1900 period had virtually all failed. Atiuian planters for example had become involved in several co-operative marketing movements all of which were failures and lost money. Suspicion of the C.R.S. was inevitable if the twentieth century history prior to 1945 is closely studied and as Sadaraka writes (1965, 12)

"until very recently the Cook Islands people had very little confidence in the Government. Moves initiated by the latter, though they were of good intentions were viewed with the greatest suspicion and received little support from the people."

However, during 1949 local pressure mounted in Atiu for further investigation of the possibility of establishing the C.R.S. A public meeting was held which resulted in Baker being summoned to Atiu and his visit culminated in acceptance of the proposal to extend the Scheme to the island. The failure of the nursery established in 1948 led to its discontinuance in 1949 and initial planting was delayed as seedlings had to be supplied from Rarotonga and because of delays in Land Court arrival on Atiu. In 1949 Baker (1949, 2) wrote that

"due to lack of shipping calls at Atiu it has not been possible to hold family meetings to grant occupation rights on this island. The Replanting Scheme would have commenced at Atiu this year had it been possible for the necessary officers to get over to that island. As only one-third of the land at Atiu has been investigated, orange planting will be necessarily confined to those areas until the Native Land Court holds sittings at this island."

In August 1949 the Land Court under Judge Morgan arrived to investigate title to land and grant occupation rights.

Twenty-two plots were established in 1950 and the rate of planting increased the following year when 59 more were planted. By 1954, 145 of the total 164 plots had been established (Table XVI).

Declining production from the 'Maori' orange trees (although not admitted), desire for an increased cash income, and administrative encouragement lay behind the relatively rapid expansion of the Scheme on Atiu. By the end of 1952 even some of the people who had vehemently opposed Baker's proposed extension of the scheme to Atiu had planted. Ownership of a plot brought families prestige and hence almost all those with suitable planting land available established C.R.S. plots.

Citriculture, based on more modern production methods had been commenced on Atiu, but its successful establishment was not

TABLE XVI

C.R.S. PLANTING BY ISLANDS, 1946-1957

<u>Year</u>	<u>Rarotonga</u>		<u>Aitutaki</u>		<u>Mauke</u>		<u>Atiu</u>	
	<u>Plots</u>	<u>Trees</u>	<u>Plots</u>	<u>Trees</u>	<u>Plots</u>	<u>Trees</u>	<u>Plots</u>	<u>Trees</u>
1946	73	5,732	26	1,005				
1947	19	1,263	32	1,377				
1948	20	1,593	22	1,032	21	1,049		
1949	1	80	12	553	12	672		
1950	41	2,948	38	1,770	56	1,992	22	1,004
1951	14	1,030	21	928	8	423	59	2,557
1952	7	534	36	1,637	16	696	21	900
1953	7	392	11	467			53	2,234
1954	30	2,056	5	229			3	141
1955	12	666					2	96
1956	4	350					2	92
1957	1	110					2	90
	<u>229</u>	<u>16,754</u>	<u>203</u>	<u>8,998</u>	<u>113</u>	<u>4,832</u>	<u>164</u>	<u>7,114</u>

Source: C.R.S. Report, Appendix III.

immediate. Even at present amongst some of the older people, conservative attitudes towards the C.R.S. remain. However, most people are now aware of the circumstances which necessitated establishment of the Atiuan C.R.S. as the following statement from a plot owner indicated - "The reason for starting the Scheme here was that at the time the Maori oranges were dying out.....and they have."

## CHAPTER V

THE WORKINGS OF THE CITRUS REPLANTING SCHEME ON ATIU: 1950-1969

The history of the C.R.S. on Atiu falls into two periods, the first notable for almost complete inefficiency, the second for the rejuvenation of the industry and its rise to a position where Atiu must be regarded as the most successful citrus producing island in the Cook group outside Rarotonga, both from the point of production and of the state of indebtedness.

The physical nature of Atiu has had a profound effect on the location of citrus plots. Of the 164 plots, 145 were planted on the eastern side of the island owing to greater availability of land suitable for citriculture. This represents almost 90 per cent of the plots, and the majority of these are concentrated in the north-eastern sector of the island - particularly in Mapumai, Tengtangi and Teenui districts. The recent planting extension has reversed this trend somewhat, with the Ngatiarua and Areora districts containing the majority of the new plots.

C.R.S. on Atiu: Pre-1962

Initially, Government supervision was necessary to ensure successful establishment of the Scheme, as the native Atiuans had little idea of accepted principles and methods of modern citriculture. The "Maori" orange had grown wild and was hapazardly and irregularly attended, if at all. The establishment of plots introduced the need for regular, planned attention in order that the administration's investment be protected and recouped. The more technical aspects of production in particular were performed by the Fruit Control Department, a subsidiary organisation within the Agricultural Department, responsible for the C.R.S. The ignorance of the Atiuan growers was a major problem initially, and they were left responsible for the more menial tasks in plot maintenance - picking and weeding. The Administration was in control of fertilising, pruning and spraying and utilised local labour. The whole Scheme was under the control

of a local Fruit Control Officer, responsible to superiors in Rarotonga, and locally to the Resident Agent of the island.

Initially it could be anticipated that debt would rise in the first six or seven years as plots were not expected to come into bearing until the fifth year. It was hoped that production would then increase to the extent that annual running costs would be covered, the grower remunerated and the initial capital investment (which was subject to a five per cent interest rate) gradually repaid. However, production never reached even "conservative" projections (Table XVII) and hence the debt tended to increase. Although production initially rose in a fluctuating manner, it is only since 1964 that real progress has been made in raising Atiuan production to a level where the industry can become self-supporting, capable of giving the grower a return commensurate with the input involved, covering running costs and of reducing the aggregate debt. The debt in the period 1955-1960 reached a level where returns from some plots could not even meet annual interest accumulation. A reduction in interest charges from 5 to 3 per cent and then to 0.5 per cent assisted the situation somewhat. Furthermore, in August 1958 the repayment rate was reduced from 66 to 56 per cent of total citrus receipts. These measures had a two-fold aim, to reduce the burden of repayment and to give the grower an increased share of receipts in the hope of stimulating greater interest in the scheme. In 1964 Atiu's aggregate debt by far exceeded that of other islands, and reached an all-time record level of over \$118,000, although on a per tree basis the island was in a sounder position than Mauke. The aggregate debt history of Atiu closely parallels that of Rarotonga. Planting in Atiu began five years after that in Rarotonga and the first significant fall in aggregate debt came six years after that in the Rarotongan situation. Atiuan debt, however, at its peak exceeded the highest Rarotongan level by some \$20,000, despite the fact that Atiuan citrus acreage was under half that in Rarotonga.

TABLE XVII  
PROJECTED AND ACTUAL PRODUCTION OF THE C.R.S. BY ISLANDS, 1958-1965

<u>Island</u>		<u>Years</u>							
		<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>
Rarotonga <sup>a</sup>	Projected	45,904	52,939	56,071	59,149	63,362	67,834	69,482	70,132
	Actual	43,833	59,879	45,586	56,309	86,608	99,744	113,440	93,090
Aitutaki	Projected	13,626	17,589	21,699	26,801	30,833	33,996	35,040	35,384
	Actual	10,944	14,274	6,913	15,994	21,585	24,876	2,857	28,243
Mauke	Projected	7,986	12,485	16,642	18,330	19,380	19,380	19,380	19,380
	Actual	1,047	5,843	4,367	5,436	8,072	6,297	8,579	3,510
Atiu	Projected	1,884	5,843	11,904	18,811	24,925	27,297	27,722	28,072
	Actual	2,194	5,162	862	7,498	9,838	10,480	10,758	24,400

Source: C.R.S. Records

Aitutaki and Mauke differ from Rarotonga and Atiu in that C.R.S. debts have in general steadily increased, particularly in Mauke. The rate of debt increase on both these islands has tended to decrease recently (Figure 8) as trees have reached maturity, but unless remedial action is taken soon debts will spiral again as trees pass their period of optimum production. This also applies to Atiu but here the problem is less serious as the level of debt is falling rapidly.

The value of the work of the C.R.S. on Atiu has been proved since 1964 as the people have consciously attempted to increase production and reduce individual plot debts. On Mauke and Aitutaki, the fact that debt has increased even when trees have reached maturity should be a cause of great concern. The Atiuan C.R.S. debt by 1966 decreased to a level where the island displaced Aitutaki as the least indebted island outside Rarotonga. Yet compared to Rarotonga, Atiu is still in a relatively poor situation. The present debt position is comparable to that of the 1959-1960 year, although the fact that the Scheme is operating more efficiently now, and that production is five times as great renders the situation less critical than in 1959. The reasons for this apparent marking of time in the past decade are many and complex, and an attempt to discuss them necessitates breaking the history of the Scheme into two periods, the pre and post 1962 years.

The economic situation of the Atiuan C.R.S. deteriorated until 1962. Although 1964 was the watershed in the history of the C.R.S on the island, 1962 has been selected as the date differentiating the period of decline from that of rejuvenation for in this year the first moves initiating complete reversal of existing economic trends began. The fundamental mistake made at the outset of the C.R.S. was the fact that the administration attempted to transplant the modern capitalist cash cropping system into a traditional society. Atiuan society in 1950 as today, was still basically traditional in nature and values, although change was evident and was inexorably

making inroads into the customary way of life. The values and principles underlying the modern cash economy (of which the C.R.S. is part) differed markedly from those of the Atiuan socio-cultural system so that the introduction of the C.R.S. would not merely affect the Atiuan economy, but the whole socio-economic framework. New demands were made on Atiuans involved in the Scheme, demands their social structure was neither geared nor equipped to handle. New values were introduced which clashed with traditional ones. Failure of the C.R.S. initially was almost inevitable as from the outset little attempt was made to adapt the system of commercial citriculture to the island (apart from the Occupation Right system) or to educate the islanders for the Scheme. The C.R.S. was transplanted almost exactly from a European setting to the Atiuan situation. The agricultural economic milieu altered, but the cognitive orientation of the people remained the same. Growers were trapped between the traditional value system intuitively known, and a new alien system, the adoption of which was a pre-requisite to the success of the C.R.S. This was the principle reason for early failure of the Scheme on Atiu and the following factors constitute only part of this wider problem.

#### Lack of Grower Participation in Production

This was one of the chief factors contributing to the early failure of the Scheme on Atiu as it aggravated the appalling debt position more than any other force. Initially, it was inevitable that Fruit Control manage the more technical aspects of production as the growers knew little of modern citricultural techniques. Little attempt was made to include growers in this work, however, and they tended to rely more and more on hired Fruit Control labour for plot maintenance. Growers were interested only in their cash receipts and were oblivious of the fact that the less work they did the greater plot debts would become. They had no concept of monetary debt, as the traditional system of kin based reciprocal obligation

acted as the pivot of exchange. A minority of the plot owners aware of the debt believed this to be government debt, not their own.

By its very nature the C.R.S. was labour intensive, particularly in the Outer Islands where plots were generally only half an acre or 45 trees. The system of land tenure enforced a system of small holder production contrasting with the plantation system generally established in the tropics, operated by entrepreneurs not "chef d'entreprise", utilising machinery, local labour and having the advantage of economies of scale. In the Atiuan C.R.S. labour was the vital factor in production and the labour of the plot owner was the most economic. These however, were the people who did the least work.

Hired labour was generally highly inefficient as labourers had no personal interest in the plots they tended. Some plot owners were at times employed and the situation arose where a grower was paid for maintaining his own plot.

Lack of grower participation caused the industry to become impersonal and somewhat removed from the plot owner. Satisfaction, a vital ingredient in any form of human activity was thus omitted from the C.R.S. Only with personal involvement in the productive process could this factor be incorporated in the Scheme. The Atiuan growers' mana could become a vital factor in ensuring success.

#### Grower Ignorance

Incorporation in productive activities could have assisted growers to an understanding of the basic principles behind modern citriculture, the nature of its demands, and the consequences of either fulfilling or neglecting these demands. But this effective means of educating the planter was forsaken when the authorities hired labour gangs, some members of which were not plot owners. Any educative value of working under Fruit Control supervision was either lost or endowed on a few plot owners. Even a co-operative system of plot owners working a number of groves under supervision

would have stimulated the educative process and simultaneously minimised costs. Moreover, this would have incorporated the communal work pattern of traditional Atiuan life.

An elementary understanding of the monetary economy was also required at the outset of the C.R.S. and could have enabled its successful initial foundation. Knowledge of the operations of money, interest and debt was fundamental to the success of the scheme, but had initially been completely neglected. Vaine Rere, the most influential leader of contemporary Atiu society told the writer that the "Growers were aware of only the visible cash, and were completely oblivious of invisible money - debt. They were only interested in the immediate, visible returns to them."

When any exogenous activity is introduced into a traditional society there is a need for those involved to know reasons behind innovations and instructions. Neglect of this meant that labour and capital input in the Atiuan C.R.S. to 1964 was inefficient and consequently relatively ineffective. For example, manure deposited in plots for owners to apply to trees, often remained in plots without being used or alternatively applied later than instructed. Often fertiliser was applied to trees which had not been circle weeded. Such activity was most prevalent in the early years of the C.R.S. on Atiu.

### Shipping

Unsatisfactory shipping facilities also contributed to the early financial difficulties met by the C.R.S. on Atiu. Failure of shipping arrivals to coincide with orange picking often led to grave losses being incurred. Rough weather often did not permit handling of fruit from shore to ship, and the lack of alternative landings to Taunganui presented a problem. The improvement of Konokonoko Landing, although having provided an alternative landing site, has not completely overcome this problem.

### Infrastructural Deficiencies

With a makatea belt surrounding the island and extending to the sea, Atiu has no natural harbours in which ships can anchor to load and unload produce. The only means of moving produce to ships is an archaic and haphazard system of manhandling over the reef in lighters - inefficient in both terms of time and labour input as there is much double-handling, detrimental to the fruit (Plate 3). Blasting through the makatea has enabled vehicles to drive to the reef's edge and has improved the terrestrial infrastructure, but boating and reefing has remained a problem, although rendered a little more efficient since blasting of channels through the reef to the mainland (Plate 4). Initially the lack of access to plots was another problem confronting the C.R.S. and made for relatively difficult movement of fruit from plots to reef's edge. In many cases fruit had to be manhandled to road-heads some distance from the plots.

### Relative Isolation

Isolation is one of the greatest problems confronting economic development on Atiu. It has meant that initial supervision of the Atiuan industry could not be administered by authorities in Rarotonga. Baker foresaw this difficulty when he wrote of the Outer Islands in the Report of the Agricultural Department 1949....

"Experience in Rarotonga has shown very clearly that results under the Replanting Scheme are in direct proportion to the supervision which is available. In Aitutaki I estimate that two years work has been lost through lack of expert supervision, but this difficulty has now been overcome. With frequent air services it is possible for regular visits to Aitutaki so that an overall watch can be maintained on progress there. In respect of Mauke and Atiu, however, I am concerned lest the scheme break down for lack of adequate supervision.....In the absence of regularly scheduled shipping it is not possible.....to pay more than occasional one day visits to these islands."

PLATE 3.

MANHANDLING CARGO OVER THE REEF, KONOKONOKO LANDING 1969



"Shooting" the reef is a difficult and sometimes hazardous task. It requires both skilful boat handling and much time in loading and unloading.

PLATE 4.

KONOKONOKO LANDING



The photograph gives a view of an inter-island vessel standing off the reef prior to departure to Rarotonga. The edge of the landing blasted through the makatea to the water is visible and enables easier access between the settlement and shore. With no channel having been blasted here, loading takes place at the reef's edge.

### Lack of Regular Work

This reflects the basic lack of grower understanding of the market economy. In the traditional ascriptive social system social responsibility and decision making increased with status. Policies were promulgated by the Ariki and Mataiapo who had rights over, as well as obligations to, the people. But the C.R.S. placed the onus of plot ownership upon the individual plot owner. Responsible action on their part would protect their own interests. But plot owners, unaware of this, neglected their plots especially in the citrus off-season. Regular work, if any, was confined to the period when growers received payment for oranges. Their work pattern remained similar to that practised with the "Maori" orange. As one informant said in comparing the period of the "Maori" orange to the C.R.S.

"The Maori orange you just pick. No weeding, manure, spray and taking away the dry branches. You just pick it. No work and no money. You just pick the orange and get the money. But the plot orange you pick and get more money. But hard work. You spray, manure, weed.....Weeding! Weeding! Weeding! Hard work. The plot orange lot of money, the Maori orange none."

The regimentation and responsibility involved in modern citriculture was alien to their thinking and growers had no concept of an annual cycle of production. Lack of regular work reached its extreme when plot owners began migrating. Some plots were left for the family to tend but in the majority of cases groves fell into virtual neglect. This led to increased Fruit Control management and general spiralling of debt towards a point where complete abandonment of the C.R.S. was likely.

Thus, the history of the C.R.S. on Atiu to 1962 was disheartening. It reflected a basic misunderstanding of the Atiuan society and the principles upon which it was founded, which resulted in the near abandonment of the Scheme within twelve years of its inception.

C.R.S. on Atiu: Post-1962

In 1962 two new forces entered the economic life of Atiu, both of which contributed much to the revival of the ailing C.R.S. The first of these was the diversion of orange exports from the New Zealand market to a new canning plant in Avarua, Rarotonga. The second was the beginning of a period of enlightened administration during which basic faults of the pre-1962 era were exposed and vigorously attacked. However, the post-1962 upswing within the C.R.S. has been the result of various factors, some difficult to isolate, but which together have completely reversed former trends.

Altered economic policy involving reductions in interest rates and in the proportion of total receipts diverted to repaying initial investment, internal and external infrastructural developments, increasing citrus yields with the maturing of trees, and the establishment of the canning factory all contributed to the improvement within the Scheme. But the most significant factor was an appreciation of and the acceptance that Atiu was a peasant economy having a cognitive orientation distinct from that underlying the market economy. From this basis it proved possible to appreciate difficulties the indigenous Atiuans faced in successfully establishing the C.R.S. on their Island, and the Scheme could be adjusted to suit the social environment which to this date had been the greatest hindrance to successful foundation of the industry. In short, the human factor, important in any form of economic activity, was placed in a position where it could play a dominant role in the Atiuan C.R.S.

However, the Scheme had not only failed to adapt to the social environment but also to the physical environment. Plots had been established in the hope that they would succeed in re-establishing a citrus industry which was competitive in the New Zealand market. There was a complete lack of preliminary research as to the physical suitability of Atiu for citricultural development. The C.R.S. then represented a transplant from Rarotonga, which although

unsuccessful was not to be remedied until the economic situation became such that the very existence of the Scheme was questioned. Although great differences existed between plots, notably in production, it was not until 1962 that the first soil samples were scientifically analysed. Some plots had taken up to eight years to become productive, but nothing had been done to ascertain why. Soil and leaf samples from 50 plots were sent to the New Zealand Department of Scientific and Industrial Research at Ruakura and analysis revealed differences in fertility, ph levels and deficiencies between and within soil types. Yet until 1962 all plots had received identical managerial treatment instructions, although effective application of these varied according to the efficiency of individual plot owners and hired Fruit Control labour.

"The policy of the C.R.S. was a new and vital need. However, the powers that were, never realised their policy implementation at the commencement was the trial period, and that policy should be modified to suit existing needs and factors not provided for should they arise. No change was made and the result was a debt which will take many growers a life-time to repay."

(McCauley, Resident Agent of Atiu,  
1962-1967 pers. comm.)

As far as Atiu was concerned the pre-1962 C.R.S. period was an example of administrative "hobbyism" which has been damaging in the past throughout the Cook group and which has only served to undermine the confidence and increase the suspicion of the indigenous peoples to administrative innovation.

Preliminary research, if relatively costly, is preferable to continual failures of "hobbyism". Much of the present apathy on the neighbouring Island of Mauke may be due to repeated and costly failures of schemes - peanuts, ginger and pineapples, while the C.R.S. is the poorest in the Cook group. A similar situation to this existed in the pre-1962 C.R.S. on Atiu.

## CHAPTER VI

### FACTORS CONTRIBUTING TO THE REJUVENATION OF THE ATIUAN C.R.S.

#### I SOCIAL FACTORS

##### Enlightened Administration

The most important factor in post-1962 rejuvenation of the Atiuan C.R.S. was a period of enlightened administration on Atiu. It reflects the influence of sound administration in emerging societies, and shows that the quality of individual administrators has a profound effect upon the relative success of any scheme of economic development.

A Resident Agent on one of the Outer Islands is the sole administrative head on the island, responsible for implementing central government directives. But owing to geographic isolation and local differences in social organisation and attitudes a Resident Agent must to a certain extent adapt policy to suit the prevailing environment. As a result, an important element of local control exists which renders a Resident Agent a central pivot in any form of economic development.

The duration of individual administrations to a large extent influences the relative success of economic development schemes. In Atiu there is a marked correlation between periods of lengthy administration and successful economic development. One term administrations (a three year period) do not enable successful and permanent establishment of new activities, and have been associated with "hobbyism." Moreover, continuity of policy is not associated with changing administration. The C.R.S. was established during a double-term administration as were the coffee and virtually defunct forestry schemes on Atiu. This latter scheme, successfully established and protected by strict sanctions especially against fire, has failed to mature because of lack of continuity in policy. The successor to the Resident Agent who began the albizzia planting on

Atiu did not enforce sanctions designed to protect the developing trees. The result was loss of most trees through fire and today few remain. The period 1958-1962 notable for changing administration on Atiu was the period when the C.R.S. declined most and it took an enlightened administration which lasted almost two full terms to rectify matters. Sadaraka (1961, 24) reiterates this theme when he states

"With the vital role associated with the office of Resident Agent, the period of time which one is prepared to remain on the island is important to long term development programmes. Frequent changes of Resident Agents would appear disadvantageous, particularly when they have shown completely different ideas and interests."

Scale precludes any possibility of administrative specialisation as such would prove uneconomic, and hence a Resident Agent has to fulfil a multi-dimensional role within the island, not unlike the all-pervasive one of the traditional Ariki. Independence has reduced to some degree the former impersonal relationship of Resident Agents and the local population as they now serve the Cook Islands government. However, geographic isolation will mean, until air services are begun, that Resident Agents will have a fairly free hand in the affairs of the island they administer.

Enlightened administration was largely responsible for the rejuvenation of the citrus industry. Through increasing the measure of local control it proved possible to adapt the scheme to suit both the physical and social environments.

#### Increasing Owner Participation in Production

Great variance existed in the extent of grower involvement in production. Some planters did much of the maintenance work from the beginning, others little, and in general the state of individual plot balances at present reflects the past degree of owner participation in production. In some cases, however, other factors such as soil deficiencies, late bearing trees, disease and other natural

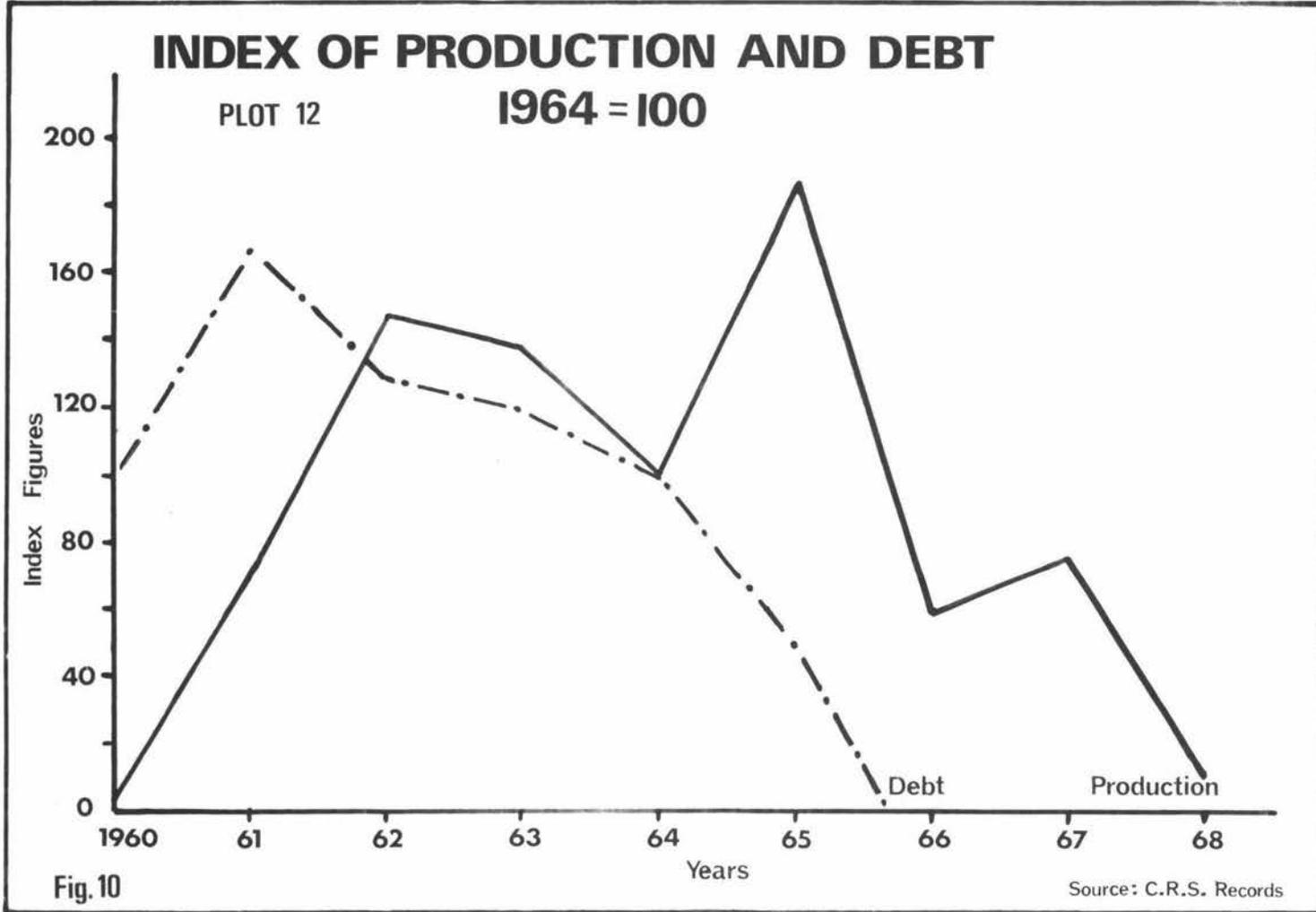
factors have contributed to the present economic state of individual groves.

Figures 10-12 show the production trends for selected credit plots on the island compared with ones with a relatively high degree of indebtedness. When the effect of planter participation in maintenance (Figures 10 and 11) is viewed against comparative lack of involvement (Figure 12), the effect of both on orchard balances is clear.

The histories of plots 12 and 27 have differed greatly since they have had credit balances. Figure 12 appears to bear out fears that credit balances may lead to decreased production as a result of reduced Fruit Control influence in management. Production from this grove has been associated with a falling off in production since it has had a credit balance although the decline in 1968 was due to hurricane influence. However, analysis of the general Atiuan situation shows that total island production in the corresponding years also fell. Plot 27 on the other hand, has shown continual increase in production since having a credit balance, with the exception of 1968.

The general trend for all Atiuan citrus growers to assume a greater managerial responsibility is reflected in Figure 13 where labour costs have markedly decreased although citricultural demands have increased as trees have matured. This trend has resulted through both a greater appreciation and understanding of the underlying principles of modern citriculture. Growers are aware of mistakes made in the past and are now consciously attending groves in order that the situation be remedied (Table XVIII). As one grower stated:

"Before I did not clean my plot properly, and the Fruit Control would not manure the plot if there was rubbish in the plot. But now I do the work properly and the trees are growing well and getting plenty of fruit. Plenty money now.....I want to clear the debt from my head. I want all the money to come into my pocket."



# INDEX OF PRODUCTION AND DEBT

PLOT 27

1964 = 100

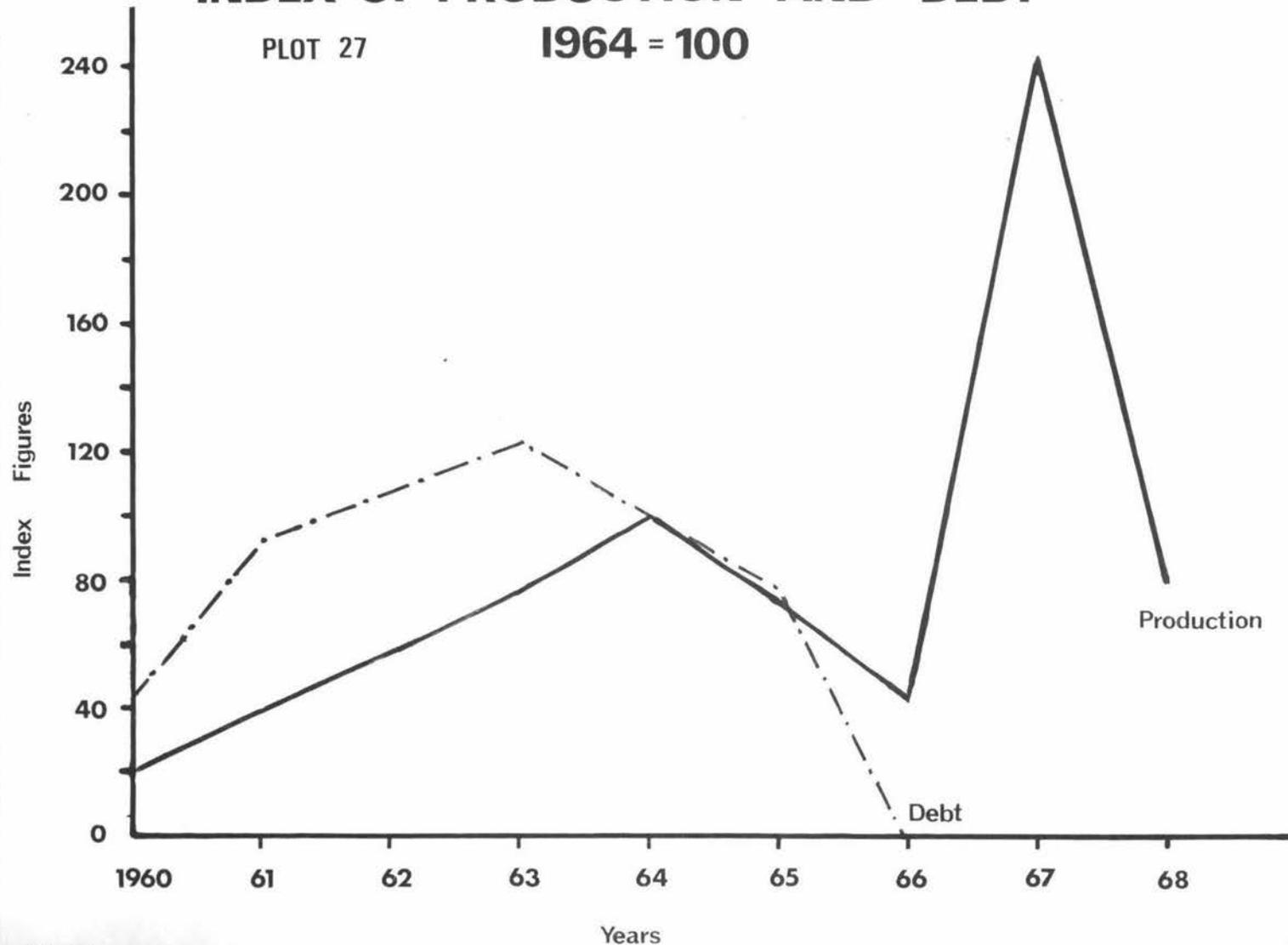
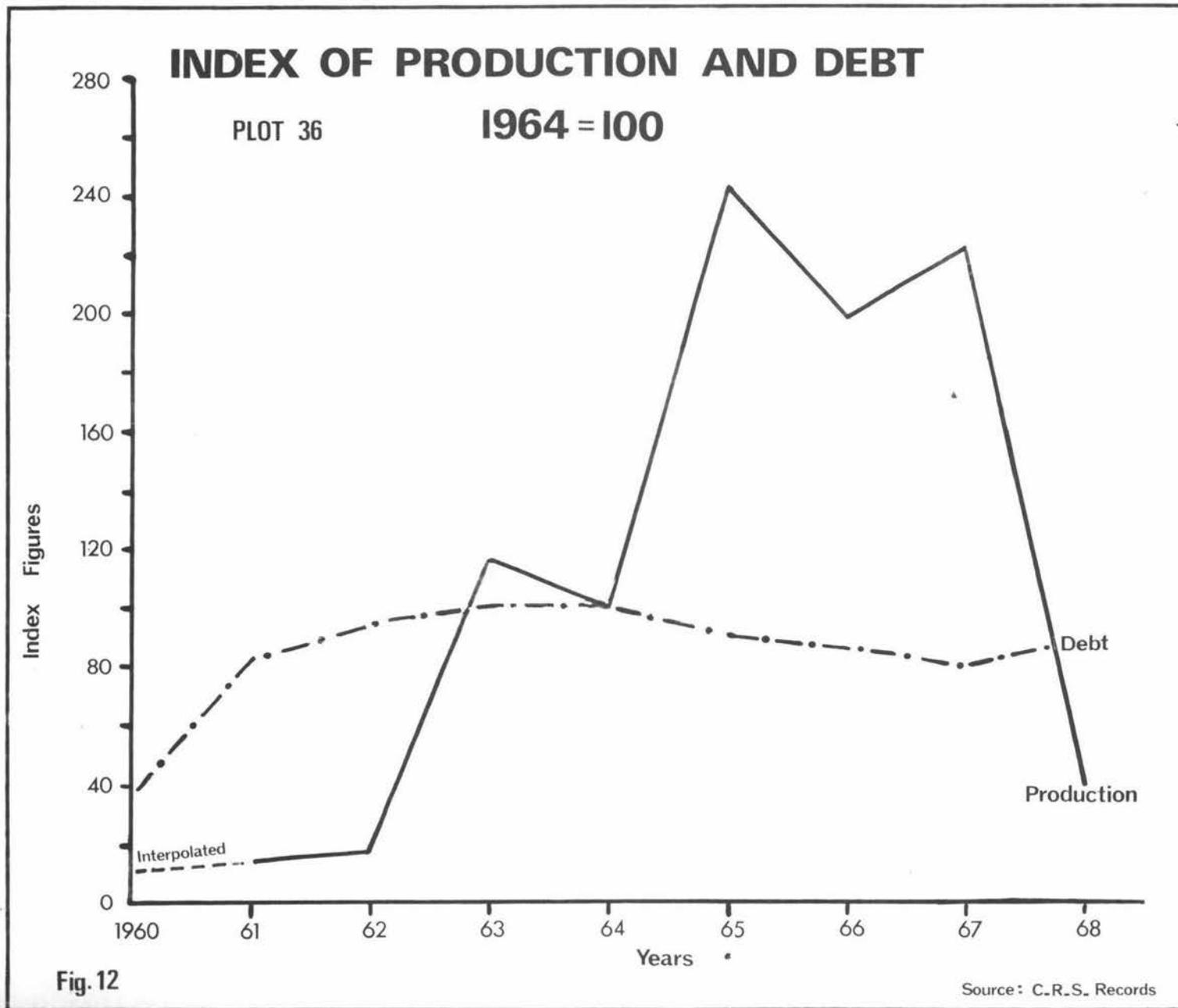


Fig. II

Source: C.R.S. Records



Most growers are adamant in their refusal to let Fruit Control assume responsibility for more plot maintenance (Table XVIII). Most want assistance only in pruning and slashing. The grower quoted above stated he wanted Fruit Control only to slash his plot "Because I do it alright and because that costs me more money." Growers have thus become aware that the plot is theirs, not the Government's, and that the level of debt, the level of production and the value of returns they receive is generally commensurate to the extent of their labour input. The Fruit Control Field Officer stated that there

"...is money in oranges now as long as the owner is prepared to work hard on his plot all the year. Those plots that are making little return for their owners are not looked after well. That is the trouble with that."

Of the 43 growers interviewed, 27 stated they would like to do more work on their plots themselves, but are unable to do so due to other factors such as engagement in permanent employment, demands of subsistence production and other less common reasons such as old age. The remainder stated that they did not wish to do any more work on their orange plots, preferring to concentrate attention on subsistence production. Figure 13 shows the present breakdown and costs of components of plot maintenance.

#### Grower Education

Education, neglected initially, was the basic cause of the lack of grower participation. The introduction of a scheme such as the C.R.S. in Atiu could not succeed unless some form of education or agricultural extension work took place. Inevitably problems must arise when modern, relatively sophisticated production techniques are introduced into a traditional society, the agricultural economy of which is notable for simple, uncomplicated practices and which is intricately adapted to the physical environment and prevailing social

TABLE XVIII

GROWER REACTION TO INCREASED FRUIT CONTROL ASSISTANCE IN  
PLOT MAINTENANCE (43 Growers)

<u>Reason</u>	<u>Number</u>
Do not want any assistance whatsoever	1
Do not want increased Fruit Control assistance but want the latter to continue to fulfil present role in maintenance	39
Want more Fruit Control assistance in maintenance	3
<u>Reasons given for not wanting increased Fruit Control assistance in Plot maintenance</u>	
Because it will increase the debt and cost money	40
Because the family can do all the plot work	1
<u>Reasons given for need of increased Fruit Control assistance</u>	
Old age	2
Lack of time to maintain plot adequately	1

In addition 6 growers, not wanting Fruit Control to do any active plot maintenance work, stated they would take increased assistance in the form of advice.

Source: For this and subsequent tables data is from fieldwork unless otherwise stated.

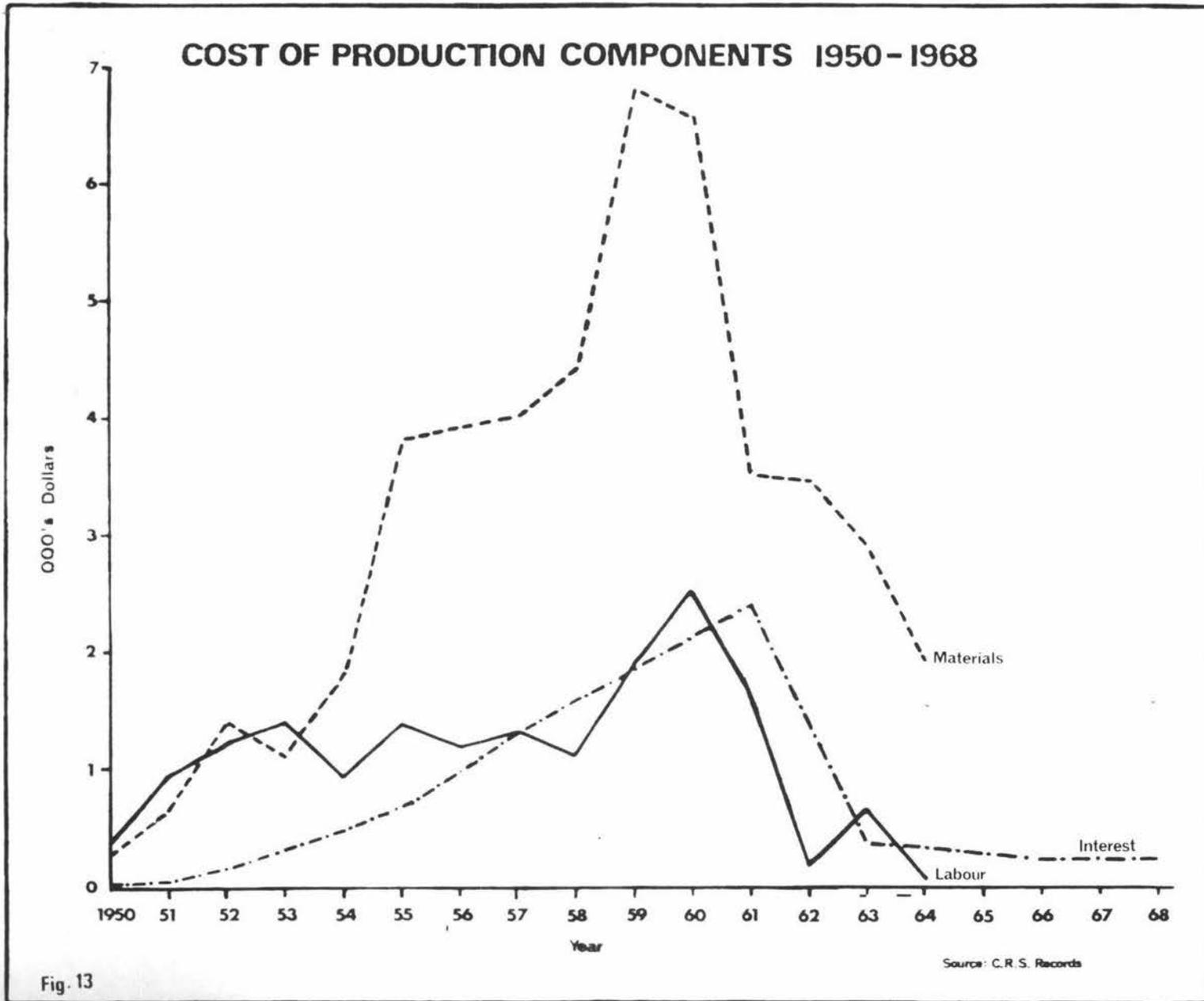


Fig. 13

organisation. McCauley (pers. comm.) wrote:

"Previous to 1962, growers were only aware that oranges grew on trees - period. Knowledge of the action of various manures, symbiosis of ant and aphid was non-existent, reasons for circle weeding, cover crops, dead wood pruning, etc. etc. were never made available. The result was that the owners looked on the plots as belonging to the Government; the cost of upkeep was no concern of theirs, and the revenue from crops was their due right as land owners, or by legal occupation."

Here lay the roots of the early failure of the C.R.S. on Atiu. Lack of grower participation in plot management and consequent debt, were a function of grower ignorance. The Scheme initially failed for it viewed development of the industry as a technical problem, and completely neglected the social implications of such innovation. As a result, technical innovations did become a real problem, not because these difficulties were inherent in innovation but rather because the indigenous people did not understand the reason behind them. Thus labour and capital in the initial Scheme were inefficient in application. Economic development and social development are inseparable. In neglecting the social aspects of development the C.R.S. initially neglected the human factor as an ingredient in economic development.

"As in any field of social development whether economic or otherwise, unless the trend of thought between the projector and the recipient is basically the same, there can be no actual communication. Nothing can succeed unless the human quality is ensured a dominant place in the development theory, and unless the person to person factor in thought, word or deed is accentuated there can be no true development.

(McCauley, pers. comm.)

A marked relationship is apparent between grower education and productivity in general although the effect on individual growers is difficult to isolate as many other factors are also related in this process. However, the recent rejuvenation

of the scheme coincides with the beginning of the extension programme implemented on Atiu. Plot owners now have an understanding of the monetary economy as their refusal in general to permit any increased Fruit Control work on plots and their conscious policy of attempting to rid themselves of debt as quickly as possible indicates. The whole Atiuan community, including the growers are aware of reasons why debt increased before 1964 ( Table XIX). But more important, they are aware of factors which will enable them to pay the debt off. As Tables XX and XXI show generally they both want and expect to repay plot debts and of the 43 growers interviewed, three had already achieved this ambition. One grower interviewed was indifferent as to whether the debt be paid or not as he was the trustee looking after the plot for a relative in New Zealand. Absenteeism is thus still a force within the Atiuan C.R.S. In addition, one elderly grower, although agreeing that he would like his plot to be debt free, was not sure that he could achieve this. - "I got more money from oranges before. Why I work on plot?"

This may be a reflection of the effect of age on production and the relative decline in production since 1965, but shows that the educative process has not been completed. Growers associate increased work with increased returns and decreased debt, but in most cases few are aware of the real links between these factors. However, the fact that even some are aware of the association has been sufficient to enable the recent improvement of the C.R.S. on Atiu. Grower knowledge of modern production techniques has expanded and although superficial in nature has been responsible for generally superior management to that of the pre-1962 era.

Of the 43 C.R.S. growers interviewed, all knew why manure was put on trees, but only 10 actually understood that manures were designed to overcome soil deficiencies. To the majority, fertilisers were applied "to make the trees healthy and to grow more orange." Twenty-six growers knew how many applications of fertiliser were made per annum and 24 of these knew the exact months of application.

TABLE XIX

REASONS GIVEN BY GROWERS AND NON-GROWERS FOR DEBT  
INCREASES IN THE PRE-1964 ERA (43 Growers)  
(32 Non-Growers)

<u>Reason</u>	<u>Frequency of Reply</u>	
	<u>Non-grower</u>	<u>Grower</u>
Reliance on hired labour	29	33
Little grower participation in production	21	32
Did not follow Fruit Control instructions	--	2
Inefficiency of hired Fruit Control labour	3	5
Lack of Grower interest	--	2
Some plots were late bearing	--	1
Low Production	--	4
Fluctuating production	1	2
Trees young and relatively unproductive	1	1
Hurricanes	--	1
Lack of technical knowledge	1	4
Shipping inadequate	1	--
Too much reject fruit	1	1
Costs of production charged to plot accounts and did not affect the grower's pocket	1	--

TABLE XX  
REASONS GIVEN BY GROWERS FOR EXPECTATION  
IN REPAYING PLOT DEBTS (43 Growers)

<u>Reason</u>	<u>Number</u>
Because the debt situation has recently started to improve	34
Because of the Voluntary Levy Fund	2
Because hired labour is used	1
Because Grower pays money from wages to accelerate debt decrease	2
Because of greater owner care and attention	5

TABLE XXI  
REASONS GIVEN BY GROWERS FOR WISHING TO REPAY  
PLOT DEBTS

<u>Reason</u>	<u>Number</u>
Want all plot receipts of sale	40
Because no interest has to be paid	1
Because of prestige reasons	1
Because does not want his inheritor to assume title to a debt	1
Because would like to be rid of debt	1

Eighteen plot owners knew the fertilisers they utilised, and a further two could name one they used. In total, only 13 growers of the 43 could answer all the questions put to them concerning fertilisers, and these people were, in general, among the best growers on the island. Of the 13 people involved, no less than 6 owned credit plots as at 30th September 1969.

A similar situation emerged when growers were questioned on the use of sprays. Thirty-six could state in general terms, why sprays were utilised to kill the mana mana (insect), but only 4 growers could state what spraying was specifically aiming to alleviate and all 4 worked either for the Agricultural Department or Fruit Control. Nine growers knew what sprays were used, 33 could state how often plots were generally sprayed per annum, but only 20 knew in what months such activity took place. The fact that Fruit Control does the majority of spraying on plots and that spraying is generally confined to similar months, although some variations do occur according to environmental conditions, may explain this apparent lack of knowledge of spraying activity. Of the total, only 7 showed a basic understanding of spraying activity, and of these, 3 owned credit plots as at 30th September 1969.

Thus, it appears there is a link between plot owner understanding of modern citriculture techniques and the level of production. Yet it appears that only a minority are aware that an annual production cycle exists, and that work must be regimented to the demands of this cycle. Knowledge of this concept is likely to lead to more regular work on plots, better management and further rises in production. However, significant progress has been made since 1962 in educating the plot owners on Atiu to an understanding and appreciation of the demands of modern citriculture practise. This, along with greater grower participation in the scheme has and will continue to be a most influential factor in promoting further improvement within the industry.

Relative Decline in Absenteeism

Absenteeism reflected extreme lack of grower participation and basic ignorance of the demands and responsibilities associated with the market economy. The fact that legal ownership of a plot was vested in an individual meant that when an owner migrated and left the plot in the hands of relations, the latter could only gain payment for their labours on the plot when they could produce a recognised form of authority. The result was that trustees usually relatives, would pick fruit and be paid for this, but would not participate in any plot maintenance as they received no payment for such work. Clause 5 of the Order Granting Right of Occupation (Appendix III) allowed for transference of Occupation Rights if a holder did not tend to the land in a "husbandlike" manner. But the fact that this could not be done immediately owing to a time lag between petitioning the Land Court and obtaining a new Order, tended to accentuate the problem. However, Judge Morgan of the Native Land Court authorised a local Atiuan Court to be held under Resident Agent McCauley in 1966 and the position was reversed. Decisions made at this Court concerning transfer of Occupation Rights were immediately ratified by the Court in Rarotonga. Security of tenure is a necessity for the Polynesian and to the success of the C.R.S. on Atiu.

Table XXII shows the effect of absenteeism on production for the years 1960-1961 and the serious impact it had on total Atiuan output. One plot is recorded as having been picked once, and as was the case with most other absenteeed plots the debt position rose to a level where despite substantial increases in production it continued to rise as interest rates absorbed the total sales receipts. The low production figures for 1960 were due to hurricane damage which tended to reduce the differential between plots in absentee ownership and those in effective ownership. The figures for 1961 show an average difference between absenteeed and non-absenteeed plots of 11.6 lbs per tree which is a significant margin, and would have affected total production markedly. Moreover, a minority of plots

at this time were not yet bearing.

TABLE XXII

THE EFFECT OF ABSENTEE OWNERSHIP ON PRODUCTION PER TREE, 1960-1961

	<u>1960</u>	<u>1961</u>	<u>Total No. of Plots</u>
Absenteeed plots	6.0	64.4	61
Remainder	9.5	76.0	103

Source: C.R.S. Records

The extent to which absenteeism contributed to plot indebtedness varied from plot to plot and was influenced by various other factors, notably the quality of the work performed by the trustees. However, the fact that in 1961, 61 of 165 representing 37 per cent of all plots were absenteeed, gives some insight to the magnitude of the problem at the time. The situation has improved since 1960-1961 but even in 1966, 31 plots were registered as being absenteeed, although with the rejuvenation of the scheme the percentage production difference between absenteeed and non-absenteeed plots had fallen considerably (Table XXIII). Nevertheless a noticeable differential in production still remained.

TABLE XXIII

THE EFFECT OF ABSENTEE OWNERSHIP ON PRODUCTION PER TREE

<u>(A)</u> 1966	<u>(lbs)</u>	<u>Total No. of Plots</u>
Absenteeed plots	213.4	31
Remainder	227.4	134

PRODUCTION PER TREE

<u>(B)</u> Post-1966	<u>1967</u>	<u>1968</u>
Plots under absentee ownership in 1966	194.1	92.5
Remainder, 1966	185.9	68.3

lbs

Source: C.R.S. Records

The effect of holding Land Court hearings in 1966 had a marked effect on the scheme as the aforementioned figures indicate.

Transference of Occupation Rights to the new owners at the time when the scheme was rejuvenating economically caused production from plots absenteeed in 1966 to exceed production from those not absenteeed in that year, for there existed (and still does) on Atiu a great desire by non plot owners to own citrus plots as they saw the benefits they brought to households. This aspiration, awareness of past mistakes made, especially lack of grower participation in production and the fact that changing ownership in many instances involved ownership being transferred to younger people, was responsible for this situation arising. Yet even today absenteeism remains a problem, though not of the magnitude it has been in the past. With the rapid rate of growth and lack of seasonality in plant growth, even a brief absence from the island has a detrimental effect on plots, as the maintenance demands associated with citriculture in a tropical environment are greater than those in more temperate areas. Absenteeism is diametrically opposed to the main demand of the C.R.S. on Atiu, regular work and regimentation of the plot owner to the labour demands of the production cycle.

#### The Revised C.R.S. Policy

In general, the new policy of increased grower participation in all C.R.S. activities aimed to inculcate in them the underlying principles of the new citrus industry. Lectures, using a "simile" approach were inaugurated and supported by practical demonstrations in the field. The emphasis from the beginning was on making the individual grower the vital factor in plot management.

To activate greater grower participation, local leadership was seconded especially to assist in translating at extension meetings. A highly respected local headmaster who was one of the members of the Legislative Assembly, (M.L.A.) the Akaere and involved in virtually all social activity on Atiu, assisted much in the

lecturing programme. An Agricultural Officer, also a local M.L.A. along with the contemporary Resident Agent, set about initiating the practical work required to rehabilitate the industry. The object of all this was to show that all members of the community, irrespective of social standing, had a part to play in overhauling the industry.

Village committees were formed, active in all aspects of social life, and local ordinances directed all phases of economic activity. A social infrastructure was created on the island, upon which development could be based. In addition to creating new institutions through which activity could be channelled to socially desired ends, some traditional institutions were incorporated which could serve development policy. Notable amongst these was the playing upon the individual mana of plot holders in order to stimulate greater efficiency. Regular village plot inspections were held, all citrus plots being visited by the growers of that village. On completion, a meeting of all plot owners was held and those who had cleaned and maintained plots well were praised and those who had neglected plots, constructively criticised. C.R.S. extension work was thus incorporated into these tutaka anane (plot inspections). The result of inspections was that growers began to ensure that their mana was not affected through laziness, and hence plot maintenance throughout the whole island improved. The Scheme had found a basis from which it could successfully operate - it had become adapted to the existing social environment. At times inter-village inspections were held and by playing on village parochialism the Scheme could be further advanced.

Thus, by carrying out an active extension programme incorporating practical explanation of theory, playing upon some of the traditional aspects of Atiuan life which could assist the development of the Scheme, and utilising respected local leadership, rejuvenation of the Atiuan C.R.S. was effected. Effective and enlightened local control was all that was required.

### Emergence of a Greater Sense of Social Responsibility

The rise of enlightened and trusted local leadership in Atiu has been paralleled by a re-emergence of social responsibility and communal solidarity. Social change has not made the same inroads into Atiuan life that have occurred on other C.R.S. islands. A greater sense of communal responsibility characterises Atiu and has played a major role in assisting the local citrus industry in becoming the most efficient in the Outer Islands.<sup>1</sup>

The effect of greater social responsibility is reflected in the Atiuan attitude to wandering stock which cause much damage in citrus plots. The local Administration enforces the ordinance prohibiting wandering stock in orchards and occurrence of such can lead to shooting of such stock. The result has been that stock is either impounded in enclosures or tied to trees. In general, the only area where stock wander uncontrolled is in the makatea, and these in many instances are impounded, especially on the inner fringe of this area (Plate 5). Pigs and goats are capable of doing serious damage to plots by eating leaves, stripping bark and rooting around the base of the trees and exposing roots. In Atiu poultry can do little damage to trees, although they wander uncontrolled as they remain in the villages, and are thus isolated from the vast majority of plots located in the lowland valleys. The Atiuan people understand the reasons why stock are not permitted to roam unattended, and their application of the ordinance prohibiting this especially in C.R.S. plots is not merely a reaction to threat of stock extermination. This responsible attitude is not confined merely to citrus producers but to the total population as Table XXIV indicates:

PLATE 5.

IMPOUNDED STOCK, ATIU



The recent emergence of social coherence on Atiu has been reflected in the attitude of the islanders to the C.R.S. Formerly stock wandered unattended and damaged groves but education and rejuvenation of the Scheme have led to almost all stock being impounded today.

TABLE XXIV

WANDERING STOCK: FREQUENCY OF OCCURRENCE (A)  
AND REASONS FOR PREVENTION (B)

	<u>Citrus Producers</u>	<u>Non Citrus Producers</u>
<u>A</u>		
Permanently wandering	2	2
Occasionally wandering	2	2
Controlled	35	23
<u>B</u>		
Possible damage to crops and plots	42	21
Because it is the law	1	2

Of the permanently wandering stock, two cases (one citrus producer and one non-citrus producer) have stock wandering in the makatea, and the other two have goats wandering on swamp land. The belief is that the goats will not wander off the swamps, but this at times does occur. Stock wandering in the makatea sometimes affects citrus exports by damaging fruit awaiting shipment in packing sheds overnight although instances of this are isolated. Growers who stated they let stock wander, did not do so indiscriminately and only for short periods of time. However, the overwhelming majority of people have pigs, goats and the few horses on the island securely tied or impounded. The reasons they do this are given in Table XXIV and reflect a positive approach to the situation rather than the negative one of fear of having stock shot.

The situation on Aitutaki and Mauke is less satisfactory and stock is often to be seen tied in orchards or to trees themselves (Plate 6). The local Administrations do not enforce sanctions against wandering stock despite this being part of C.R.S. official policy. The lack of social cohesion and responsibility on these islands is having a markedly detrimental effect upon the Scheme as a whole.

PLATE 6.

WANDERING STOCK, AITUTAKI



The C.R.S. on Aitutaki is notable for less stringent enforcement of ordinances prohibiting stock from wandering into orange groves. This lack of social responsibility reflects the problem of law enforcement in a small, isolated and interrelated society. In the photograph goats are seen grazing in an orange plot.

Thieving of fruit also reflects the degree of official cohesion existing within a community and the extent of communal responsibility prevailing. This problem, although not as prevalent as in Aitutaki and Rarotonga in particular, is still evident in Atiu today. It affects mainly those plots near the main roads, as such orchards are "utilised" to provide nocturnal sustenance to fishermen. Loss of fruit also occurs at the landings on boating and reefing days but only to a minor degree. On Rarotonga in the Ngatangia, Matavera, Tupapa and Avatiu areas stealing reaches its zenith and many plots have become heavily indebted through pilfering, especially by the landless Outer Islanders who have settled in the area. In complete contrast, the other less populated side of Rarotonga, particularly the Aorengi area is one of high productivity.

Of all the C.R.S. islands, Atiu represents the best example of social responsibility in attitudes to economic development and other allied forces. This, along with enlightened administration and the extension programme on the island, has been responsible for enabling social attitudes to be adapted to suit the particular demands of the C.R.S. During the initial period of C.R.S. reconstruction on Atiu, voluntary organisations such as the Boy Scouts and Boys' Brigade assisted in cleaning plots for a minimal sum, especially on plots of the elderly and infirm who had no immediate recourse to labour. Teenui villagers renovated their meeting house by performing similar tasks as the above-mentioned organisations. As a result, the rejuvenation of the Atiuan citrus industry was achieved at cost far below what could have been expected and merely through the community welding together under trusted leadership.

## II ECONOMIC FACTORS

### Altered Economic Policy

The reduction of interest rates from the original 5 to 0.5 per cent has assisted the C.R.S. as it has reduced interest payments, thus allowing an increased rate of repayment of outstanding advances and a general rise in payments to growers. The education of growers in the general economic principles upon which the market economy was based and in the operations of a money economy also radically assisted the improvement in the economic position of the Scheme. Growers agreed voluntarily to levy themselves 10 cents per bag in 1964 on top of the repayment rate of seven-twelfths of total receipts in order to repay plot debts rapidly. Monies from this fund are used to defray production expenses the following year. The Voluntary Plot Working Account, as it is termed, has been most effective in reducing the total debt of the Atiuan C.R.S. as material requirements in production are no longer charged to plot accounts, which explains the reduction in material costs since 1964 as shown in Figure 13.

Since 1964 with the exception of 1968, the Atiuan C.R.S. debt has undergone a reduction from \$118,153 at 30th September 1964, to \$77,064 at 30th September 1969. This represents a thirty-five per cent reduction in debt in five years. Table XXV shows the voluntary levy to be a substantial fund and it symbolises the participation of growers within the Atiuan industry and their conscious desire to reconstruct the C.R.S. and place it on a sound economic basis.

TABLE XXV

#### THE VOLUNTARY PLOT WORKING ACCOUNT, 1964-69

<u>Year</u> (as at 30th Sept.)	<u>\$ Amount</u>
1964	825.50
1965	3,147.20
1966	3,306.90
1967	2,721.68
1968	1,103.60
1969	3,133.73

### III INFRASTRUCTURAL FACTORS

#### Increased Supply of Machinery

Comparative lack of machinery was a problem in the C.R.S. in the initial period of establishment. What machinery did come to Atiu was obsolete and unreliable and tended to be comprised of discarded units from Rarotonga. Efficient machinery was necessary for the success of the Scheme. Owing to the relative isolation of Atiu from Rarotonga, comparatively few shipping calls especially in the citrus off-season (when spraying in particular is performed) and the rapid all year growing season, breakdowns prove costly. Any mechanical breakdowns resulted either in work not being performed or in a greater demand being made on the plot owners who at that time were little interested and involved in the Scheme. Lack of and unreliable machinery tended to heighten the inefficiency of the Scheme. In 1960 the Fruit Control machinery consisted of two tractors (one of which was regularly out of commission), two 400 gallon power sprays and one water pump. There was a complete lack of implements capable of preparing land for planting and for assisting in plot maintenance, especially weed growth in plots belonging to elderly people incapable of keeping plots clean.

With the increase in local control from 1962 onwards this situation was rectified somewhat and in 1969 the Fruit Control inventory consisted of three tractors, three 400 gallon power sprays, one water pump, one set of discs, one disc plough and a slasher mower. In addition, a bulldozer belonging to the Agricultural Department was also used, but in June 1969 this was sent to Mauke and Atiu has thus been left without any efficient mechanical means of clearing ground for planting.

The small scale of operations will prevent any major stock of machinery being held in Atiu and breakdowns will continue to be a problem. During 1969 the slasher, an important machine in controlling growth in plots broke down and it took three months for the necessary

part to be replaced. Plot maintenance proved difficult as only the young owners were capable of clearing plots manually (by reaphook), while meeting the demands of the subsistence economy (Plate 7).

Despite the drawbacks the situation has improved considerably in recent years and the stock of machinery when fully operative is capable of assisting growers to maintain a relatively good standard of maintenance.

#### Improved Shipping

Shipping to the present day remains a problem in the C.R.S., although recent developments have tended to decrease the stultifying influence it formerly had on the industry. Atiu was traditionally one of the least visited islands of the southern group, and the problem was heightened by the fact that it produced a perishable crop.

The distance of Atiu from Rarotonga, 114 miles, and the relatively small cargoes offering were not conducive to more regular shipping calls, necessary if wastage within the citrus industry was to be reduced. Moreover, with Atiuan oranges being exported to the New Zealand Market before 1962 great losses were incurred in transit. From this aspect Mauke and Atiu were placed in a disadvantageous position for fruit from these islands was usually loaded before that of Aitutaki and Rarotonga. Time was a vital factor in getting perishable oranges to the New Zealand market, and an inverse relationship existed between orange losses and the regularity and speed of shipping. This problem of shipping was heightened by the fact that shipping space on the Maui Pomare (720 tons) and after 1960 the Moana Roa (2,750 tons) was limited, and islands were allocated shipping space which did not take into consideration variations in export production within the season itself.

A marked improvement in shipping has occurred since 1963 when the Legislative Assembly attempted to overcome the inadequacy of interisland shipping in the Cook group by limiting the number of operative licences in the group to three, and by paying a subsidy to

PLATE 7.

MECHANISATION OF CITRICULTURE



Mechanisation of the citrus industry is significant as it enables more efficient tree husbandry and reduces the labour demands made on individual growers. The photograph shows mechanised spraying of trees by Fruit Control employees. The uncontrolled growth of grass and weed show the effect of breakdowns of machinery on isolated Atiu where no repairs can be carried out. The elderly owner of the above plot was unable to effectively control growth as Fruit Control's mower had broken down.

vessel owners. The Government has thus gained some control over shipping movements in the group and has improved the efficiency of both scheduling and boat maintenance. As a result, shipping, one of the most vital parts of the Cook Island economic infrastructure has improved considerably. This roughly coincided with the diversion of Atiuan fruit from the New Zealand Market to the juicing plant in Rarotonga, and with the beginning of the rejuvenation of the C.R.S. Since the C.R.S. has been oriented to the Rarotongan market, shipping in season has become far more regular and in the height of the picking period Atiu now receives a boat at least once a week, which contrasts markedly with the pre-1962 period when shipping was limited to one vessel a month. As a result wastage within the industry has markedly declined.

Since 1962-63 a relationship has developed between Atiuan growers and the smallest inter-island trading vessel Tagua. The two larger boats operating in the group Bodmer and Akatere - have greater tonnage capacity and for this reason in general do not visit Atiu. In 1969, 70 per cent of shipping calls in the orange season were made by the Tagua. Many growers refuse to pick fruit, for personal reasons, for vessels other than the Tagua in the height of the season when shipping is regular.<sup>2</sup> Most shipping is confined between Tuesday and Thursday to coincide with the weekend break of the canning factory (except when the season is at its height and the factory operates seven days a week) and with the prevailing custom of the Atiuans of not working on Sundays.

#### Harbour Improvement

Improvements to the landings have assisted in increasing the efficiency of the C.R.S. Atiu lacks even one good harbour, as is characteristic of the whole Cook group, except Penrhyn. Inter-island vessels are forced to stand off the reef to be loaded by an archaic and slow process of boating and reefing, each village providing a boat and a crew (Plate 8).

However improvements have been made which have eased this

PLATE 8.

ORANGE LOADING, TAUNGANUI LANDING



Despite landing improvements at Taunganui, handling of fruit is still a slow process. Until improved harbour facilities are created damage to fruit is inevitable. On boating and reefing days each village provides a boat and crew for loading and off-loading of cargo. The photograph shows the method of loading lighters.

problem. Roads have been blasted through the Makatea to the waters edge and outward cargoes can now be transported to the inner edge of the reef by tractor or truck for loading into lighters. The reef itself has been blasted at Taunganui and a channel created to the edge of the landing and this has facilitated more efficient handling and movement of fruit (Plate 9). However, in rough weather boating and reefing remains hazardous with the result that some fruit is damaged or lost by boats overturning and through crane loading at the vessel itself. At time when reefing conditions are poor, ships return to Rarotonga leaving oranges behind.<sup>3</sup>

An alternative landing to Taunganui has been created at Konokonoko and depending on conditions, boating and reefing take place at one or other of the landings. Nevertheless loading is occasionally impossible and fruit is left. As on Mangaia, boating and reefing conditions are not good, and only the skill and industriousness of the islanders themselves makes the method sensible.<sup>4</sup>

#### Expansion of Road System

Initially inadequate, roading has been a problem within the Scheme, but now access has been provided to virtually all plots, the majority having tracks running through them as allowed for in the Occupation Right clauses. In periods of wet weather some of the access tracks become impassable, and this still presents a real problem during the picking season if a boat is due. As trucks cannot reach orchards, tractors are used, but are much slower than direct trucking from orchard to landing shed for weighing and stacking for the arrival of the ship the following morning. However, at present, providing weather is fine the 'on-island' transport system is efficient.

#### The Introduction of Fruit Processing

The opening of the canning plant in Avarua was also an important factor in the recent rise of the Atiuan C.R.S. Experience had shown that under the existing Scheme it was uneconomic to produce export quality fruit in Atiu. The significance of the canning

PLATE 9

CHANNEL BLASTED THROUGH REEF TO MAINLAND,  
TAUNGANUI LANDING



Loading of oranges for trans-shipment over the reef has been eased by the blasting of a channel to the mainland. Even in relatively rough weather when reefing conditions are not good loading of inter-island vessels can take place. The channel and breakwater can be observed in the photograph.

industry was that it was only concerned with the quality of the juice and not the outside appearance of the orange. As a result, what was reject fruit from an export standpoint, was acceptable in the factory and as well as reducing losses, production costs were lowered as less spraying was required.

Another important effect of opening the factory was that as the market was closer, Atiu being only 114 miles away from Rarotonga compared with some 1,700 miles from New Zealand, losses in transit through fruit over-ripening would not occur. The net result was that although a lower price was obtained for fruit (\$1.17 as compared to \$1.66 of export fruit, the total island crop, other than that domestically consumed, was saleable and production costs reduced.

In addition because the Atiuan C.R.S. assumed a more local orientation less fruit was lost as shipping could be more regular, and virtually obtained when required. Previously, when fruit was shipped to New Zealand a month elapsed between shipping calls and as a result inter-shipping losses were incurred.

#### IV ALLIED FACTORS

In addition to the above factors, other developments have occurred which have assisted the upswing of the citrus industry.

##### Emergence of Leadership and Social Coherence

The rise of new leaders on Atiu has been a factor which has assisted the recent developments in the C.R.S. Around this new leadership the Atiuan community has united and social coherence emerged. It is difficult to evaluate the effect of local leadership in the upswing of the C.R.S., but as this has occurred through a basically social revolution it would indicate that leadership may have played a significant role.

A prominent school-teacher was used as an interpreter at lectures and extension meetings while an Agricultural Officer assisted in practical work. The use of local idiom, and respected leaders of the community undoubtedly hastened the extension programme and gave growers confidence in proposed developments. Assistance in restoring plots to desired standards of maintenance came from various sections of the community. As a result of general social involvement, the C.R.S. was quietly, efficiently and cheaply restored to a position whereby it could become economic.

##### Independence

Although independence has brought party politics to Atiu, a factor which is tending to create friction within the community, it has been responsible for innovation which in some instances has benefitted the Scheme. It has increased local Cook Island control of Government organisations. Ultimate control no longer lies with distant administrators in New Zealand, although economically the group is still largely dependent on New Zealand for assistance.

Perhaps the most important innovation since 1965 has been the introduction of Radio Cook Islands. This has had the effect of "locking" the economic infrastructure into a more efficient system.

In such a decentralised environment as the Cook Islands an efficient system of communication is essential and the fact that this can now reach to the individual grower's household is significant. The radio provides plot owners with knowledge of shipping movements far quicker than the previous telegraph service, and has enabled the picking of the perishable oranges to coincide more efficiently with shipping. The recognised leader of temporary Atiu stated, "...one of the main reasons for starting the radio was to assist in the economic development of the Cook Islands."

Shipping improvements, although initiated just previous to independence, owe much to the efforts of the local Cook Islands Government and with radio, have revolutionised vital inter-island communications.

#### Changing Social Empathy

Changing levels of social empathy have also played a significant role within recent developments in the C.R.S. on Atiu. Changing social attitudes have, as already mentioned, brought about a major improvement within the C.R.S. and growers have been able to obtain new material items. However, these commodities and items are capable themselves of stimulating economic activity creating wants in individuals, which can generally only be satisfied by partaking in the C.R.S. Modern concrete block homes and motorcycles in particular, often the end products of participation in the Scheme, have in many instances catalysed citrus production and increased the aspirations of non-plot owners to obtain citrus plots in order that they could build a modern block home. A reciprocal relationship thus exists between socially desired items and the C.R.S. Increases in the frequency of one leads to stimulation of the other. The recent extension of citrus planting on Atiu has been influenced to a great degree of changing levels of social empathy. Social aspirations are altering and as one informant indicated

"You know the house before - the walls purau and the roof kikau. Rotten quick. You know, you pay the loan and the roof rot in 30 years. But the kikau 3 years and you want people to help you cut the coconut leaves and purau. But if you no money - how to get the people. You have to kill one, two, three pigs for the feed. That why I say the block house better. You know the Maori house better for the fresh air, but a lot of work. That why I don't like it?"

### References

1. The one occasion the author saw wandering stock in a C.R.S. plot involved goats which had wandered off swamplands.
2. Such occurred on 14th May 1969, when the "Akaterere" visited Atiu. Much fruit which could have been picked was left until the next visit of the "Tagua" or was forfeited by growers.
3. Such occurred in early June, 1969 when a boat en route for Atiu from Aitutaki was called back to Rarotonga because of the forecast of rough weather.
4. On 22nd April 1969 Atiuans unloaded inward cargo and loaded 3,234 bags of oranges plus other outward cargo in approximately six hours. The previous day it took Maukians a similar time to unload a comparable amount of inward cargo and 500 bags of oranges plus other outward cargo in far superior reefing conditions.

## CHAPTER VII

CONTEMPORARY INFLUENCES ON PRODUCTIONI NATURAL INFLUENCESSoil Type

Soil type at present seems to have some effect on production as is shown in Table XXVI. Tetoa clay loam seems to be associated with lower yields per tree than either Moeroa and Te Kapi clay loams, productivity in which is similar.

TABLE XXVISOIL TYPE AND PRODUCTION PER TREE, 1960-68

<u>Soil Type</u>	<u>1960</u>	<u>1962</u>	<u>1964</u>	<u>1966</u>	<u>1968</u>
Te Kapi	4.3	92.0	101.4	221.1	99.7
Tetoa	3.39	60.55	83.49	174.84	47.21
Moeroa	11.66	90.48	118.02	224.80	81.44

Source: C.R.S. Records

Note: The table is based only on those plots from which soil samples were tested at Ruakura.

With the 1964 revision of the Scheme and subsequent soil analysis there appears to have been a more marked increase in production on Moeroa and Te Kapi soils and a lesser, yet still significant, increase in production off Tetoa soils.

Altitude

Altitude also appears to have some effect on levels of production. Table XXVII indicates more efficient production on plots over 120 feet than from orchards below this level. From only 21.55 per cent of trees (representing 21.2 per cent of plots) located above 120 feet came 48 per cent of production in the period

1960-68. However it is unlikely that altitude alone was responsible for this for social factors, and the distance from household to plots would also affect this.

TABLE XXVII

ALTITUDE OF PLOTS AND PRODUCTION, 1960-68

<u>Altitude</u>	<u>Percentage Total of Plots</u>	<u>Percentage Total of Trees</u>	<u>Percentage Total Production</u>
0-20	11.5	10.3	8
20-40	15.7	16.4	10
40-60	15.0	14.4	8
60-80	17.5	18.5	7
80-100	5.5	5.6	10
100-120	12.6	10.25	8
120-140	7.8	8.2	21
140-160	8.6	9.0	8
160-180	.6	.6	2
180-200	1.2	1.25	4
200-220	1.2	1.3	8
220 +	1.8	1.2	5

Source: Fruit Control Records

Slope

Depending on the enlightenment and knowledge of the grower concerned, the effects of slope can be overcome by application of modern technology. For example, by concentrating manure application on trees higher up a slope, the grower can allow for downward diffusion of nutrients. In a labour-intensive industry, the quality and knowledge of the human factor is a most important element in production.

Geographic Isolation

Many of the problems associated with the C.R.S. in Atiu

are a function of the geographical isolation of islands. The difficulties arising from the decentralised nature of the C.R.S. were manifest in the initial policy, as direct and effective supervision from authorities in Rarotonga proved impossible. Radio, although an important development co-ordinating picking and shipping to a greater effect than the previous system, has not enabled personal communication between the powers that be in Rarotonga and local Atiuan growers and Field Officers.

Local Fruit Control Officers are controlled from Rarotonga and little provision exists for initiative as written directives come from the central authorities. This was one of the basic weaknesses of the Scheme in the pre-1962 period - no real local control of significance existed, and visits from Rarotongan advisors were infrequent and then extremely brief. Until this situation was remedied the Scheme ran inefficiently and uneconomically.

"The basic weakness found on my arrival was that maintenance of plots for all phases of activity was directed from Rarotonga. The visits from top advisors were few and far between, and were of only 4 - 6 hours duration. Seldom did any top advisor stay for a lengthy period. This was due no doubt to the fact that such persons had their own large plantations in Rarotonga, which to them was of primary importance. Progress (though of some sort) was evident, but was not a fraction of what could have been achieved, had the scheme had some measure of local control, as it was all directions came from Rarotonga."

(McCauley, pers. comm.)

The evolution of a Scheme whereby the citrus industry had a larger measure of local control was a major contributing factor to the post-1962 rejuvenation. Yet even today isolation remains a problem as it is difficult even to get Fruit Control Officers together for short extension courses. The introduction of inter-island air services, however, could in the future rectify the situation somewhat.

### Hurricanes

Hurricanes have had, and will continue to have, a marked influence on Atiuan citrus production. Two hurricanes have affected the C.R.S. on the Island to date and future planning will have to allow for occasional checks on citrus output. The effect the hurricanes of 1960 and 1967 had on production can be seen in Figure 8, while Figure 14 comparing annual shipments for selected years, shows the effect of hurricane damage on production by comparing that of 1968 to years of average (1963) and bumper production (1965).

The economic effect of a hurricane upon the C.R.S. is great. The 1967 hurricane caused the Atiuan debt position to rise over \$15,000 and this would have been even greater had there not been the Voluntary Levy Fund by which growers pay for much of their material costs themselves. Hurricanes can be periodically expected to stultify the growth of production and rate of improvement in the economic situation of the Atiuan C.R.S.

### Drought

Drought has had serious implications for the Scheme in past years, and unless reserves of water can be found, will continue to be a problem from time to time. The degree to which drought affects production depends much upon the season in which it occurs, the most disastrous periods of shortage being experienced when the trees are in fruit. 'Fruit drop' is then likely to occur. However, Atiu, through having a more reliable climate is probably better off in this respect than other C.R.S. islands in the group.

### Plant Diseases and Pests

Up until 1962 when fruit was exported to New Zealand, diseases had a marked effect on the Atiuan citrus industry. Grading resulted in the rejection of much fruit, the majority of which was not even consumed domestically. Lack of adequate supervision

### ATIUCITRUS SHIPMENTS FOR SELECTED YEARS

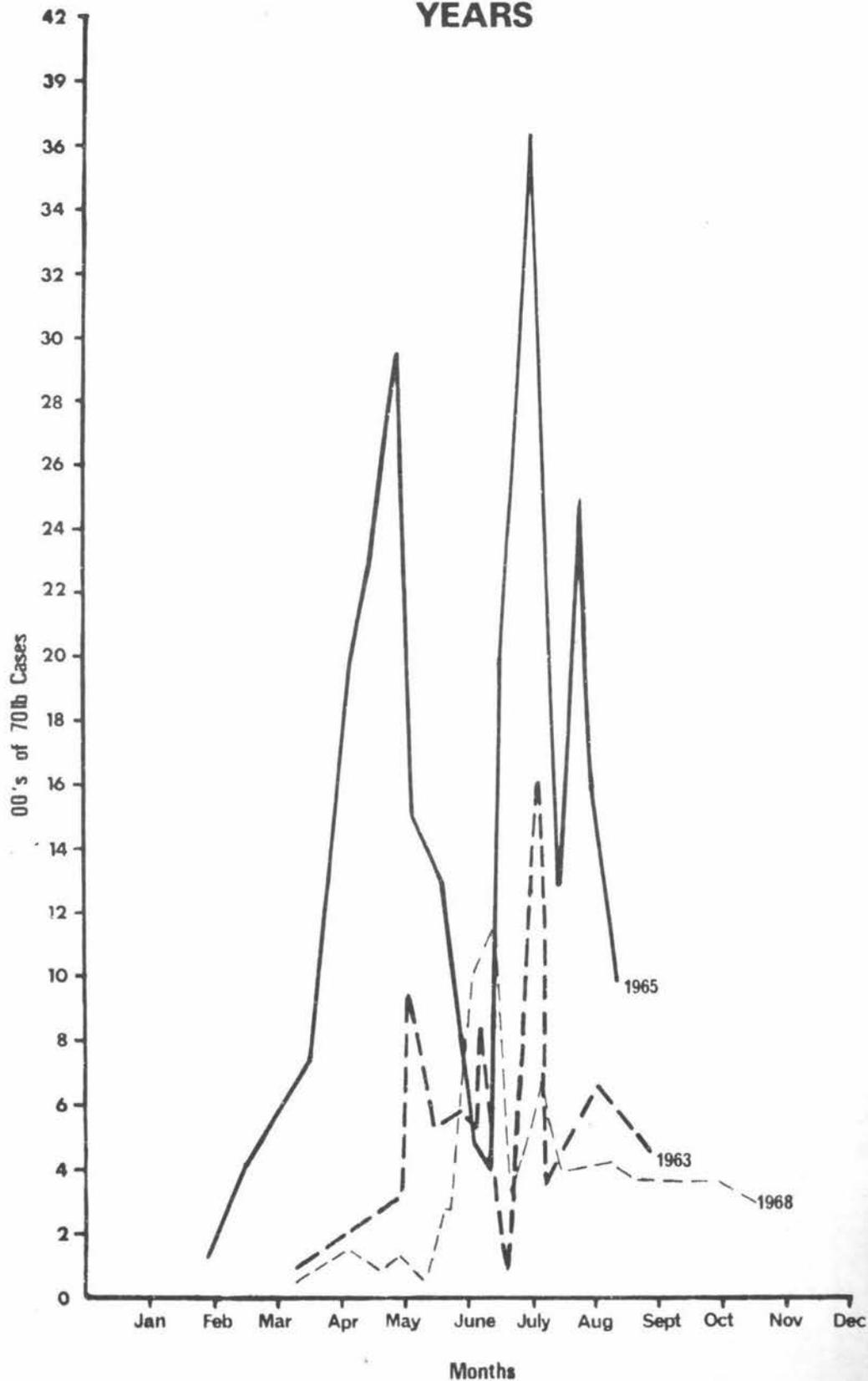


Fig. 14

Source: C.R.S. Records

was not conducive to the production of export quality fruit and hence in this early period much of Atiuan production was lost. With the opening of the canning factory in Rarotonga however, spraying of rust mite in particular decreased as all fruit, irrespective of colour, was accepted by the juicing plant.

Other plant pests and diseases, however, remain a continual hazard to production - scale, blossom moth, white fly, ants and aphids are all sprayed for and adversely affect production if not treated immediately.

## II CULTURAL INFLUENCES

### Distance of House from Plot

No marked correlation was noticeable between distance from home to plot and the level of production, although it appears likely that this factor may be closely associated with rising levels of production with increasing altitude as in general the higher the altitude the closer plots **are** to the settlement.

The introduction of the motorcycle could affect any impact distance from house to plot may have on production but to date it appears to have had little significant effect on plot outputs.

"Motor cycle not much good. Can't take coconut or firewood and that only good for yourself. A truck is better. But is alright for getting down the land, feeding the pig, something like that. You know it is a long way down the land and tired if you walk - motorbike is better. I got a lot of land you know and I got some land in Tuaroa, Matai, Akaara, Mapumai, Mokoera, Teenui. That why I like the motorbike. And slow for the walk. Quick on the motorcycle."

(informant, Teenui village)

### Changing Ownership

There appears to be no significant relationship between general plot production levels and changes in either legal or effective ownership of plots. Absenteeism, formerly a real problem has been to a large degree overcome and trustees are generally better than they were in the pre-1962 period as they have in many cases obtained consent from the holder of the Occupation Right to any returns from the plot.

However, multiple ownership - either effective or legal - tends to be associated with lower production amongst people in professional employment. Otherwise, as Table XXVIII indicates little effect on production results from changing ownership of plots.

TABLE XXVIII

COMPARISON OF PRODUCTION PER TREE BETWEEN PLOTS HAVING HAD OWNERSHIP  
CHANGES AND THOSE STILL IN ORIGINAL OWNERSHIP (lbs per tree)

	<u>1960</u>	<u>1962</u>	<u>1964</u>	<u>1966</u>	<u>1968</u>	<u>Average Total</u>
<u>Plots having had Ownership change</u>	7.32	96.3	117.74	218.3	70.86	102.10
<u>Plots in original Ownership</u>	9.2	88.3	110.7	230.4	84.7	104.66
<u>Average Total</u>	8.26	92.3	114.22	224.4	77.78	103.40

Source: C.R.S. Records

Since the inception of the Scheme, 36 plots have had their Occupation Rights transferred to new owners, four of which are under Fruit Control supervision as no relation of the original plot holders is prepared to assume title to the plots. To protect administrative investment Fruit Control assumes title. Of these four plots three were in absentee ownership and the fourth belonged to an old man incapable of maintaining his trees.

Of the 36 changes in legal ownership, 20 have been as a result of death, 1 because of age and 15 because of absenteeism. Of the latter group 1 owner was in Niue, 2 in Manuae, 2 in Mauke, 5 in Rarotonga and 6 in New Zealand. Subsequent to transference of Occupation Rights, 8 have undergone a further change in effective ownership - 3 through death (the Land Court has not yet transferred the Occupation Right to a new holder) and 5 through absenteeism of owners (1 in Rarotonga, 4 in New Zealand).

As distinct from changes in legal ownership, 38 other plots have undergone changes in effective ownership. Of this group, 11 changes were due to marriage where effective ownership passed from the wife to her husband, 1 through death (the Occupation Right has not yet been transferred), 5 due to old age and 21 through absenteeism. Of

the absentees, 9 are in New Zealand, 9 in Rarotonga and 1 each in Mitiaro, Mauke and Mangaia respectively.

Of the 104 original plots 64 have been subjected to either changes in effective or legal plot ownership. In addition one other plot, originally in dual ownership, has been legally divided between the two. Thus, two Occupation Rights now exist where there was formerly one.

#### Age of Trees

The production figures for the various tree age groups for 1967 show broad rises in production with maturity (Table XXXIX) but marked fluctuations do occur between groups, suggesting that other factors - particularly the standards of management - play an important role in determining the extent of production. The differential between production of the age groups is more balanced in the total production figures from 1960-68, as later planted plots come into bearing about the time of the revision of the Scheme on Atiu and have recorded higher yields per annum than their predecessors, which for many seasons were poorly managed.

TABLE XXIX

COMPARISON OF PRODUCTION OF TREES OF VARIOUS AGES

<u>Date Planted</u>	<u>Production per tree 1967</u>	<u>Average total Production per tree, 1960-68</u>
1950	153.55	122.76
1951	202.40	144.51
1952	158.12	134.17
1953	197.55	123.24
1954	89.21	151.19
1955	100.64	74.87
1956	37.90	65.71
1957	22.03 (44.06 +)	146.61

+ Of the two plots planted in 1957, only one is recorded on having been picked in 1967. The figure in the bracket is that of the plot picked.

Social Status

Traditional social status is not associated with higher or lower levels of productivity in the citrus industry. As could be expected a high percentage of people of traditional social rank on Atiu are plot owners as such people traditionally had greater rights within the community and were in many cases responsible for delegating land under the traditional land tenure system. Although the Land Court now officiates over land, vestiges of respect for the traditional leaders remain and influence the present day social life on the islands. Table XXX shows this with respect to land and ownership of C.R.S. plots.

TABLE XXXFREQUENCY OF PLOT OWNERSHIP AMONGST PEOPLE OF TRADITIONAL SOCIAL RANK

<u>Citrus Producers (43)</u>	<u>Social Rank</u>	<u>Non-Producers</u>
2	Ariki	0
5	Mataiapo	3
0	Chief Akaere	1
1	Karakia	0
11	Rangatira	3
0	Akaere	1
<hr/>		<hr/>
19		8

The incidence of plot ownership amongst heads of households of traditional social rank is 70% whereas for the island as a whole the frequency of plot ownership per household is approximately 48%.

Status within the emerging social system is more significant as it is real, not apparent as with traditional leadership which has been relegated to virtually only ceremonial importance. Status in the contemporary Atiuan society is largely based on an occupational foundation. Wage or salary employment furnishes a person with money and material items which provide status.

One would expect increasing social status in the modern sense to be associated with higher educational standards which in turn should be associated with higher productivity in citrus production. Although education of growers has been a potent factor in the recent rejuvenation of the C.R.S. this has not been reflected within the different occupational groupings as Table XXXI shows.

TABLE XXXI

COMPARISON OF PRODUCTION BETWEEN OCCUPATIONAL GROUPS

<u>Occupational Type</u> (Plot Owners)	<u>Average Production for</u>	
	<u>1967</u>	<u>1960-68 (pounds per tree)</u>
Permanently employed	150.44	118.86
Casually employed	184.98	116.81
Planters	<u>189.60</u>	<u>136.23</u>
Average Total:	175.01	123.97

Planters in 1967 were most efficient producers of citrus, followed by casually employed people and lastly by those permanently employed, although some of the people in the latter class are Fruit Control personnel and amongst the most efficient orange producers on Atiu. Time is obviously the vital factor in this apparent anomaly. The lower the occupational status, the more time is available for planting activities. The extension programme may have affected people of lower status more than those in permanent employment and in part accounted for the higher production differentials between that of 1967 and that of the 1960 decade as a whole, but time seems to be the most influential factor.

The labour intensive nature of the C.R.S. has made the time available, vital in citrus production. Analysis of plot balances as at the 30th September 1969, shows that of 19 plots in credit, 16 are owned by planters, 1 by a casual labourer, and the remaining

2 by people in permanent employment. However, 3 of the plots included in the planter classification are operated by an ex-school teacher and Ariki. This is the only example of multiple credit plot ownership on Atiu and perhaps reflects the possible impact of education and occupational status on production. Plot indebtedness for the different occupational groupings reflects this general trend (Appendix V).

#### Age of Plot Owner

There appears to be a distinct relationship between age of plot owners and the productivity of plots, though other variable factors distort this feature. Correlation of age and production for 1967 shows a marked differential between output from plots operated by people over 45 years of age and those under this age. Those under 45 produced an average of 228.06 lbs per tree while output from plots owned by people over 45 years averaged 130.44 lbs per tree. Increasing age appears to be associated with decreasing production. The 25-34 year age group produced an average of 265.95 lbs per tree in 1967 compared to 190.13, 162.67 and 129.48 lbs per tree for the 35-44, 45-54 and the 55 years and over age groups respectively.

## CHAPTER VIII

AREAL PATTERNS WITHIN THE ATIUAN C.R.S.Village Production Patterns

Table XXXII gives the breakdown of production into the various survey blocks within village boundaries. Almost 82 per cent of total production comes from three districts - Mapumai (30%), Teenui (26%) and Tengtangi (26%) which is merely a reflection of the distribution of plots and trees, for these three villages contain 75 per cent of total bearing trees on the island.

The highest yields on a per tree basis came from Mapumai and Teenui villages, Ngatiarua and Areora villages having the least production per tree. The total average production per tree for the individual villages from 1960-68 were Teenui 167.16, Mapumai 160.74, Tengtangi 126.92, Areora 111.56 and Ngatiarua 35.42 lbs.

Appendices VI-X show village production on frequency tables for the period 1960-68 and increasing yields per tree are reflected in the increasing number of plots in the higher producing ranges. This applies particularly to Teenui and Mapumai, to a lesser extent to Tengtangi and Areora, while Ngatiarua is notable for low yields. A series of maps plotting the levels of production and indebtedness per tree did not reveal notable features. The maps were drawn on two year intervals from 1960-68 and although showing the general improvement in the C.R.S. debt position and increasing production, no marked areal patterns emerged. This may indicate the relative complexity of the C.R.S. on Atiu, especially the varying efficiency of the human factor in production.

Comparison of Location of Plots and Households

With the alteration in the system of descent following introduction of the Land Court, land rights of villagers need not correspond to the contiguous village districts and many own citrus

TABLE XXXI

## COMPARISON OF PRODUCTION BY VILLAGES AND NUMBER OF TREES, 1960-68

<u>Village</u>	<u>Survey Block</u>		<u>Annual Average Production (lbs)</u>	<u>Percentage of total Island Production</u>	<u>Number of Trees</u>	<u>Percentage of total number of trees</u>
<u>MAPUMAI</u> (43 Plots)	Tetoa	(18)	110,662.72	11.35	755	10.63
	Tahamanu	( 9)	41,083.11	4.22	315	4.43
	Vaimakoura	(11)	101,990.87	10.46	492	6.92
	Papuaha	( 5)	39,943.74	4.09	265	3.73
			<u>293,680.44</u>	<u>30.12</u>	<u>1,827</u>	<u>25.71</u>
<u>TENGATANGI</u> (46 Plots)	Ngaretu	(22)	110,070.39	11.29	928	13.06
	Arakau	(24)	141,496.81	14.51	1,054	14.84
			<u>251,567.20</u>	<u>25.80</u>	<u>1,982</u>	<u>27.90</u>
<u>AREORA</u> (34 Plots)	Kaheua	( 8)	37,366.04	3.83	302	4.25
	Ahaaia	(26)	128,886.94	13.22	1,195	16.82
			<u>166,252.98</u>	<u>17.05</u>	<u>1,497</u>	<u>21.07</u>
<u>NGATIARUA</u> (7 Plots)	Te Raata	( 7)	<u>10,770.07</u>	<u>1.10</u>	<u>304</u>	<u>4.28</u>
<u>TEENUI</u> (33 Plots)	Aitutaki	(16)	168,834.38	17.31	790	11.12
	Teenui	( 6)	17,564.76	1.80	226	3.18
	Araki	( 6)	42,724.54	4.38	276	3.88
	Pahouhou	( 5)	23,458.09	2.40	219	3.08
			<u>252,581.77</u>	<u>25.89</u>	<u>1,511</u>	<u>21.26</u>

Source: C.R.S. Records

plots in other village districts as revealed in Table XXXIII.

TABLE XXXIII

C.R.S. PLOT OWNERSHIP BY VILLAGE DISTRICTS, 1969

<u>Village of Plot Owner</u>	<u>Plot Location</u>					<u>Total</u>
	<u>Mapumai</u>	<u>Tengatangi</u>	<u>Areora</u>	<u>Ngatiarua</u>	<u>Teenui</u>	
Mapumai	21	8	8	-	6	43
Tengatangi	5	24	5	4	8	46
Areora	-	2	23	4	5	34
Ngatiarua	-	1	2	3	1	7
Teenui	2	1	4	1	25	33

Note: In addition to the plots in the above table there are 2 others under Fruit Control supervision.

Ngatiarua, with few orange plots, actually has more plots owned by people resident in other villages than in Ngatiarua itself. Teenui has the greatest correspondence of citrus plot ownership and residence in the same village district, 75 per cent of plots being owned by people resident in the village itself. Areora has 69 per cent, Tengatangi 83 per cent, Mapumai 49 per cent and Ngatiarua 42 per cent of plot owners residing in the same district as their planting lands are located.

Patterns of Ownership by Village of Plot Owners

There are 165 plots on Atiu under the present C.R.S. and of these, 104 are involved in multiple "effective" ownership, based on 42 households. Thus only 62 plots are owned on an individual household basis. Originally, only one case of multiple plot ownership was permitted on Atiu - the remainder arose as a result of transfer of Occupation Rights due to death, old age, absenteeism, and other factors. The degree of multiple plot ownership on a village basis is shown in Table XXXIV.

TABLE XXXIV

PLOT OWNERSHIP: FREQUENCY TABLE

<u>Village of Plot Owner</u>	<u>Number of Plots per Household</u>					<u>Total</u>
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	
Mapumai	24 +	4	2	-	1	31
Tengatangi	24	6	2	1	-	33
Areora	5 +	9	1	2	-	17
Ngatiarua	1	-	2	-	-	3
Teenui	6	9	3	-	-	18
	60	28	10	3	1	102

Note: + One plot in Areora and another in Mapumai have been officially taken over by Fruit Control as a result of Absentee ownership and their debts have been written off. Hence the table totals only 102.

The average number of plots per household is approximately 1.6. In addition to the 104 plots in legally recognised multiple ownership, four more are under the effective control of Fruit Control and another is likely to be similarly operated unless a land holder assumes title to the plot.

## CHAPTER IX

THE EFFECT OF THE REJUVENATION OF THE ATIUAN C.R.S.I PHYSICALChanging Nature of Production: 1950-1969

Lack of grower participation in production was a major contributing factor in the increasing debt position of the C.R.S. on Atiu (Figure 8). It was anticipated that initially labour would be the most expensive element in the cost of establishing plots. These costs were expected to fall as growers were to assume greater responsibility for maintenance. Fruit Control however, were forced to continue costly services owing to the failure of growers to take over management with the result that debt continued to rise in the life of the Scheme. The less maintenance plot owners did, the worse the debt position became, with the result that by 1957 interest payments alone virtually equalled labour costs. This occurred at the same time as material costs in the Scheme increased as trees became productive and required increased husbandry, particularly in spraying and fertilising (Figure 12).

Although production was rising the actual rate of increase was only a small proportion of potential output, and indebtedness was further aggravated by poor policy. In 1958 when the situation became critical, increased use was made of hired labour to protect the Administration's investment. This failed to alleviate the situation, as interest rates in particular and running costs more than absorbed the value of production. Reports in the late 1950's drew particular attention to the deteriorating position of the C.R.S. on Atiu and Mauke. Higher material costs owing to freighting, lack of adequate infrastructure, insufficient supervision and lack of regular shipping links with the New Zealand market had placed Outer Island growers in a disadvantageous position. A New Zealand Treasury delegation in 1960 recommended a decrease in interest rates for the Islands of Mauke and Atiu in order to restore the industry and to encourage growers. However, no immediate change resulted either

in economic policy or in re-organising operations and the situation remained critical until a major review of the industry was undertaken in 1962.

Material costs tended to decrease in the 1959-1961 period, particularly manure costs which fell from \$5,337 in 1959 to \$562 in 1961. In 1964, \$1,931 was spent on manure. While costs fell, exports increased in the immediate pre-1962 period. In 1959, per tree production had been .87 cases of 70 lbs and this had risen to 1.2 cases in 1961. Labour and capital input were both highly inefficient.

In 1962, all Atiuan fruit was sent to the Avarua canning factory and with little rejection, exports rose. The need for spraying was greatly reduced with the result that costs fell sharply from \$12,798 in 1961 to \$6,208 in 1962 and to \$3,946 in 1964.

Post-1960 increases in production have coincided with decreased costs, which along with increased plot owner participation in production has overhauled the Scheme. Interest charges no longer exert their former influence as plot debts decline.

The debt has undergone a marked decline from a record \$118,000 in 1964 to \$77,000 in 1969, and has fallen every year with the exception of 1968, and even in that year some growers managed to repay a proportion of their debt.

The opening of the canning factory, although important in providing an added incentive to production, cannot be regarded as being the chief factor in improving the economic situation of the Atiuan C.R.S. C.R.S. extension work and changes in grower attitudes along with other human factors, have been more significant.

#### Extension of Citrus Replanting

The prosperity resulting from the rejuvenation of the C.R.S. on Atiu has to a large extent been responsible for the recent extension of citrus plantings. This has taken two forms, extension to existing plots and the creation of new plots.

Thirty-six plots have been established in Atiu under the "A" Scheme. This is an attempt to establish new orange groves under private ownership, involving no capital investment from the Administration as was the case with the C.R.S. Atiu is the only island outside Rarotonga where such extension has taken place, which indicates administrative confidence in the Atiuan people. Trees are supplied which are paid for when they come into bearing and growers pay for material costs as these are required. The Scheme it is hoped, will evade the mistakes of the past and should not lead to the high degree of indebtedness which still affects the C.R.S.

"A" Scheme planting began in November 1965 and has tended to increase the proportion of citrus plots in the south and south-western parts of the island which have few plots under the C.R.S. New plantings have been concentrated heavily on the Areora district as shown below in Table XXXV.

TABLE XXXV

"A" SCHEME PLANTINGS BY VILLAGE DISTRICTS

<u>Village</u>	<u>Number of Plots</u>	<u>Number of Trees</u>
Mapumai	1	63
Tengatangi	2	101
Areora	25	1,368
Ngatiarua	2	144
Teenui	6	365
Total:	<u>36</u>	<u>2,041</u>

Unlike C.R.S. there is relatively little cross-village ownership of plots owing to the recent origin of the "A" Scheme (Table XXXVI).

TABLE XXXVI

"A" SCHEME PLOT OWNERSHIP BY VILLAGE DISTRICTS, 1969

<u>Village of Plot Owner</u>	<u>Plot Location</u>					<u>Total</u>
	<u>Mapumai</u>	<u>Tengatangi</u>	<u>Areora</u>	<u>Ngatiarua</u>	<u>Teenui</u>	
Mapumai	1					1
Tengatangi		2				2
Areora			17	2	5	24
Ngatiarua				2		2
Teenui			1		5	6

"A" Scheme plots are still unproductive, and assuming a five year interval exists between planting and producing the first trees will yield in the 1971 season. It is hoped that the "A" Scheme, through necessitating direct grower investment, will involve the grower in all aspects of production. Already this appears to be materialising (Table XXXVII). Although initially work on new plots is relatively uncomplicated all growers who had applied fertiliser to trees know how much fertiliser they applied, how many applications were made per year, at what times they applied manure, and only one "A" Scheme plot owner involved did not know what manures were applied to his plot.

Similarly with spraying, all growers who had sprayed their young plots knew why, when the plots were sprayed, and what sprays were actually applied. One sprayed whenever he saw signs of "mana mana" (insects). A greater sense of responsibility, greater degree of personal involvement and a greater degree of grower participation and comprehension of modern citricultural techniques appears evident in the "A" Scheme as opposed to the C.R.S.

At present all spraying on C.R.S. plots is performed by Fruit Control and as "A" Scheme plots mature it can be anticipated that Fruit Control will assume increasing responsibility for this and possibly pruning. However, indications are that the plot owner and family will

TABLE XXVII

FREQUENCY OF USE OF THE VARIOUS TYPES OF LABOUR ON 42 C.R.S. (PRODUCTIVE) AND 16 "A" SCHEME (UNPRODUCTIVE) PLOTS

		Plot Owner	Family	Fruit Control Employees	Owner (Family)	Owner/Hired Labour	Owner/Family Hired Labour	Owner/Family Administration	Owner/Administration	Family/Hired Labour.
<u>CULTIVATING</u>	Productive	5		20				1	17	
	Unproductive	3		2	1				9	
<u>FERTILISING</u>	Productive	26	5		11	1				
	Unproductive	12			3					
<u>PRUNING</u>	Productive	19	3	5	10	1				2
	Unproductive	13			1				1	
<u>SPRAYING</u>	Productive			43						
	Unproductive	9		3	1				2	
<u>WEEDING</u>	Productive	9	3		26	1		1	1	2
	Unproductive	5			9	1				
<u>PICKING</u>	Productive	3	4		32		3			1
	Unproductive	1			13		1			

On one unproductive plot all the work was done by school children.

be the basic work unit in the Atiuan citrus industry. In some cases, especially owing to old age, and particularly commitments in permanent employment, some "A" Scheme plot owners may employ local or Fruit Control labour as occurs within the C.R.S. In general it can be expected that grove owners and families will assume greater responsibility for management in the C.R.S. as citricultural knowledge expands while a concurrent decrease in plot owner responsibility for management will occur within the "A" Scheme.

II ECONOMICResults of the Post-1962 Rejuvenation

The effect of the rejuvenation of the C.R.S. has resulted in a marked improvement in the economics of the Scheme and the economy of Atiu. The social significance of this rejuvenation will be discussed in Section III.

A notable increase in production has resulted from the post-1962 recovery of the Scheme. In the period 1961-1969 a thirty-five per cent increase in output occurred, mostly owing to an increasing awareness of the importance of, and more effective use of the human factor within the industry (Table XXXVIII).

The general trend for production increases on most plots is visible in Table XXXIX which shows that with the exception of 1968 there appears to have been a major increase in production on most plots since 1960. In 1963, 97 plots produced less than 100 lbs and 25 from 200 to 400 lbs per tree. However, by 1967 the situation had changed noticeably, only 47 plots producing less than 100 lbs and 59 from 200 to 400 lbs per tree.

The position of indebtedness also underwent a parallel alteration, the position improving radically in the decade. Whereas production had been undergoing a microscopic rise even in the pre-1962 period, debt had been rapidly deteriorating. Rejuvenation completely reversed this trend and apart from 1968 each year since 1964 had experienced a marked drop in the total debt position on the island. Table XX indicates the extent of this improvement in the level of indebtedness. Since 1964 when the level of debt reached an all time record for any of the C.R.S. islands a marked change has occurred, which has reduced the debt 25 per cent in the period September 1964 to September 1969 despite the 1968 season in which the Atiuan C.R.S. debt rose by \$15,000. The rapid improvement is the result of conscious activity on behalf of most growers to rid themselves of this load. Their desire to free themselves from debt has catalysed as they now realise that the lower the debt the greater their returns.

TABLE XXXIX

FREQUENCY TABLE OF PRODUCTION PER TREE, 1960-1968

<u>Production in lbs per tree</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>
0	68	6	2	12	5	1	0	2	13
1-50	94	62	47	46	43	10	7	27	64
50-100	2	58	55	39	41	18	22	18	45
100-150		29	33	22	33	26	24	25	21
150-200		7	17	17	20	21	34	28	15
200-250		2	1	14	12	23	14	18	3
250-300			7	6	5	16	23	17	3
300-350			2	5	2	15	11	12	1
350-400				0	1	16	8	10	
400-450				2		5	5	1	
450-500				0		8	5	2	
500-550						1	5	3	
550-600						3	3	0	
600-650									
650-700						1	1		
700-750					1			1	
750-800							2	1	
800-850									
850-900									
900-950					1				
950-1000									
1000-1050									
1050-1100									
1100-1150									
1150-1200				1					
1200-1250				1		1			

Total No. Plots = 164 (165 from 1965)

Source: C.R.S. Records

TABLE XL

C.R.S. TOTAL DEBT AND PER TREE DEBT BY ISLANDS, 1951-69 (Dollars)

<u>Year</u>	<u>Rarotonga</u>		<u>Aitutaki</u>		<u>Atiu</u>		<u>Mauke</u>		<u>Grand Total</u>	
	<u>Total</u>	<u>Per Tree</u>	<u>Total</u>	<u>Per Tree</u>	<u>Total</u>	<u>Per Tree</u>	<u>Total</u>	<u>Per Tree</u>	<u>Total</u>	<u>Per Tree</u>
1951	39,564	3.40	15,168	2.55	1,274	1.25	5,952	1.60	61,968	2.20
1952	50,642	4.00	21,030	3.06	4,634	1.27	9,314	2.25	85,656	2.64
1953	59,870	4.55	30,966	3.64	10,458	2.31	12,256	2.53	114,550	3.25
1954	75,202	5.58	35,826	3.99	16,260	2.40	18,454	3.65	145,782	3.90
1955	90,514	5.82	46,874	5.09	22,764	3.30	23,724	4.69	183,876	4.72
1956	99,140	6.12	58,290	6.33	34,654	4.87	30,200	5.98	220,886	5.82
1957	104,352	6.30	69,238	7.52	45,862	6.35	37,968	7.52	257,530	6.92
1958	102,814	5.57	76,522	8.31	59,810	8.18	44,840	8.88	281,886	7.73
1959	79,824	4.29	74,376	8.08	70,364	9.63	61,348	12.15	286,962	8.53
1960	85,800	4.65	86,094	9.36	92,984	12.73	78,184	15.50	343,162	13.03
1961	76,780	4.16	85,252	9.26	106,294	14.55	83,804	16.60	344,216	11.14
1962	68,272	3.70	82,618	9.04	113,358	15.89	88,162	17.46	352,410	10.69
1963	54,417	2.95	81,188	8.89	117,505	16.47	89,914	17.81	343,024	11.53
1964	39,340	2.13	96,569	10.57	118,154	16.56	89,742	17.77	343,806	11.75
1965	40,258	2.18	91,488	10.01	104,679	14.67	93,113	18.44	329,536	11.32
1966	50,051	2.71	97,588	10.68	90,519	12.69	93,864	18.59	332,022	11.16
1967	52,855	2.86	96,910	10.61	81,103	11.37	97,396	19.29	332,859	11.03
1968	94,581	8.12	114,578	12.54	96,246	13.49	102,971	20.39	408,376	12.88
1969 (March 31st)	44,274	2.40	114,334	12.52	86,062	12.06	100,535	19.91	345,201	11.72

Source: C.R.S. Records

Hence, the 1964 levy of ten cents on all bags of oranges exported which has accelerated debt decrease, was increased to twenty cents at the beginning of the 1969 season. The result has been a near 20 per cent fall in debt within one year as 1969 realised over 22,000 packed case equivalents. In absolute terms debt fell from \$96,246 in September 1968 to \$77,065 one year later. At this rate of debt repayment Atiu with the exception of a small number of heavily indebted plots could be virtually free within four years

Improvement in the indebtedness of the individual plots can be seen in Table XLI. In 1962, 62 plots were indebted to amounts between \$0.14 per tree while 102 were within the frequency range \$15.30 per tree. However, by 1967, 103 plots fell into the \$0.14 frequency and 62 in the \$15.30 brackets.

The improvement in the C.R.S. has increased the payout to growers despite the fact that they voluntarily levy themselves twenty cents per bag on top of the seven-twelfths taken from receipts for repayment of advances to defray production costs, means they are receiving less money than that to which they are entitled. The fall in receipts since 1966 has been mainly due to declines in annual production (Table XLII). Yet despite falling receipts, the debt continued to decrease until 1968. The average return per plot in the period 1955-1968 has been \$30.49 (65 cents per tree) while that for the best production year, 1965, was \$79.21 (\$1.75 cents per tree.)

Through increasing production and returns per grower, rapid decline in the debt position, education and involvement of growers in all aspects of the Scheme, the C.R.S. has undergone a considerable change since 1962 which at present appears as if it may eventually place the Atiuan C.R.S. in a position where it is economically self-supporting.

The improvement has not only been reflected on Atiu itself, but also within the total Cook Islands economy, of which the citrus industry is the most important element.

TABLE XII

FREQUENCY DIAGRAM OF PLOT INDEBTEDNESS PER TREE, 1960-1968

<u>Dollars per tree</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>
0-4	3	1	1	1	1	5	8	10	16
5-9	27	7	8	12	10	22	35	39	28
10-14	118	40	53	36	46	58	56	46	50
15-19	15	36	78	75	73	56	40	28	39
20-24	1	8	21	30	24	17	16	14	17
25-29		2	3	6	9	5	4	3	7
30-34		+		2	2	2	1		
35-39				1					
	<u>164</u>	<u>164</u>	<u>164</u>	<u>164</u>	<u>165</u>	<u>165</u>	<u>160</u>	<u>158</u>	<u>157</u>

+ Figures for 70 plots not available as records had been destroyed.

Source: G.R.S. Records

TABLE XLIII

RECEIPTS FROM ORANGES SHIPPED FROM ATIU AND C.R.S. DEBT (Dollars)

<u>Year</u>	<u>Payout to Growers</u>	<u>Credit to Plots</u>	<u>Total Receipts</u>	<u>Debt</u>
1955/56	30.29	90.87	121.16	34.65
1956/57	341.19	1,023.58	1,364.77	43.96
1957/58	769.92	2,309.75	3,079.67	57.81
1958/59	934.39	2,803.18	3,737.57	66.65
1959/60	3,332.33	6,664.66	9,996.98	70.98
1960/61	1,116.00	2,180.00	3,296.00	92.98
1961/62	4,592.00	7,012.00	11,606.00	106.29
1962/63	3,819.83	7,291.70	11,509.53	113.26
1963/64	8,229.25	6,192.87	14,422.12	117.50
1964/65	6,402.90	6,952.79	13,355.69	118.15
1965/66	13,070.50	16,015.24	29,085.74	104.68
1966/67	12,894.21	15,184.05	28,078.26	90.52
1967/68	9,842.33	12,642.09	22,484.42	81.10
1968/69	4,652.61	5,461.37	10,113.98	96.25
	<u>70,027.75</u>	<u>91,824.15</u>	<u>162,551.89</u>	<u>1,194.78</u>

Table XLIII indicates that of the Outer Islands Atiu has been the most efficient producer of citrus fruit since 1963. Per tree production in 1965 reached 3.42 cases which was well ahead of that of Mauke, (.70 cases) and Aitutaki, (3.09 cases). However, yields are still far behind those in Rarotonga where, in 1965, production reached 5.09 cases per tree. The efficiency of Rarotongan production contrasts markedly with that of the Outer Islands as revealed in Table XLIII showing average annual yields.

TABLE XLIII

C.R.S. PRODUCTION PER TREE BY ISLANDS FOR SELECTED PERIODS

<u>Island</u>	<u>Average Annual Production</u> <u>per tree</u>	
	<u>1965-67</u>	<u>1965-68</u>
Rarotonga	5.72	5.48
Atiu	3.14	2.62
Aitutaki	1.88	1.67
Mauke	1.12	.98

Source: C.R.S. Records

As can be seen the 1967 hurricane affected Atiu and Aitutaki to a greater extent than the other C.R.S. islands, yet despite this, the economic situation of the Atiuan Scheme did not suffer to the same extent as the other Outer Islands.

Pre-1962 Atiu accounted for approximately 3 per cent of total Cook Island citrus production but since then it has produced approximately 11.55 per cent (Table XLIV). In 1965 a bumper harvest provided 16.75 per cent of total Cook Island production. Both Mauke and Aitutaki in the post 1963 period have in general experienced declines in absolute and percentage Cook Island citrus production. Rarotonga, although fluctuating in importance has generally produced approximately 70 per cent of total production.

TABLE XLIV

PERCENTAGE PRODUCTION AND DEBT ON EACH C.R.S. ISLAND, 1950-68

<u>Year</u>	<u>Rarotonga</u>		<u>Aitutaki</u>		<u>Mauke</u>		<u>Atiu</u>	
	<u>Production</u>	<u>Debt</u>	<u>Production</u>	<u>Debt</u>	<u>Production</u>	<u>Debt</u>	<u>Production</u>	<u>Debt</u>
1950								
1951	100.00	63.84		24.48		9.60		2.05
1952	82.78	59.12	17.22	24.55		10.87		5.41
1953	71.70	52.26	28.30	27.03		10.69		9.12
1954	76.38	51.58	13.74	24.57	9.87	11.15		12.65
1955	64.38	49.22	27.06	25.49	8.54	12.90		12.38
1956	93.22	44.88	1.33	26.38	2.32	13.67	5.10	15.68
1957	86.22	40.52	11.34	26.88	1.55	14.74	.96	17.80
1958	80.12	36.40	16.34	27.14	1.42	20.48	2.10	21.21
1959	75.50	27.62	18.91	26.04	1.80	21.37	3.77	24.52
1960	70.31	25.00	16.76	25.08	6.86	22.81	6.06	27.09
1961	78.96	22.30	11.97	24.76	7.56	24.34	1.49	30.88
1962	66.06	19.37	18.76	23.44	6.37	25.01	8.79	32.16
1963	68.68	15.86	17.11	23.66	6.40	26.21	7.80	34.25
1964	70.54	11.44	17.59	28.08	1.51	26.10	7.41	34.36
1965	83.63	12.21	2.10	31.76	6.32	28.25	7.93	31.76
1966	62.60	15.07	18.80	29.39	2.33	28.27	16.25	27.26
1967	74.75	15.87	7.11	29.11	5.60	29.26	12.52	24.36
1968	66.56	23.16	15.32	28.05	2.61	25.21	15.48	23.56
1969	89.10	12.82	.20	33.12	2.95	29.12	7.73	24.93

Source: C.R.S. Records

Yet although Atiuan production has been recently raised to a position of pre-eminence amongst the three Outer Island C.R.S. producers, it is the rapid reduction of debts which has been most prominent when placed in its Cook Island context (Figure 8). The Atiuan debt in 1964 reached a record level for all islands, despite the island having only 22.86 per cent of total trees in the group. The pattern of Atiuan C.R.S. debt has roughly corresponded to that of Rarotonga with the exception that aggregate debt reached a higher level despite having fewer trees and that the first recorded significant fall in debt came in 1964, fourteen years after planting began, whereas in Rarotonga this took thirteen years.

Since 1964 Atiuan aggregate debt has fallen below that of both Mauke and Aitutaki. On per tree basis since, Mauke has been most indebted. The Atiuan debt reached a peak in 1964 of \$16.56 per tree, but this rapidly declined to \$11.37 by 1967 and although increasing to \$13.49 per tree in 1968 has since been reduced to \$10.7 as at 30th September 1969. This contrasts with Mauke and Aitutaki both of which have shown tendency for a steady rise in the debt position since initial planting. Yet, although Atiu has undergone an important transformation since 1964, the situation remains serious compared with the level on Rarotonga. Between September 1964 and September 1969, Rarotonga, Aitutaki and Mauke registered percentage debt increases per tree of 12.67, 4.73 and 12.04 respectively, while Atiu underwent a percentage decrease of 27.17.

Thus Atiu has increased its production in the group relative to other C.R.S. islands and has vastly improved its economic foundations with the result that the industry plays a far more significant role both in the life of Atiu itself and to a much lesser extent in the life and economy of the Cook group in general.

The C.R.S. has, since its inception in 1945, come to play an increasingly important role within the Cook Islands economy (Table XLV). At present the Scheme accounts for approximately 80 per cent of the total citrus production of the group. The importance of

TABLE XLV

COOK ISLANDS: COMPARISON OF CITRUS RECEIPTS TO TOTAL EXPORT RECEIPTS, 1956-1966

<u>Year</u>	<u>Total Export Receipts</u>	<u>Fresh Citrus Exports</u>		<u>Processed Citrus Exports</u>	
		<u>Value (Dollars)</u>	<u>Percentage</u>	<u>Value (Dollars)</u>	<u>Percentage</u>
1956	970,234	173,282	17.85		
1957	1,081,850	223,252	20.63		
1958	810,516	225,854	27.86		
1959	998,670	310,074	31.04		
1960	928,630	240,904	25.94		
1961	1,196,368	312,980	26.16	196,846	16.45
1962	1,421,306	237,728	16.72	274,140	26.32
1963	1,669,554	257,556	15.42	572,138	34.27
1964	1,866,574	307,794	16.48	786,998	42.16
1965	1,853,298	123,730	6.2	787,150	39.24
1966	1,797,557	199,000	11.07	787,150	43.79

Source: Adapted from C.R.S. and Internal Affairs Dept Records

citrus fruits in total export receipts of the Cook Islands had increased from 28.12 per cent in 1950 to 30.04 per cent in 1959 although suffering a decline to 20.63 per cent in 1957. After this date an increasing amount of citrus production was diverted to the Avarua canning factory and fresh citrus exports declined, until in 1966 only 11.07 per cent of total export receipts came from citrus receipts. However, 43.9 per cent came from processed fruit sales (which are predominantly of citrus origin). Thus in 1965 receipts from fresh and processed fruits accounted for approximately a half of the total Cook Island export receipts. The Cook Island's economy is thus becoming quasi-monocultural as the C.R.S. and private plantings come into full production.

Within the citrus industry Atiu is beginning to play a more significant role. Citrus yields in the Outer Islands have tended to decrease recently with the exception of Atiu which in normal years provides about 12 per cent of the total Cook Island harvest. The island's position within the total cash economy of the group, although small, has increased. The C.R.S. on Atiu at present accounts for approximately 6 per cent of total export receipts. When other exports are added, coffee and copra in particular, the Atiuan share increases to approximately 7 per cent of total export receipts, although in 1966 the island contained only 6.89 per cent of the total Cook Island population and had a dependency rate of 60.73 per cent.

## CHAPTER X

POSSIBLE INNOVATIONS WHICH COULD ASSIST THE ATIUAN C.R.S.Diversification of Citrus Varieties

Of the initial 7,303 trees planted, 6,539 were Rarotongan Seedless and 944 Late Valencia varieties. This has created a problem in the Scheme for it has led to production peaking. Depending upon the season, Rarotongan seedless trees generally reach peak production in June, Late Valencias in late July and August (Figure 14). When fruit was shipped to New Zealand this proved a problem as the island had a quota for space on the Maui Pomare and later the Moana Roa not suited to the variations in production throughout the season. With more regular internal shipping and the opening of Island Foods Ltd, this situation has been alleviated but the processing industry faces problems of production schedules as citrus yields tail off and pineapple production begins and vice versa.

An increasing proportion of post-1966 plantings has been of Late Valencias, more suited to the requirements of the juicing industry and which will boost production towards the end of the season. Tripolatia and Jaffa varieties have been introduced as a pilot project which is attempting to diversify the industry and spread production more evenly throughout the season (Table XLVI).

TABLE XLVIATIU C.R.S. VARIETIES OF TREES PLANTED TO DATE

	<u>Trees</u>	<u>No. Plots</u>
<u>C.R.S.</u> Late Valencias	944	20
Rarotongan Seedless	6,359	141 + 4 mixed
	<u>7,303</u>	<u>165</u>
 <u>"A" Scheme</u>		
Late Valencias	590	17
Rarotongan Seedless	921	12
Jaffa	172	5
Tripolatia	224	3
	<u>1,907</u>	<u>37 +</u>

+ This total is 37 not 35 as two plots have both Late Valencia and Rarotongan Seedless Trees.

—Source:— C.R.S. Records—

### Nursery Establishment

The lack of uri anane (seedlings) is a real problem confronting extension of the present citrus plantings on Atiu. Geographical isolation from existing nurseries in Rarotonga is not conducive to extension of the Scheme. No attempt has been made to re-establish a citrus nursery on Atiu since the original one was closed in 1949. The re-establishment of a nursery is not only now possible but is a necessity if extension and replanting programmes are to be introduced efficiently and successfully. The present system of having uri anane sent from Rarotongan nurseries is very inefficient and wasteful as many seedlings fail to establish themselves. Of total "A" Scheme plantings 401 trees of the 1,907 planted died. The situation has been worse in C.R.S. plot extensions where 201 trees of the 252 planted did not survive. Extension of the industry is held up not only by geographic isolation from nurseries and comparative scarcity of seedlings but also by the fact that a significant proportion of seedlings die in the transplanting process. Air travel could possibly improve the situation but failing this the establishment of a nursery is the only means of reducing losses and increasing the rate of extension.

At present awaiting the arrival of seedlings are many growers who earlier cleared land in readiness for planting. With the non-arrival of seedlings they have however, let their land revert to bush. One planter interviewed had experienced the complete loss of all seedlings planted in land he cleared in 1967. No replacements have since arrived. This situation is most unsatisfactory and is having a stultifying influence on possible expansion not only of the C.R.S. but also of the total Atiuan cash economy.

### Replacement of Existing Trees

There is a need on Atiu to realise the necessity for the commencement immediately of a replacement programme for existing C.R.S. trees, especially the first planted, to ensure continuity of

production before old trees age. This need is closely allied to that of establishment of a more efficient means of obtaining seedlings. The smoother the transition from one generation of trees to another the better.

"Citrus plantations reach their optimum production in about 25 years. Economically, a grower should start replanting a new plantation when the existing one reaches 20 years. To achieve this Outer Islands such as Atiu and Aitutaki should have their own citrus nurseries to supply themselves with replacements. This is necessary for two reasons - one; the shock of removing trees from Rarotongan nurseries and shipping to Outer Islands is far greater and gives trees a retardation which in many cases ends in the young trees dying, and two; many trees which are sent from Rarotonga are infested with pest diseases."

(McCauley, pers. comm.)

There is still room for improvement in the role man plays in C.R.S. production on Atiu, for although significant progress has been made in recent years, conservatism and resistance to change remains a problem. Further extension work, education and particularly greater co-operation and liaison between Fruit Control and producers and between Rarotongan officials and the local Atiuan Administration would improve the situation. At present there is insufficient diffusion of knowledge from official circles to growers. Plot owners are still told to perform tasks at times without understanding the underlying reasons (Table XLVII).

Although growers generally see the relationship between following official advice and increased production, there is still room for improvement. One individual stated that there was a need for Fruit Control to explain their directives to the individual growers. This is undoubtedly one of the greatest weaknesses in the Scheme at present and is closely associated with the quality of personnel involved.

Atiuan people, both growers and others, realise that

TABLE XLVII

GROWER REPLIES AS TO WHETHER FRUIT CONTROL DIRECTIVES ARE HEHEDED

	<u>Plot Owners</u>	<u>Others</u>
Follow advice closely	24	14
Follow advice relatively closely	5	12
Follow advice, when possible, but not all that closely	8	-
Follow advice sometimes	4	1
Follow advice closely, but have only done so since 1961	2	-

TABLE XLVIII

FREQUENCY OF SUGGESTED METHODS FOR THE IMPROVEMENT OF C.R.S. ON ATIU

<u>Methods</u>	<u>Citrus Producers (43)</u>	<u>Others (30)</u>
Improved plot maintenance	34	27
Extension of plantings	27	23
Replacement of existing trees	2	3
Greater co-operation between grower and Fruit Control	6	3
Increased grower participation in production	3	4
Establishment of a nursery	-	2
Provision of more machinery	6	5
Development of a harbour	-	3
Improved roading on Atiu	-	2
Provision of better qualified personnel	-	1
Further grower education in principles of the market economy	-	1
Prevention of absenteeism	-	1
Prevention of wandering stock	1	-
Prevention of stealing	-	1
Improved liaison between Rarotongan and Atiuan Officialdom	2	1
Improved efficiency of hired labour	1	-
Need to instill a genuine interest of people in the C.R.S.	-	1

despite recent improvements in the position of the Scheme there is no room for complacency. Table XLVIII outlines the frequency of replies as how Atiuans believe the C.R.S. could be further improved and shows that the people are becoming increasingly aware of the nature and demands of the market economy.

## SECTION III

## CHAPTER XI

THE IMPACT OF THE C.R.S. ON CONTEMPORARY ATIUI SOCIAL IMPACT

The C.R.S. has proved an important agent of social change on Atiu. Because it has involved a large sector of the population, its effects have had influence on the majority of households. In May 1965, 102 of 209 households were involved in citrus growing, but the effect of the Scheme has not merely been limited to households owning plots but to the remainder of the community too, as the C.R.S. has had a multiplier effect within the total Atiuan economy providing employment opportunities for the non-citrus growing section of the community.

However, although the C.R.S. is being analysed as an individual element introducing change to Atiu it is difficult to divorce it from other factors either endogenous or exogenous contributing to social change. The Scheme, however, is not merely an agent inducing change but in some instances also tends to reinforce existing features of the socio-cultural pattern on Atiu.

Re-evaluation of the Traditional Concept of the Environment

An important influence of the C.R.S. on Atiu has been that it has altered the man/land relationships. Atiuans have had to re-evaluate their environment and change their traditional conception of it. Along with coffee-growing, orange production has led to basic alterations in social attitudes towards the environment. Arable land, generally confined to areas inside the makatea belt has tended to become of greater significance to the community. Of the eight ecological zones referred to in the first section, introduction of the market economy has led to an intensification of the importance within the Atiuan economy of the four inner resource zones. The subsistence economy which was finely adapted to the environment

tended to exploit all resource zones on the island. However, introduction of commercial agriculture, dependent on availability of arable land has placed more emphasis on the resource zones within the interior.

Fishing, both at sea and on the reef has declined as cash cropping provides an alternative means of obtaining food, particularly proteins, for the diet. As the accompanying household budgets show, a significant proportion of income is channelled towards the purchase of meats, although this in many instances has led to a poorer diet than before (Appendix XI).

The immediate coastlands too, have suffered a decline in overall significance within the economy, despite recent plantings of coconuts. Plantations, however, have tended to be somewhat neglected. The island of Takutea has been the scene of most coconut replanting on Atiu. However, of all resource zones the makatea has suffered most in relative reduction of significance within the economy. Yams and kumera, formerly cultivated by most householders on Atiu are now grown by only a minority, most of whom are the more elderly planters. The slope between the makatea and the swamps is one area where intensification of utilisation has taken place as here lies the main area for citriculture and coffee growing.

The taro swamps have probably also experienced increased utilisation with population increase as colacassia remains the staple food in the Atiuan diet, although its importance has been reduced through increasing access to "papa'a" foods. The outer margins of the central plateau near the swamps have also undergone economic re-appraisal as along with the contiguous area (the other side of the swamps) this has become one of the main zones of commercial agriculture. It was here that tomato growing which terminated with cessation of direct shipping links to New Zealand was based.

The central highland or "fernland" is the ecological zone which has experienced the greatest re-appraisal. Although as yet little planting has occurred here, it is this area where future

expansion of arable agriculture will take place. It is the frontier zone within the agricultural economy. Already some citrus plots, coffee plantations and coconut plantations have been established. The now defunct peanut and forestry industries were established here. These plantings, along with pineapple, maniotia, kumera, yam, taro ~~tatua~~ and other crops shows a basic change in the attitude of Atiuans to this area, formerly neglected, burned and regarded as being useless agriculturally. The proposed establishment of a large citrus plantation in Atiu by Island Foods Ltd, would utilise part of the fernland.

Thus, through contact with the outside world and subsequent social change, notably introduction of cash cropping, there has been a significant alteration in the relative importance of the eight ecological zones within the changing Atiuan economy. The move towards a more cash-oriented economy is reflected in the intensification of significance of the inner four ecological zones more suited to agrarian uses. But in addition, introduction of the cash economy infuses a "store" function to the traditional society and economy. Individuals begin to gain prestige by material wealth as the traditional reciprocity system declines. Time has a great economic value today than before and has become inversely related to wealth. Concurrent to the establishment of commercial agriculture has been the relative decline of the outer ecological zones partially the result of their location further away from the centralised settlement. The distinctive settlement pattern of Atiu has tended to accentuate this more than has been the case on other islands in the group, although the recent introduction of motorised transport is likely to reduce its effect.

### Family

There has been a general trend in Atiu for a move from living in extended to nuclear families. The market economy is a significant factor involved in this individualising nature of contemporary Atiuan society. However, the extent to which the Scheme is involved is difficult to estimate as it represents only one of many

agents inducing social change.

Of the sample, 57 per cent of households were of the nuclear family unit, while another 30 per cent were of the extended family one generation extended. Only 13 per cent of the households consisted of the extended family unit, two or more generations removed. The introduction of the block house has to a limited extent encouraged this trend.

The sample revealed that a greater proportion of households with a plot lived in extended families than the non-citrus plot owning section of the community. In this case the Scheme is to a certain extent bolstering the traditional family life of Atiuans, its effect having been syncretistic in nature. Although it has individualised a section of the economy, it has not done so in the social sense. Of the plot owning households, 50 per cent lived in extended family groups while 47 per cent lived as nuclear families. Of households not involved in citrus production, 42 per cent of the households lived as extended families, the remainder living in nuclear family groups. Of this latter group, only 2 of the 10 extended family households had the head of household in permanent employment while 3 of the 12 nuclear family households had the head of household in permanent employment. Thus no distinct relationship exists between nuclear family living and the level of monetary income of households. In general there exists a tendency for those households with greater monetary income to live more in the traditional extended family unit. Those with less income live in nuclear form and show a greater tendency to adopt out children to households more capable of providing for offspring.

Of plot owners, 65 per cent of owners interviewed who owned block homes, a citrus plot, and who were engaged in regular employment lived in extended family households. The balance of the same category lived in nuclear family form.

Family size varies much from household to household, the average number of children being 6.2. This figure includes both

blood and "feeding" children. Many in the latter category are children from the neighbouring islands of Mauke and Mitiaro who attend the Atiu Junior High School. There appears to be on significant correlation between family size and the economic status of people. Artificial birth control measures are virtually non-existent on Atiu and family size proves difficult to limit, hence the system of adopting out "feeding children". Thus, although in some cases a problem, the prevailing social system does have inbuilt social security for children of parents with limited means.

Of the 75 households included in the sample, 20 contained feeding children and/or grandchildren. Of the 35 feeding children in the sample, 8 were from the neighbouring island of Mitiaro or from Mauke, and were attending the Junior High School in Atiu.

Table XLIX shows the highest frequency of people in households to be 8 and although the majority of homes have up to 8 inhabitants, a significant proportion have in excess of that number. The varying frequencies of household occupancy between villages is in part a reflection of the age/sex distribution of the respective villages and the extent to which they have been subject to migration.

Table XLIX also indicates that the C.R.S. has had little impact on the number of people per household, and that in general citrus producers have a greater number of people per household than the remainder of the community. Although the mode for both is 8 people per household, 36 per cent of citrus producing households have occupancy rates per household in excess of 8 people as opposed to only 20 per cent in the case of the non-citrus producing segment of the population. This is also reflected in the village breakdowns within the table too. Thus, those with the means of providing more adequately for households tend to have the larger families and dependency ratios. In this sense the C.R.S. is tending to bolster the traditional socio-cultural pattern.

#### Socio-Economic Status

As Atiu is at present in a transitional stage of development,

TABLE XLIX

NUMBER OF PEOPLE PER HOUSEHOLD ON ATIU, 1969

Frequency Table on a Village Basis

<u>No. people in house</u>	<u>Citrus Producers</u>					<u>Total</u>	<u>Non-Citrus Producers</u>					<u>Total</u>	<u>Grand Total</u>
	<u>Areora</u>	<u>Ngatiarua</u>	<u>Tengatangi</u>	<u>Mapumai</u>	<u>Teenui</u>		<u>Areora</u>	<u>Ngatiarua</u>	<u>Tengatangi</u>	<u>Mapumai</u>	<u>Teenui</u>		
	1	-	-	1	-		2	3	2	2	2		
2	1	-	-	1	-	2	2	2	2	-	5	11	13
3	1	2	2	2	4	11	1	2	1	2	2	8	19
4	1	-	2	1	3	7	3	2	2	1	1	9	16
5	2	2	2	2	3	11	4	1	1	2	6	14	25
6	1	4	1	1	2	9	1	1	-	1	2	5	14
7	2	-	3	2	2	9	3	1	2	-	-	6	15
8	8	-	2	2	4	16	4	2	3	1	2	12	34
9	2	-	2	1	3	6	1	-	1	-	2	4	10
10	1	1	2	1	1	6	2	-	1	1	5	9	15
11	2	-	-	4	1	7	-	-	-	-	3	3	10
12	2	-	1	-	3	6	-	-	1	-	-	1	7
13	1	-	2	-	1	4	1	-	-	-	-	1	5
14	1	-	-	-	-	1	-	-	-	-	-	-	1
15	-	-	-	-	1	1	1	-	-	-	1	2	3
16	1	1	1	-	-	3	-	-	-	-	-	-	3
17	-	-	-	2	-	2	1	-	-	-	-	1	3
	<u>26</u>	<u>10</u>	<u>21</u>	<u>19</u>	<u>28</u>	<u>104</u>	<u>26</u>	<u>13</u>	<u>16</u>	<u>9</u>	<u>42</u>	<u>106</u>	<u>210</u>

there exists two status criteria - the traditional status and the emerging status based on material wealth. Prestige in the new system is gained by material wealth and savings as opposed to the old reciprocity system where mana was gained by exchanging as much as possible. Although a fundamental clash and ambivalence between the old and emerging orders exists, this section deals only with the latter.

A significant relationship exists between opportunity to earn money and the socio-economic situation of households. The population has been divided into six groups based on occupations mainly of the head of household, but in cases where the head of household is not a good gauge for classification, adjustments have been made. This applies especially where a woman may be employed as a schoolteacher for example, while the husband is a planter. Such a family could hardly, in the Atiuan context, be classified in the planter classification. Table L provides the average frequency of ownership of various household items and against this the corresponding results from the following socio-economic classes can be compared.

(i) Planter

Of the planter classification, where planting is virtually the sole means of livelihood and little opportunity to engage in monetary employment exists, the general living conditions of people are poorest. Of the 6 homes included in this classification all were of the traditional purau wall and kikau roof type. The average number of rooms per capita was .21, the number of radios and stoves per capita being .08 and .03 respectively. The average size of the family was 6.3 people and there were 1.6 pit toilets per capita. The average annual monetary earnings of this classification was between \$100- 149. No household included in this class had sewing machines, running water, internal washing facilities, motorcycles, refrigerators or motormowers.

(ii) Planter, Plot Owner

Eleven of the homes in this classification were block houses, 3 kikau/purau homes and the remaining 1 of old European wood wall, iron roof type. The average number of rooms per capita was .54 while per capita frequency of radios was .12, running water .02, installed washing facilities .01, motorcycles .05, stoves .09, motormowers .02, pushmowers .03, sewing machines .06 and pit toilets .16. The average family size in this group was 6.6 people per household and the median wage was between \$450-499 per annum.

TABLE L

AVERAGE FREQUENCY OF OWNERSHIP PER CAPITA AND PER  
HOUSEHOLD OF VARIOUS ITEMS, ATIU, JUNE 1969

<u>Item</u>	<u>Frequency</u>	
	<u>Per Capita</u>	<u>Per Household</u>
Sewing Machine	.07	.57
Pit Toilet	.12	.96
Flush Toilet	.01	.40
Radio	.12	.82
Running Water	.04	.32
Installed Washing Facilities	.01	.50
Motorcycles	.07	.56
Push Bikes	.01	.60
Trucks	.001	.10
Motorcars	.001	.10
Refrigerators	.02	.10
Stoves	.08	.60
Motormowers	.03	.21
Pushmowers	.03	.21

(iii) Planter, Plot Owner, Casual Labourer

Twelve houses included in this group were of the block variety, while the remaining 1 was of mixed European and local style consisting of a hardboard wall and kikau roof.

The number of rooms per capita was .44 while per capita frequency of sewing machines was .57, pit toilets .12, radios .10, running water .02, motorcycles .06, stoves .06 and pushmowers .03. There was no instance of ownership of motormowers and installed washing facilities in this group, while as in the above discussed classification flush toilet facilities were non-existent. The median wage of these homes was between \$650 and \$699 annually and average family size was 8.

(iv) Planter, Plot Owner, Professionally Employed

For this section of the Atiuan population 13 of the houses were of concrete block construction, the remaining 8 being of the European style wood/iron type. The number of rooms per capita was .53. Per capita frequency of sewing machines was .09, pit toilets .10, radios .11, running water .05, motorcycles .09, refrigerators .01, stoves .08, motormowers .04, pushmowers .01. Included in this group was one household with a record player and another with a tape recorder, indicative of the rising level of per capita income.

The average size of families in this grouping was 9.7 people, while annual median monetary income per household fell between \$1,050 and \$1,099.

(v) Planter, Professionally Employed

Of this socio-economic class 14 homes were block houses erected under the contemporary Cook Islands housing scheme, another 2 being European wood/iron in type. The number of

rooms per capita was .59 and frequency per capita of sewing machines .09, radios .16, pit toilets .14, flush toilets .007, running water .05, motorcycles .11, refrigerators .04, stoves .09, motormowers .03 and pushmowers .04. Average family size in this group was 7.11 while the average annual monetary income fell into the \$1,050 - \$1,099 bracket. Notable in this income group is the introduction of the flush toilet - an important element in improving sanitation on the island. There was, however, not one home with installed washing facilities.

(vi) European, Professionally Employed

This group of four households, included to provide a comparison with the others, represents the opposite end of the socio-economic developmental continuum from the planters. All homes were of the European wood/iron type, one being new, and the others, though of older vintage, were well maintained. The number of rooms per capita was 2.0 which by far exceeds the ratio of rooms to people amongst the various classes of the indigenous people. Per capita frequency of sewing machines was .38, radios .63, pit toilets .13, flush toilets .3, running water .38, installed washing facilities .50, motorcycles .25, pushcycles .13, motorcars .25, refrigerators .50, stoves .38 and motormowers .38. The average size of families was 3.3 but with the exception of the Catholic Priest on the island this became 4.0 head per household. The average annual monetary income of households excluding that of the priest was \$3,200 - \$3,249.

With increasing monetary income the general socio-economic condition of the population improves as the above figures indicate. The greater the income of the household the greater is the sum of material assets held by the household. The difference between classes on a per household breakdown would be slightly greater as

family size in general increases with higher income. The effect of the C.R.S. in the general socio-economic life of the Atiuan population is clear only between the bottom two socio-economic groups and although plot ownership in the higher groups appears to be associated with better living standards, its real effect is difficult to isolate. Although not as important as forms of permanent employment in raising socio-economic levels of households, the Scheme plays a significant role in raising living standards amongst a greater proportion of the population. On Atiu opportunities for permanent employment are limited, and the Scheme offers the next best means of obtaining monetary income for those not engaged in permanent employment and who have access to land suitable for citriculture.

#### The C.R.S. and the Housing Scheme

The Cooks Island Housing Loan Scheme is at present operative on Atiu and to date 148 block homes have been constructed and another poured wall home has been built. Housing loans operate on a revolving fund, repayments being the basis for subsequent granting of loans. The Scheme entitles the individual to an \$800 loan and applications are granted on the basis of size of the household making the application, the ability to repay quickly and finally, the ability to repay the loan regularly in the long term. Because the fund is revolving, those who have greater potential to repay loans generally receive preferential treatment. Interest is built into the repayment sums while an insurance premium of \$32 on \$800 loans, or \$16 on \$400 loans is deducted preparatory to repayment. The situation to June 1969 was that 148 modern concrete block homes had been constructed and of these 97 loans have been repaid (43 relatively quickly) and 51 are outstanding. Of the loans, 8 were repaid by individuals in New Zealand, 10 by people in Rarotonga, 10 through the Thrift and Loan Department of the Atiu Co-operative Society, to which most public servants on Atiu belong, and 2 special loans (involving \$400 each which are being repaid when the applicant can so afford). Of the 146 loans granted, 128 have been or are being paid off on Atiu.

Of the outstanding loans, 32 applications totalling some \$23,000 were made on Atiu itself, while another 19 applications totalling \$11,500 are outstanding to Atiuans who made requests for loans while in Rarotonga. Thus, there are 51 applications outstanding, involving approximately \$34,500. If the outstanding loans are added to the number of houses already built, 197 loan applications have been made by Atiuan families. This leaves only 12 households which have not received or have not applied for a housing loan.

The first housing loans on Atiu were granted to people in professional employment as this section of the community had the greatest repayment potential. Subsequently plot owners have obtained loans as they represent the next most affluent section of the community. Of 103 legal plot owners at June 1969, only 15 did not own block houses themselves, and of these a number were living in block homes belonging to relations and 4 had made housing loan applications. Thus the C.R.S. has played a major role in the contemporary housing scheme on Atiu and has been instrumental in making Atiu one of the best housed Outer Island communities in the Cook group, and by far the best housed of the Outer Islands in the Southern group (Figure 15).

A notable relationship exists between the frequency of loan repayments and the period of orange picking when the majority of the population obtain most of their annual monetary income. C.R.S. plots have operated as security for housing loans on Atiu.

The housing scheme has tended to become a real community enterprise as materials are brought ashore at far lower rates than private goods. All housing goods are reefed in Atiu at \$3 per ton as opposed to \$6 for private goods. A prominent leader said

"On Atiu we have attempted to reduce as much as possible labour costs in building. The charges for boating and reefing of housing materials has been decreased as has the cost of obtaining sand for mortar. The Boys's Brigade and Boy Scouts movements have agreed to help in providing sand for those requiring it, and at a price much below which sand could be obtained before."

### ATIU: HOUSE TYPES 1969 BY VILLAGES



#### LEGEND

- M Traditional Purau wall; Kikau roof
- Block
- Modern European
- △ Old Wood wall; Iron roof
- ▽ Mixed Traditional-European

Fig. 15

Fieldmap May 1969

Block housing on the island marks a basic change from the past house types and has changed many old living practises and old demands (Plate 10). The most notable break from the past is that the structures are permanent and require little maintenance. The traditional kikau roof had to be replaced every three years. In addition, block homes are simple to build thus allowing the family to build its own home and are less affected by hurricanes. Blocks are produced locally from coral sand and imported cement and have the advantage of requiring little water, which on Atiu is scarce. As one informant said -

"The fact that a block house requires very little water as compared to a poured wall home is a great blessing on Atiu where there is an inadequate water supply."

The block house is tending to hasten the individualisation of Atiuan society in that as a permanent structure, it represents a material asset through which one gains prestige within the community. Hence, every nuclear family strives to own such a home. European type housing is socially desirable and the G.R.S. more than any other factor has been responsible for their enabling widespread ownership. The recent extension of the "A" Scheme to Atiu has been prompted by this desire. Many people, when asked why they had planted on a Scheme plot, replied - "To get the block house" or "To get the furniture for the house." Patterns of living are fast altering in Atiu. Block housing is slowly tending to reinforce the move from extended to nuclear family living, and is playing a major role in improving the standards of sanitation on the island. This is reflected in results from the questionnaire sample of citrus plot owners interviewed. Fifty-five per cent of block homes were occupied by extended families, while the remaining 45 per cent were used by nuclear family units. Of the sample, 80 per cent of plot owners (one third of whom were owners of "A" Scheme plots) had block homes, 16 per cent owned European wood/iron homes and 4 per cent had

PLATE 10.

TRADITIONAL AND MODERN HOUSING, AREORA



New block homes in Areora village contrast strikingly with the traditional purau/kikau houses. To the right of the photograph in the foreground is another recent innovation- a communal water tank for domestic uses.

hardboard wall/iron roof homes. Of the European style homes, 6 of the 8 had been renovated under the housing loan scheme. In contrast, of non-planters only 45 per cent of homes were of the block type and almost half of these belonged to people in permanent occupations. Another 5 per cent of homes were of the poured wall variety, 22.5 per cent were European wood/iron in construction (of which 80 per cent were in good condition and occupied by a person in permanent employment), 5 per cent were hardboard wall/iron roof construction and 22.5 per cent of traditional purau wall/kikau roof type. Thus a significant difference in housing exists between plot owners and non-plot owners.

#### Motorcycle Ownership

Of 53 motorcycles on Atiu in June 1969, 51 were owned by households with someone in permanent employment, the remaining 2 being owned by planters both of whom owned citrus plots (one also having a son in Government employment in Rarotonga). Of the total 53 motorcycles on the island, 24 are located in households owning producing plots and another 10 in households with "A" Scheme plots. The C.R.S. appears to have played only a minor role in enabling motorcycle ownerships, there being a more marked correlation between ownership of motorcycles and regular monetary employment.

#### Background and Attitude of C.R.S. Plot Owners

There appears to be little difference in backgrounds of the citrus growers and non-citrus growers on Atiu. The limited openings for permanent employment are generally taken by those with higher educational qualifications, although recent political developments have been associated with some nepotism. Of all people interviewed, 20 citrus producers and 13 non-producers have not had any other form of non-agricultural employment, which reflects the relative lack of employment opportunities in Atiu.

Similarly with respect to aspirations of parents for their offspring, few significant variations in attitude between citrus

growers and non-citrus growers existed. One variation of note was that a greater percentage of citrus growers stated preference for their children to be planters than the non-citrus people included in the interview. This is probably a result of the recent successes of the C.R.S. which has shown citrus growers that money can be made from planting. Table LI outlines the percentage of answers falling into each category of the non-citrus plot owning and citrus plot owning people interviewed.

TABLE LI  
PARENTAL ASPIRATIONS FOR CHILDREN

	<u>Per Cent Replies</u>	
	<u>Plot Owners</u>	<u>Others</u>
Permanent Government Employment	45	46
Permanent employment if possible, otherwise planters and domestics	18	24
Permanent employment for boys only	7	3
Permanent employment for girls only	0	2
Some children in permanent employment, others subsistence production	5	0
Subsistence employment only	22	10
Subsistence employment, but to migrate as well and send money back to the family	2	10
No replies	2	6

Participation in citrus production does not appear to be associated with different attitudes to life. Both citrus growers and the remainder of the population had similar views on what represented the main "mana manata" (problems) on Atiu (Table LII).

TABLE LII

FREQUENCY OF EXPRESSED OPINION ON THE NATURE OF PROBLEMS  
FACING CONTEMPORARY ATIU

<u>Problem</u>	<u>Citrus Producers</u>	<u>Others</u>	<u>Total</u>
Lack of good Harbour	41	29	70
Lack of Water	39	29	68
Limited Employment Opportunities	5	7	12
Poor Diet	4	1	5
Poor Housing	6	5	11
Poor Sanitation	2	3	5
Isolation especially in Orange Off-season	16	14	30
Seasonality of Income	3	1	4
Comparative lack of Machinery	8	4	12
Lack of good all Weather Roads	5	3	8
Social tension resulting from Innovation	1	1	2
Existence of conservative attitudes	1	1	2
Lack of Central Government interest	-	1	1
Occurrence of Hurricanes	1	1	2
Social tension resulting from Party Politics	1	1	2
Distance from settlement to swamps	1	1	2
Migration of Atiuans	1	-	1
Lack of a Diversified Economic Base	1	-	1
Lack of Investment	-	1	1
	136	103	239

Although more effective change has probably taken place amongst plot owners than the planter section of the community, attitudes appear to be relatively consistent throughout the community. Table LIII bears this out in outlining the frequency of replies to the question seeking the reasons for the success of Atiu of the C.R.S.

TABLE LIII  
FREQUENCY OF REPLIES TO THE RESULTS OF REJUVENATION  
OF THE ATIUAN C.R.S.

<u>Results</u>	<u>Frequency of Reply</u>	
	<u>Orange growers (43)</u>	<u>Others (32)</u>
Road Development		1
Replacement of ailing exports of "Maori" Oranges	1	
Extension of Housing Scheme	19	8
Provision of income for many households	36	24
Provision of employment for many	19	14
Increased shipping calls	12	10
Educated people in cash cropping	1	
Provision of an additional source of food	1	1

In addition to this, one grower stated that the Scheme has not been successful, but agreed that since greater grower participation in it an improvement had been recently made, while another three said there was too much debt but that the situation was improving. Two non-growers believed that the Scheme was unsuccessful in that returns were poor for the labour input involved.

Though some variation exists as to desirable agricultural goals, both citrus and non-citrus growers in general desire a mixed subsistence cash cropping agricultural economy, one providing for the subsistence needs of the family, the other the material items (Table LIV).

TABLE LIV

FREQUENCY OF DESIRABLE GOALS IN AGRICULTURE EXPRESSED BY  
HOUSEHOLD HEADS

<u>Goal</u>	<u>Citrus Producers (43)</u>	<u>Others (32)</u>
Cash Crops - source of money	3	-
Both Food and Cash Crops together - balanced economy	27	19
Both Food and Cash Crops together - for educational purposes		1 +
Food Crops - Yield all year round	1	-
Food Crops - To sustain the family	11	4
Food Crops - Do not require monetary investment	1	-
Food Crops - To save monetary income	-	3
Neither - Agriculture is not a fitting pursuit	-	1
Uncommitted (Expatriate Government Servants)	-	4

+ Catholic Priest

A significant proportion of people interviewed also stated preference for food crops. One interesting answer was given by a non-citrus grower who, although planting subsistence crops stated preference for neither cash nor subsistence cropping and implied that planting was an inferior pursuit. The individual had a professional occupation and considered it beneath him to earn income from planting and hence did no cash cropping at all. The "White Collar" attitude exists even on Atiu.

In total, 65 per cent of citrus growers and 61 per cent of non-citrus producers stated preference for growing both food and cash crops in conjunction with one another. Thirty per cent of citrus producers indicated preference for growing good crops, while only 5 per cent preferred growing cash crops. None of the non-citrus producers stated preference for cash cropping over subsistence

production, but 26 per cent preferred the latter. The remaining 13 per cent of non-citrus producers were not involved in local agriculture at all.

A similar pattern to that discovered above was found in an investigation of the time people spent on cash and subsistence production. Both non-citrus and citrus producers spent more time in production of food crops than cash crops. Of the non-citrus plot owners, 83 per cent spent more time in food crops than cash crops as did 90 per cent of citrus producers. Four per cent of non-citrus growers spent about as much time throughout the year in cash crop production as subsistence production while another 13 per cent being expatriate government employees relied solely on bought food and were not involved in any form of agricultural production. Six per cent of citrus growers stated they apportioned equal time to cash and subsistence crops while 4 per cent stated that they spent more time in cash cropping.

Citrus plot ownership is not associated with decreased subsistence cropping and no significant variation exists between citrus and non-citrus growers on the number or type of subsistence crops produced. Cash crops supplement the subsistence base of the economy and do not result in decreased subsistence production. The level of monetary income to a large extent determines the number of people in households, and so those with a higher monetary income usually have a larger labour force.

### Migration

Of all Atiuan born children of families in the sample, 21.3 per cent had emigrated. Of these, 55 per cent were in Rarotonga, 37 per cent in New Zealand, 3 per cent in Mangaia, 2 per cent in Mitiaro, and 1 per cent in each of Tahiti, Manihiki and Australia.

As shown earlier, plot owners and people in permanent employment have larger households than planters and this feature is born out in the sample material. However, actual family size does not vary - both have an average family of 7 children, if those

who have migrated are included. However, only 1.6 children per household migrate from families owning citrus plots, while 2.45 migrate from non-plot owning families. The C.R.S., it would appear, is an important force in slowing the flow of young people from Atiu. Lack of employment opportunities especially potential to earn money, encourages young people of non-C.R.S. plot owning families to migrate. In only 4 of 22 cases did migration from such homes involve school children. There was no significant difference in the proportions of children employed in different fields from either citrus plot owning or non-plot owning households. This applied both to those on Atiu and abroad. The only significant difference lies in the greater degree of migration from non-plot owning households. The effect of this migration can be seen in Table LV.

TABLE LV

EMPLOYMENT OF CHILDREN RESIDENT ON ATIU

<u>Occupation</u>	<u>Number of Children</u>	<u>% Total</u>
Planter	21	6.00
Domestic	23	6.50
Government	4	1.20
Trading	1	.30
School	212	60.00
Pre School	94	26.00
	<u>355</u>	

Of all children recorded in the sample who had emigrated, only 25 per cent were attending school and another 3 per cent were pre school. Seventy-five per cent of emigration involved people in the productive age group between 15-64 years.

The majority of households heads interviewed showed little inclination to emigrate. Only 22 per cent of plot owners stated that they would like to emigrate compared with 30 per cent of non-

plot owners, although most wished to migrate for only limited periods (Table LVI).

TABLE LVI

FREQUENCY OF REPLIES TO SUGGESTED MIGRATION OF  
C.R.S. PLOT OWNING AND NON-PLOT OWNING HOUSEHOLDS

<u>No intention of migrating because</u>	<u>Citrus Producers (43)</u>	<u>Others (32)</u>
(i) May lose land	1	0
(ii) May lose title to plot	3	0
(iii) Have no rights in land elsewhere	1	0
(iv) Only member of family remaining on Atiu	2	3
(v) Do not wish to leave homeland and family	11	8
(vi) Established and well settled	17	7
(vii) Have a good living standard - migration would only reduce the level of living	2	2
<u>Intend migrating for</u>		
(i) Wish to return to home island: Rarotonga	1	1
Mangaia	0	2
(ii) Term of office soon expires	0	2
<u>Intend migrating for a limited period to</u>		
(i) Rarotonga to earn money to improve the standard of living	1	2
(ii) New Zealand to earn money to improve the standard of living	3	3
(iii) Aitutaki to build a home for children	0	1
(iv) Further education	1	1

The desire for a more balanced monetary and subsistence economy is seen in the higher frequency of non-plot owner replies stating the desire for children to migrate to earn money which could be remitted to the family. Money is becoming a necessity on Atiu and is resulting in much social change. Those households with no one in regular employment and without citrus plots or significant plantings of other cash crops are forced to migrate if desires are to be fulfilled.

#### Aspirations of Heads of Household

The C.R.S. appears to have fulfilled many of the aspirations of plot owners as few wished to be engaged in any other activity than that in which they were at present involved. Of 43 citrus producers only 12 stated such desire. Two people stated they would like to engage in trading activities, 5 expressed desires to be in permanent professional employment while 3 others would like to be mechanics. However, of these 10 people, only 2 were planters, the remainder were already engaged in permanent employment. Two other planters expressed the desire to plant more citrus and to plant pineapples respectively in order to provide regular cash income throughout the year.

Of 32 non-citrus producers, 5 planters wanted to establish citrus plots in order to obtain a cash income, 2 wanted permanent positions in the Administration, 1 wished to begin a trading business, while 4 others would like to be employed in either carpentering or mechanical trades. In total, only 2 of the 12 people were engaged in permanent employment, while another expressed desire for promotion. These figures indicate that with the exception of the planter element of the population with little or no significant monetary income, most people are generally satisfied with their present occupation. The fact that 6 of the 25 people with other aspirations wished either to plant or to extend citrus plots indicates the value of and success of the C.R.S. on Atiu, despite the fact that returns from this are in general less remunerative than being permanently employed.

### Sunday Observance

The demands of the market economy have also made for some direct social change. Notable amongst this has been a relative decline in the observance of Sunday. While still a significant aspect of Atiuan life, a number of growers work on plots on the Sabbath and although they represent only a minority, the practice indicates a decrease in the strength of the Sunday Church observance. In the past Atiuans have refused to work on Sundays, even when boats arrived to load citrus produce and thousands of cases of fruit have been lost as a result. However, rejuvenation of the industry has made growers more aware of the cost and has produced alterations in religious attitudes.

Yet even today, where possible, work on Sunday is avoided. Orange shipments are usually confined to the three days from Tuesday to Thursday in order to avoid fruit picking on Sundays. As the voyage to Rarotonga takes one day, this allows for a work free weekend in Rarotonga, except in periods of peak production. On one occasion in 1969 when a boat arrived, most growers picked fruit on the preceding Saturday, only a minority picking on the Sunday.

## II ECONOMIC IMPACT

### The Atiuan Cash Economy

About 60 per cent of the cash income of the island is derived from Administration and other Government salaries. Remittances and the sale of oranges provide approximately equal shares of the remainder.

In 1955 receipts from the sale of oranges totalled \$121 but by 1966 income reached a maximum of \$28,078. This, a record year, made up approximately 25 per cent of total cash income on Atiu. In hurricane-affected 1968 receipts totalled \$11,216 approximately 11 per cent of total income earned on the island. However seven-twelfths of total citrus receipts are used to repay plot debts and of the remaining five-twelfths the growers pay a levy of 20 cents per bag to defray production costs the following season. A small proportion of this levy covers any labour costs resulting from Fruit Control work on individual plots. The net result of this is something less than five-twelfths of net citrus receipts entering cash circulation on the island. As the debt decreases and more plots gain credit balances, less will be repaid to the Administration.

Despite much consumption expenditure being oriented to Rarotonga, the C.R.S. undoubtedly has an important multiplier effect within the economy as comparatively little money is saved. Employment opportunities are provided and although profits of externally owned businesses are remitted, some income generated by the Scheme percolates through the community.

Table LVII shows the income for Atiu in 1968. Copra production was still affected by the 1967 hurricane and none was exported in 1968. No figures for arrowroot export receipts were available and hence have not been included in the table.

TABLE LVII

ESTIMATED MONETARY INCOME FOR ATIU, 1968

<u>Source</u>	<u>\$ Amount</u>
Wage from private enterprise employees	2,000
Public Servant Salaries	58,787
Wages of Government Casual Employees	4,500
Coffee receipts	1,124
Orange receipts	11,216
Remittances	18,625
Other (e.g. sale of food, casual labour)	700
	<hr/>
	\$ 96,952

Note: In constructing this table discrepancies were found in some figures and in such instances the author utilised what were considered the more realistic statistics. In addition there may be minimal duplication within figures but this has been allowed for where possible.

Source: Atiu Administration Records  
Private Trading Records

The C.R.S. in the future will come to play a more significant role in the cash economy of Atiu. The debt situation at present hinders its potential although the situation is rapidly improving. With the extension of plantings on the island under the "A" Scheme, in which it appears debt will not accumulate the citrus industry will come to play an even more significant role. If expansion is matched with replacement of existing trees the citrus industry can only become more significant as a source of income for an increasing number of Atiuans and subsequently as an agent of social change.

Table LVIII attempts to relate the increases in citrus production to spending power within the Atiuan community. Turnover figures have been obtained from all significant trading enterprises on Atiu. All show increase in turnover during the periods

involved and although fluctuations within turnover figures cannot be attributed solely to fluctuations within the citrus industry a close relationship appears likely. It is difficult to state the extent to which the C.R.S. has influenced these fluctuations as increases in salaries and wages and in receipts from other exported commodities will also affect these figures. There is some correlation between citrus production and purchasing power. The 1960 hurricane caused a drop of over \$4,000 in turnover in one private trading business on Ariu in that year over the 1959 financial year. Extension of credit to some extent masks the effect of fluctuations in the C.R.S. on business. The effect of the drop of production in 1968 is likewise reflected in the trading figures of all enterprises from which figures were obtained.

TABLE LVIII

COMPARISON OF ANNUAL CITRUS YIELDS AND THE  
PURCHASING POWER OF THE ATIUAN COMMUNITY, 1962-68

Year	Citrus Production (70 lb cases)	Retail Sales \$	Post Office Savings Bank \$	+ Post Office Turnover \$
1962	9,838			
1963	10,480	18,198		
1964	10,758	26,866	- 1,704	42,921
1965	24,400	44,125	4,726	82,351
1966	23,273	46,958	15,524	88,659
1967	19,557	76,168	- 5,506	180,329
1968	7,667	67,690	- 2,843	100,102

+ Savings Bank balances of deposits and withdrawals.

Source: Government and Retail Business Records

Similarly the effect of bumper crops in 1965 and 1966 is reflected in trading figures, especially from the Post Office where turnover in 1967 increased over 100 per cent from 1966, much as a

result of improvement in the economic position of the C.R.S. Table LIX shows the relevant figures for the Post Office Savings Bank and of remittances for the period 1964-1968 and shows a marked relationship between the fortunes of the C.R.S. and the value and type of transaction involved. In general, all types of Post Office transactions have increased paralleling the rising output and value of the citrus industry and to some extent being the result of inflationary tendencies in the economy. Fluctuations in annual citrus yields are also reflected in Post Office records. Rising levels of spending power within the Atiuan community is seen in remittances for private imports (as opposed to remittances to Atiu which are sent to families from relations who have migrated). In 1964 the amount of money remitted from Atiu amounted to \$43,980 but by 1966 this had increased to \$76,807. Despite the significant improvement in the economic position of the Atiuan C.R.S., the drop in production in 1967 and 1968 was reflected in remittances from Atiu which fell to \$59,101 and \$70,253. Similarly, transactions in the Post Office Savings Bank reflect the fortune of the C.R.S. to a large extent. In years of high production, deposits exceed withdrawals while the opposite occurs in years of low citrus yields. The years 1964 and 1965 which mark the beginning of the improvement of the C.R.S. registered in \$7,349 excess of withdrawals over deposits and this was again seen in 1968 when withdrawals exceeded deposits by \$1,704. However, 1966 and 1967, (which mark years immediately following the bumper crops of 1965 and 1966) deposits exceeded withdrawals by \$15,524 and \$4,726 respectively.

Thus, the citrus industry plays a major role in determining the fortunes of trading activity on Atiu, and the Scheme has undoubtedly assisted the people in coming to some understanding with the market economy. The number of Post Office Savings Bank Accounts held in Atiu gives some indication of the extent to which people are involved in the monetary economy, but as many have migrated or alternatively hold accounts in Rarotonga, the increasing number of

transactions more effectively shows the increasing involvement of Atiuans in the cash economy (Table LIX) and a certain correlation with citrus yields.

TABLE LIX

ATIUA: POST OFFICE TRANSACTIONS, 1964-1968

(A) Number of Transactions

<u>Year</u>	<u>Remittances</u>		<u>Savings Bank</u>	
	<u>In</u>	<u>Out</u>	<u>Deposits</u>	<u>Withdrawals</u>
1964	634	382	246	180
1965	1,097	691	551	297
1966	729	742	509	292
1967	826	513	370	286
1968	974	418	493	288

(B) Value of Transactions

<u>Year</u>	<u>Remittances</u>		<u>Savings Bank</u>	
	<u>In</u>	<u>Out</u>	<u>Deposits</u>	<u>Withdrawals</u>
1964	11,044	5,502	7,040	8,348
1965	17,730	87,447	13,021	9,296
1966	21,285	98,093	28,093	12,569
1967	25,406	84,513	12,456	6,952
1968	18,625	88,878	10,886	13,728

Source: Post Office Records

As with housing loan payments monthly turnover of trading enterprises is also affected by the C.R.S. Figures are shown for 1965 and 1968 in Table LX. Those for the Atiuan Co-operative Society do not show marked increases of turnover in the citrus season as most dealings are with the salaried people on the island to whom credit is generally extended. However, small increases

TABLE LX  
MONTHLY TURNOVER PATTERNS, 1965 AND 1968  
(Dollars)

	<u>P.O. Deposit</u>	<u>P.O. Withdrawal</u>	<u>P.O. Turnover</u>	<u>Atiu Co-operative Society</u>	<u>Total Turnover</u>
<u>1965</u>					
January	414	1,639	5,050	1,727	6,777
February	529	244	4,677	1,672	5,349
March	884	1,201	6,400	779	7,179
April	862	524	6,426	1,775	8,201
May	1,300	310	8,755	1,865	10,620
June	1,991	642	9,613	2,025	11,638
July	1,747	432	6,822	1,995	8,817
August	1,078	68	6,779	1,381	8,160
September	1,478	1,278	8,009	1,727	9,736
October	693	1,349	4,801	1,854	6,656
November	415	1,232	6,297	1,731	8,028
December	1,293	1,057	7,022	1,898	8,920
<u>1968</u>					
January	1,429	677	8,507	2,760	11,268
February	434	287	6,040	2,650	8,690
March	914	455	7,157	3,155	10,672
April	270	681	8,378	2,210	10,588
May	853	1,699	7,586	3,313	10,899
June	882	1,976	7,572	3,346	11,018
July	1,442	1,418	8,835	3,727	12,562
August	1,596	811	8,560	4,615	13,175
September	1,110	2,415	9,040	3,958	12,998
October	702	715	9,997	3,651	13,648
November	753	91	9,711	3,442	13,153
December	677	1,197	8,359	3,868	12,227

Source: Post Office Records

are evident during the period of the citrus harvest. In 1968 the increase from July to September coincides with the period of citrus payments in this hurricane affected year while the mid-year turnover peak in 1965 coincides with the height of production between May and July in that year.

The problem of seasonality of income of many Atiuans is reflected in the Savings Bank trends in 1965. The period from May to September marks the period of the citrus harvest and Savings Bank deposits are accordingly high. However, for the remainder of the year deposits are exceeded or almost equalled by withdrawals. The corresponding columns in 1968 show this feature too - the period of maximum deposits corresponds with the period of increase in turnover of the Atiuan Co-operative Society and with the period of peak production of citrus in that year. The hurricane undoubtedly has masked somewhat the distinctive pattern which can be seen in the 1965 figures.

#### Propensity to Save

As the market economy develops and expands, materialism assumes a more important place in the life of the island. Saving tends to reinforce the individualising factor in the society as the need for mutual interdependence for security provided by the reciprocity system decreases. The propensity to save, increases with rising monetary income after basic minimum living standards are reached (Table LXI). The motivation to save is basically for specific purposes in nature, (e.g. block homes, motorcycles and furniture). When these are obtained little saving occurs. Of current citrus producers on the island, 53 per cent of householders saved, while 75 per cent of non-producers regularly saved. The higher savings propensity amongst non-citrus producers is due to a higher proportion of people in professional employment and the desire of many planter families to own a block home. As most citrus producers own block homes, there is little incentive for them to save as the reciprocity system still affords security to households with

relatively small monetary income. Only a minority of regularly employed people save for security purposes.

TABLE LXI

ATIUI: SAVINGS PROPENSITY BY INCOME GROUPINGS, 1969

<u>\$ Annual Income</u>	<u>Savers</u>			<u>Non-Savers</u>			<u>Total</u>
	<u>Citrus Growers</u>	<u>Others</u>	<u>Total</u>	<u>Citrus Growers</u>	<u>Others</u>	<u>Total</u>	
0-400	2	3	5	10	4	14	- 9
400-800	3	5	8	3	2	5	+ 3
800-1200	8	8	16	8	-	8	+ 8
1200-1600	3	6	9	-	-	-	+ 9

Of the 43 citrus growers interviewed 22 saved, 6 for security purposes, 16 for security and special purposes, none for purely special purposes or for old age. This contrasted with the 32 non-citrus producing people interviewed, 25 of whom saved, including 1 who saved for old age and 4 for special purposes (all for new concrete block homes) in addition to 20 people whose motivations to save correspond with the general pattern among citrus growers, in that they were oriented to security (9 cases) and combined security/special purposes (11 cases). These latter two savings motivations as with the citrus producing section of the people were confined to those people in regular employment. Twenty-one households with producing plots did not save at all, 13 because all income was consumed, 7 because plots and consumption combined absorbed all money and 1 because all money was being used to build a home. Only 6 non-citrus producers did not save at all, and all stated that income was consumed.

Several Savings Institutions are utilised on Atiu (Table LXII). A limited number of people held Life Insurance Policies and Trading Bank Accounts, both notable innovations in Atiu.

TABLE LXII

SAVINGS INSTITUTIONS: FREQUENCY OF USE

<u>Institution</u>	<u>Grower</u>	<u>Non-Grower</u>	<u>Total</u>
Post Office	22	21	43
Atiu Co-operative Thrift and Loan	11	14	25
Trading Bank	1	3	4
Life Insurance	2	6	8
Housing Loan	1	2	3
	<u>37</u>	<u>46</u>	<u>83</u>

Consumption

The ownership of a C.R.S. plot as expressed before is generally associated with increased materialism and superior living conditions than is found in the non-employed, non-plot owning section of the community. However, even plot owners do not enjoy a standard of living as high as people in permanent employment, some of whom are plot owners themselves. A series of household budgets was conducted over a monthly period in which people from selected socio-economic classes recorded all their purchases (See Appendix XI). The budgets show a broad difference in incomes between the different socio-economic groups. Two planter households received \$23.80 and \$25 in the month respectively compared with \$34.30 and \$47.16 received in households owning a citrus plot. In both the latter instances the plots had passed their peak production. A citrus grower who also had permanent employment with the Public Works Department, netted \$68.28 in the month while the professionally employed plot owner netted \$157.80. A professionally employed, European household received \$283.09 in the same period. Thus vast differences exist between the different socio-economic groups in terms of monetary income.

This range is reflected especially in the consumption patterns of individual households. Increasing income is associated with increasing consumption of 'papa'a foods - especially meats

(fish and beef in particular). There is a marked lack of protein in the diet of the people. Fish, in the past were the main type of meat consumed, pigs being the only really significant alternative. Fishing is not practised to the same extent as previously as many people can seldom find time for such activity owing to commitments to cash cropping and regular forms of employment. The planter section of the population is the only group which fishes regularly. However, fishing is much dependent upon weather conditions on the reef and is often impossible. However, with the advent of cash cropping there has been a notable rise in the consumption of bought foods. This has been associated with a deterioration in diet in some cases particularly amongst families of lower socio-economic status.

#### Food Exchange

Food exchange in traditional Atiuan society was central to the reciprocity system, but with the advent of cash cropping and the market economy and money it is now declining. Food was traditionally exchanged widely amongst the villages between relations and non-relations. Exchanges of food still reach their peak at ceremonial occasions, such as Christmas and are generally confined to local "Maori" foods. As one informant stated -

"This custom is still being carried out as it used to be in the past but nowhere near as strong as it was in the past. It is gradually dying out especially in exchange between people who are not related. Today people only give food when they have extra or when somebody is in the position of not having any. Today with the cash crops people do not have as much time to produce food crops and thus the amount of food exchange has decreased."

In a limited number of instances bought foods are exchanged for local foods within the family grouping and occasionally between neighbours. Those in regular employment assist in providing bought food for those people without a regular income who reciprocate by giving local goods. There were 8 instances of this occurring amongst

citrus growers included in the sample and 4 cases amongst new growers. Although ties are weakening, the family remains an interdependent unit.

More infrequently clothes are exchanged by people in regular employment with planters who may provide them with food. Three citrus growers occasionally gave clothes and tobacco to people who brought them local foods, especially fish, while one occasionally also gave money. One other citrus producer gave clothes to his immediate relations who had no source of monetary income. There were two instances of this occurring amongst the non-grower element interviewed. Two other families, one of a citrus plot owner family, regularly received clothes sent from relations in Rarotonga to whom they sometimes sent food.

Although no distinct differences exist between plot owners and non-citrus growers in their involvement in the traditional reciprocal exchange system, in general the more traditional sections of the community (planters in particular) are far more involved as they have no alternative means of gaining security. Those in professional and permanent employment having relatively more security do not generally involve themselves in as much exchange, although when this does occur it sometimes initiates new types of exchange.

With the C.R.S. and the greater frequency of monetary income, the raii has virtually disappeared on Atiu, the last attempt to enforce one failing in the mid 1950's. With diversification of the economy in which the C.R.S. has been pre-eminent, the need for conservation of local food resources has diminished.

### CONCLUSION

The C.R.S. has been the only successful commercial agricultural venture of any significant scale introduced to Atiu. After a rather poor beginning the Scheme was overhauled and subsequently its economic position has vastly improved. The result has been that the cash sector of the economy has expanded and affected a larger proportion of the population to a greater degree than ever before.

The history of the C.R.S. on Atiu to a large extent reflects the statement of Belshaw and Stace (1955, 1) that -

".....The problem of economic development and social betterment in the Cook Islands depends not only on the ratio of natural resources to population, and on capital, transport, markets, the level of technology and other economic factors as these are usually understood, but also on social attitudes and organisation. These last in large measure determine the extent to which economic potentialities are in fact realised. To quite an important extent they depend on political and administrative approaches and conditions."

Realisation that the human factor was an essential ingredient in any development scheme was to a large extent responsible for the recent success of the C.R.S. on Atiu. The most significant feature of this revival is that it has been achieved by the Atiuans themselves under enlightened administration. The whole population has been involved and is now aware of the significance of the development programme to the entire community. Active local participation in the Scheme has enabled growers to appreciate the demands of the market economy and the "mana" of individual growers has become an important element within it. Satisfaction is a prerequisite to success of any human activity.

Social change has been catalysed as a result of recent revitalisation of the Scheme and with proposed extension of plantings

it will be further promoted. If the new aspirations associated with development can be achieved then the C.R.S. will increase its influence on the socio-economic life on Atiu. Emigration may become the vital factor in the future of the Scheme. Present community leaders are aware of this threat, not only to the C.R.S. but to the island as a whole, and are attempting to provide amenities to discourage movement, particularly of young people from Atiu.

The C.R.S., a vital element in the economic development of Atiu has assisted to unleash new forces and aspirations and its future will to a large extent depend upon its ability to satisfy these desires. Economic and social development cannot be divorced. Change is multi-dimensional and the history of the Citrus Replanting Scheme on Atiu has involved and will continue to involve social, as well as technical, infrastructural and administrative factors.

APPENDIX I

Questionnaire (a copy follows this explanation)

A sample survey was performed to obtain information unobtainable elsewhere in order to provide insight on the effect the C.R.S. has had on Atiu in altering standards of living within the community and in causing socio-economic differentiation. The survey was also designed to attempt to gauge attitudes of the Atiuan population to various aspects of life on the island, notably in agriculture and in the broader field of social change.

The questionnaire was compiled before departure for the Cook Islands, and as a result, on arrival it was found necessary to adapt it to local conditions. The language difficulty proved to be the major obstacle, but was overcome by use of local words. As Allen found in Mangaia, the word "problem" in particular proved difficult as no Cook Island Maori equivalent exists. In this case the word "mana manata" (big trouble) proved adequate. When necessary, local schoolteachers assisted in interpreting questionnaires. However, the majority of interviews were accomplished without this assistance.

Originally it was intended to do 100 interviews which would represent approximately 50 per cent of the total households on Atiu, but only 75 were completed, because of exceptional social activity in the period April-June, (a Cook Island Boys's Brigade Camp, visits of the Resident Commissioner and the Catholic Bishop, impending installation of the Rongomatane ariki, the departure of a sporting team to Aitutaki and the Constitution Celebrations) coupled with the work pattern of Atiuan planters. This work pattern generally allowed interviewing to be done either early in the morning or late at night. These 75 interviewed represented 40 per cent of the total households on the island and on this considerable proportion of the population rests the worth of the sample questionnaire.

The survey was stratified on a two dimensional basis, the aim being to get a sample reflecting village breakdown which was

proportionate to the total number of occupied households in each village, and hence, approximately proportionate to the total number of people in each village. Simultaneously the population was divided into the broad socio-economic groups (based on occupational status) of permanently employed planter, plot owner and subsistence planter. Through this, it was anticipated that the socio-economic effect of the C.R.S. on Atiu could be gauged.

Subsequently, in analysing the research material, the author deemed it necessary to divide further the three socio-economic groupings. This has resulted in some irregularity in the number of households included in each group. Despite this, the author feels that there are sufficient people in each group to permit generalisations to be made and comparisons to be drawn between the different socio-economic classes.

To overcome any possible stereotyping of information, the author also encouraged people to elaborate on any topic on which they had personal opinions. In a limited number of instances the author revisited such people, to obtain a deeper appreciation of local insight into various matters and incidentally to inject a little "local colour" into the work.

### Mapping

A land use map (1 inch to 10 chains) was constructed on arrival at Atiu, after permission to do so had been unanimously granted by the Island Council. Base maps were prepared prior to departure from New Zealand from a series of aerial photographs taken of Atiu in 1958. Owing to the age of these photographs, many adjustments had to be made in the field.

The land use mapping was carried out with the aid of these aerial photographs which were cut up into sizes convenient for utilisation in the field. Making use of these photographs, the author could locate himself on the island and plot land use on to the photographs themselves. At night, these would then be transferred to the base maps. Use of a compass was impracticable in the "bush"

environment, where the majority of agricultural activity takes place. Plotting had to be carried out by locating positions on the photographs and then by traverse around and through plots and gardens. In the makatea, locating and accurately plotting the isolated and microscopic garden plots was impossible and these will not appear on the map. In contrast, the open environment of the fernland made for easy and efficient mapping. When completed the maps will be the fourth in a series of Land Use Surveys of the Cook Islands (N.Z.M.S. 146/5) being produced by the Massey University Geography Department and the New Zealand Department of Lands and Survey.

In addition to the land use mapping, a soil survey, which adapted that of Grange and Fox in 1956 was carried out. The distribution of population by households was also investigated as was a survey of housing types, and these three maps are included in the body of the thesis. The construction of a topographic map of Atiu by the Photogrammetry Department of Otago University has also enabled a cross-section of the island to be made.

House and DwellingName:House No:Village:Number of people in HouseholdRelation to Head of HouseholdAge GroupSexRace

Number of Motorbikes in Household

Number of Licences

Owner

When Purchased

Occupation/locality of children of HouseholdLocationAgeOccupation

At home on Atiu

North Cook

South Cook

Raro

New Zealand

Other

Occupation of those gainfully employed in Household (exclude school children)

General Agricultural work

Citriculture

Administration

Trading

Public Service

Other

No. of rooms excluding kitchen, bathroom, washroom

Dwelling type: kikau wall/kikau roof  
 wooden wall/kikau roof  
 lime wall/kikau roof  
 lime wall/iron roof  
 wooden wall/iron roof  
 European style

Does house have sewing machine  
 pit toilet  
 radio  
 running water  
 installed washing facilities  
 motormower  
 refrigerator  
 stove

No. years primary		Read?
Secondary	education Head of Household	Write?
tertiary		Newspaper?

Social rank within family  
 village  
 island

Has Head of Household been out of Atiu?

Where?  
 How long?  
 What occupation?  
 Why did you return?

Would you migrate from Atiu if possible?

Why?  
 Why not?

Where would you go?  
 Why?

What would you do?  
 Why?

Has Head of Household had any other form of permanent employment?

What do you want your children to do?

Why?

Agricultural(a) Food Crops

1. How many taro plots (wet)  
taro tarua do you have  
dry land gardens
2. Do you spend more time in your food crops than in your cash plot?  
Why?  
Why not?

Cash Crops

How many cash crop plots do you have?

Tomatoes
Citrus
Coffee
Pineapples
Peanuts
Other

Do you prefer growing food crops to cash crops?  
Why?  
Why not?

Citrus

1. Why did you start growing oranges (or other cash crops)?  
Why haven't you started growing oranges?
2. Are you pleased you did start growing?  
Why?  
Why not?
3. Are you pleased you didn't start growing?  
Why?  
Why not?
4. What would you prefer to do and why?

5. Do you consider the C.R.S. a successful scheme?  
Why?  
Why not?
6. How could it be improved on Atiu?
7. Why does the debt increase on the plots?  
Why not?
8. What is the greatest problem facing citrus growers on Atiu at present?

General Plot Information

- |  |       |               |               |
|--|-------|---------------|---------------|
|  |       | Village:      |               |
|  |       | Plot No:      |               |
| 1. Age of the Plot owner   |       | Race:         |               |
| 2. Does the Plot Owner live on Atiu?<br>(If not, who is the Plot holder?)                      |       | Sex:          |               |
|  |       | Age:          |               |
|  |       | Race:         |               |
|  |       | Sex:          |               |
| 3. What is the present occupation of the Plot Owner?   |       |               |               |
| 4. Why did the plot owner migrate?   |       |               |               |
| 5. How many children does the plot owner<br>plot holder have?                                  |       | <u>Stated</u> | <u>Actual</u> |
| 6. How big is the plot?  | Acres |               |               |
|  | Trees |               |               |
| 7. Total production last year  | Cases |               |               |
|  | Value |               |               |
| 8. What happens to the fruit after it leaves Atiu?<br>Where does it go?<br>To whom is it sold? |       |               |               |
| 9. How long have you operated the plot?  |       |               |               |
| 10. Did you have a citrus plot before the C.R.S. began?  |       |               |               |
| 11. Has the plot been paid off?<br>Why?<br>Why not?  |       |               |               |

If so, do you still use the C.R.S. advice?

Why?

Why not?

12. Would you like more help from the C.R.S.?

Why?

Why not?

Would you prefer to do more by yourself?

13. Do you ever expect to pay the plot off?

Why?

Why not?

Do you want to pay the plot off?

Why?

Why not?

14. Does your family like you growing oranges?

Why?

Why not?

15. Did your family quarrel over the land before you started growing oranges?

Why?

16. How did you get your family to give you the land to grow oranges?

#### Income and Expenditure

1. Does your family share in the money you make from the orchard?

Why?

Why not?'

2. What are the main sources of your monetary income?

Remittances

Wages

Orchard returns

Other





APPENDIX II  
OCCUPATION RIGHTS

An Occupation Right is granted to an individual subject to the following terms and conditions:

1. "The land shall be used for the purpose specified above.
2. The right of Occupation shall be for so long as the occupier or his descendants shall use the land for the purpose specified in this order and shall comply with the other conditions contained herein.
3. The occupier may not lease or transfer his right of occupation to any other person or persons.
4. On death of the occupier, his occupation right shall pass to his children and registered adopted children who shall decide, subject to the approval of the Native Land Court, who, of those children or adopted children shall occupy. If the occupier leaves no children or registered adopted children then the successors appointed by the Native Land Court shall decide who shall occupy.
5. If the occupier leaves the Island where the land is situated and takes up permanent residence elsewhere or if he fails to use the land for the purpose for which the occupation right was granted or if he fails to use it in a proper and husbandlike manner or if for any other reason he abandons the land or is unable to continue to use it in accordance with the conditions herein contained then the owners or the next of kin of the occupier or his issue as the case may require may, with the approval of the Native Land Court, appoint a new occupier subject to any order or condition the Court may make as to compensation.
6. The Native Land Court may, so long as money is owing by the occupier to the Cook Islands administration for the development of the land, declare the land subject to the provisions of Part IV of the Cook Islands Amendment Act, 1946.
7. Any disputes will be settled by the Native Land Court.

8. The Court reserves the right to lay off a right-of-way over the lands held under an occupation right whenever it is shown that such a right-of-way is necessary to give access to land which otherwise would have no suitable access."

(From Order Granting Right of Occupation - Section 50, Cook Islands Amendment Act, 1946)

APPENDIX III

Of the relatively infertile island of Atiu with a small area suited to agriculture, Colonel Gudgeon wrote in 1902:

"Of this island it may be said that every inch of it is worthy of cultivation, though it has not that appearance of fertility which is so characteristic of Rarotonga and Aitutaki. Even a man of experience may be deceived by the appearance of the bare central ridge, with its red soil and low-growing fern; but this is really the best land in the fertile island, for on the highest part of the ridge coconuts, bananas, oranges and coffee grow with utmost luxuriance, and the kumara, most valuable and uncertain of south sea vegetables, yields large crops.....Coffee and oranges grow vigorously, but very few trees are to be seen; but there is an excuse for the non-cultivation of the orange, for men can be hardly expected to cultivate fruit for which there is no demand, and it is only within the last two years that any anxiety has been shown to purchase the oranges of this island, except at the end of the season, when fruit has become scarce and therefore, valuable.

The result of this apathy is that the tribes of Atiu are about the most poverty stricken people of the group. For this state of affairs the land tenure may be in a measure responsible, for there the old tribal system of the New Zealanders holds sway; the land belongs to the tribe, and the three Arikis, Rongomatane, Parua, and Ngamaru, are supreme - that is they would be supreme if the two former women possessed any force of character, but as they have none they have fallen into the hands of their relatives, and the island is misgoverned. Ngamaru is a man of strong character, but he has not lived with his own people for the last 20 years.....

The.....tribes of Atiu.....are less civilised or amenable to reason than any people in the eastern Pacific, and will require to be governed with a strong hand."

APPENDIX IVATIU: AGE/SEX DISTRIBUTION AND DEPENDENCY BY VILLAGES, 1956-1966

<u>Age Groups</u>		<u>Ngatiarua</u>					<u>Mapumai</u>														
		Male	%	Female	%	% Total	Male	%	Female	%	% Total										
<u>0-14</u>	1956	34	2.6	39	2.8	5.4	43	3.3	51	3.9	7.2										
	1966	39	2.9	38	2.9	5.8	53	4.8	37	2.8	7.6										
<u>15-64</u>	1956	40	3.1	24	1.8	4.9	41	3.1	42	3.2	6.3										
	1966	29	2.2	24	1.8	4.0	37	2.8	36	2.9	5.7										
<u>65 +</u>	1956	2	.2	3	.2	.4	1	.1	2	.2	.3										
	1966	1	.1	4	.3	.4	3	.2	2	.2	.4										
<u>Totals</u>	1956	76		66		10.7	85		95		13.8										
	1966	69		66		10.2	93		75		13.7										
<th colspan="5"><u>Tengatangi</u></th> <th colspan="5"><u>Areora</u></th>												<u>Tengatangi</u>					<u>Areora</u>				
<u>0-14</u>	1956	60	4.6	55	4.2	8.8	107	8.2	91	7.0	15.1										
	1966	71	5.4	68	5.1	10.5	117	8.8	88	6.6	15.4										
<u>15-64</u>	1956	57	4.4	48	3.7	8.0	95	7.3	81	6.2	13.5										
	1966	36	2.7	39	2.9	5.7	84	6.3	83	6.3	12.6										
<u>65 +</u>	1956	4	.3	5	.4	.7	4	.3	4	.3	.6										
	1966	2	.2	4	.3	.5	4	.3	3	.2	.5										
<u>Totals</u>	1956	121		91		17.5	206		176		29.2										
	1966	109		113		16.7	205		174		28.5										

<u>Age Groups</u>		<u>Teenui</u>				% Total	<u>Total</u>	
		Male	%	Female	%		Total Number	% of Total Population
<u>0-14</u>	1956	102	7.8	94	7.2	15.0	673	51.5
	1966	137	10.3	119	9.0	19.3	767	57.8
<u>15-64</u>	1956	92	7.0	76	5.8	12.9	596	45.6
	1966	81	6.1	75	5.7	11.8	524	39.4
<u>65 +</u>	1956	6	.5	7	.5	.5	38	2.9
	1966	6	.5	7	.5	1.0	36	2.7
<u>Totals</u>	1956	200		117	13.5		1,307	100
	1966	224		201	15.2		1,327	99

Source: Cook Islands Census 1966

APPENDIX VFREQUENCY TABLE OF DEBT, 1960-68(For 2 year intervals based on occupational Status. (Dollars per tree))Permanently Employed

	<u>1960</u>	<u>1962</u>	<u>1964</u>	<u>1966</u>	<u>1968</u>
Credit				1	1
0-4				1	2
5-9	5	1	2	3	5
10-14	14	11	9	9	5
15-19	4	8	8	7	7
20-24		4	4	3	4
25-29			1		

Casually Employed

Credit					1
0-4					2
5-9				1	1
10-14	10	3	3	5	3
15-19	1	6	3	3	2
20-24		2	4	1	2
25-29					

Planters

Credit				3	7
0-4	2	1	1	6	13
5-9	21	7	7	31	20
10-14	91	38	35	41	40
15-19	10	64	59	30	31
20-24	3	15	16	12	11
25-29		2	6	4	6
30-34			2	1	

Note: Until 1964 there were 164 plots, thereafter 165

Two plots cannot be classified on the above table as one plot is tribally owned and another absenteeed.

APPENDIX VI

FREQUENCY TABLES OF PRODUCTION IN MAPUMAI VILLAGE, 1960-1968

<u>Production per tree in lbs</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>Average Total 1960-1968</u>
0	15	1		3	1					
1-50	15	10	9	12	4	1	1	2	10	1
50-100	1	13	8	5	7		2	1	12	3
100-150		6	7	4	8	6	3	2	3	12
150-200			5	3	2	2	6	6	4	8
200-250				1	4	3	3	7		4
250-300			1	1	1	5	4	4		2
300-350				1	2	1	2	2	1	
350-400					1	4	2	3		
400-450						2	1	1		
450-500						2	2			
500-550						1	2			
550-600						2	2			
600-650										
650-700						1				
700-750								1		
750-800										
800-850										
850-900										
900-950										
950-1000										
1000-1050										
1050-1100										
1100-1150										
1150-1200										
1200-1250										

Source: C.R.S. Records

APPENDIX VII

FREQUENCY TABLES OF PRODUCTION IN TENGATANGI VILLAGE, 1960-1968

<u>Production per tree in lbs</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>Average Total 1960-1968</u>
0	19	2	1	3	1				3	
1-50	16	19	12	9	9	4	3	5	10	
50-100		8	10	13	14	5	2	3	9	
100-150		3	10	3	4	4	5	7	6	
150-200		3	1	2	3	6	10	5	4	
200-250				2	3	6	1	3	2	
250-300				3		3	3	4	1	
300-350			1			3	5	5		
350-400						2	4	2		
400-450						1	1			
450-500						1	1	1		
500-550										
550-600										
600-650										
650-700										
700-750					1					
750-800										
800-850										
850-900										
900-950										
950-1000										
1000-1050										
1050-1100										
1100-1150										
1150-1200										
1200-1250										
1250-1300										

Source: C.R.S. Records

APPENDIX VIII

FREQUENCY TABLE OF PRODUCTION IN NGATIARUA VILLAGE, 1960-1968

<u>Production per tree in lbs</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>Av. Total 1960-68</u>
0	4			3	1	1		1	2	
1-50	7	4	2	1	4	2	1	1	3	2
50-100	1	3	5	2	2	1	3	1	4	2
100-150		4	3	5	2	1		1	2	4
150-200		1	2		2	2	3	4	1	4
200-250				1		2	3	1		
250-300					1	2	2	2		
300-350								1		
350-400						1				
400-450										
450-500										
500-550										
550-600										
600-650										
650-700										
700-750										
750-800										
800-850										
850-900										
900-950										
950-1000										
1000-1050										
1050-1100										
1100-1150										
1150-1200										
1200-1250										
1250-1300										

Source: C.R.S. Records

APPENDIX IX

FREQUENCY TABLE OF PRODUCTION IN TEENUI VILLAGE, 1960-1968

<u>Production per tree in lbs</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>Av. Total 1960-68</u>
0	14								1	
1-50	29	12	6	7	10	1	1	5	20	1
50-100	1	20	16	7	9	1	6	5	14	11
100-150		7	11	11	12	4	6	9	5	14
150-200		3	9	8	7	5	9	7	2	12
200-250		2		8	7	7	2	5	1	3
250-300			2	2	1	2	10	6	2	4
300-350						8	3	3		
350-400						4	2	1		
400-450						2	1			
450-500						3	2			
500-550						2		3		
550-600										
600-650										
650-700										
700-750										
750-800							2	1		
800-850										
850-900										
900-950										
950-1000										
1000-1050										
1050-1100										
1100-1150										
1150-1200										
1200-1250						1				
1250-1300										

Source: C.R.S. Records

APPENDIX E

FREQUENCY TABLE OF PRODUCTION IN ARECRA VILLAGE, 1960-1968

<u>Production per tree in lbs</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>Av. Total 1960-68</u>
0	17	3		3	2	1		2	7	
1-50	25	15	20	9	16	2	3	13	21	6
50-100		14	13	12	10	7	6	6	8	13
100-150		9	3	4	6	9	9	6	5	12
150-200		1	2	4	5	4	8	5	1	5
200-250				4	1	5	4	2		4
250-300			4	1	1	3	4	1		2
300-350				2		3	1	3		
350-400				2		7	1	3		
400-450							2			
450-500							2			
500-550						1	1	1		
550-600										
600-650										
650-700										
700-750										
750-800										
800-850										
850-900										
900-950										
950-1000					1					
1000-1050										
1050-1100										
1100-1150										
1150-1200				1						
1200-1250										
1250-1300										

Source: C.R.S. Records

APPENDIX XI

A series of Income and Expenditure Accounts were issued to selected households of different socio-economic status over a monthly period. The aim was to show the effect of increasing income on living standards, especially domestic consumption. The household chosen varied from subsistence planter households to the European household which represents the opposite end of the socio-economic development continuum.

<u>(A) PLANTER</u>		<u>FAMILY SIZE = 10</u>	
		<u>Week 1</u>	
<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Cash in Hand	3.50	3 Corned Beef	1.29
		1 lb Rice	12
		1 Soap	28
Sale of Taro	3.00	1 Dripping	22
		1 Corned Beef	43
		1 Tobacco	42
		2 Cigarette papers	06
		Bread	50
		1 Corned Beef	43
		1 Herrings	33
		6 lbs Sugar	54
		1 Corned Beef	43
		3 lbs Sugar	27
		1 Cigarettes	27
		1 Matches	02
		Bread	50
		Pictures	
		Excess of Income over	
		Expenditure	09
	<u>        </u>		<u>        </u>
	\$6.50		\$6.50
		<u>Week 2</u>	
Orange Receipts	2.00	Pictures	30
		Pictures	50
Sale of Taro	3.00	3 lbs Sugar	27
		1 Soap	28
Boating/Reefing Wages	1.90	5 Beef	2.15
		1 Benzine	38
		1 Kerosene	20
		Pictures	30
		Excess of Income over	
		Expenditure	2.52
	<u>        </u>		<u>        </u>
	\$6.90		\$6.90

Week 3

Island Council			
Remuneration	3.00	6 Matches	12
" "	3.00	Bread	2.70
" "	6.00	4 Cigarettes	1.08
		6 doz. pegs	72
		1 Cigarettes	27
		6 lbs Sugar	66
		1 Bag Flour	2.28
		Excess of Income over	
		Expenditure	<u>4.17</u>
	<u>        </u>		
	\$12.00		\$12.00

Week 4

		3 lbs Sugar	33
		1 Cigarettes	27
		1 Tobacco	46
		2 Beef	1.18
		3 lbs Sugar	33
		1 Soap	14
		2 Matches	04
		2 Beef	1.18
Excess of Expenditure			
over Income	<u>3.93</u>		
	\$3.93		<u>        </u>
			\$3.93

(B) PLANTER                      FAMILY SIZE = 3Week 1

<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Island Council Wages	1.60	1 Herring	30
" " "	1.60	1 Sardines	20
" " "	1.60	1 Biscuits	30
" " "	1.60	12 Bread	20
" " "	1.60	1 Corned Beef	43
" " "	1.60	6 Bread	10
" " "	1.60	1 lb Salt	07
		Excess of Income over	
		Expenditure	<u>9.60</u>
	<u>\$11.20</u>		<u>\$11.20</u>

Week 2

Boating/Reefing Wages	70	4 Guitar Strings	50
" " "	70	1 Kerosene	19
" " "	70	2 Sweets	01
Wages for planting Taro	2.60	$\frac{1}{2}$ gal. Benzine	38
		1 doz. Fishing hooks	10
		1 Men's Wear	40
		3 Kerosene	40
		4 Matches	08
		2 Corned Beef	80
		2 Mackerel	40
		Excess of Income over	
		Expenditure	<u>1.44</u>
	<u>\$4.70</u>		<u>\$4.70</u>

Week 3

Boating	2.90	2 Beef	50
		1 Powder	70
		4 lbs Sugar	36
		2 Soap	28
		$\frac{1}{2}$ gal. Benzine	38
		3 Batteries	48
		$\frac{1}{2}$ lb Biscuits	<u>20</u>
	<u>\$2.90</u>		<u>\$2.90</u>

Week 4

Sale of Taro	5.00	1 small Flour	2.20
		3 pkt Dripping	60
		1 Soap	28
		1 Yeast	70
		Pictures	30
		1 Kerosene	19
		Tobacco	28
		Pictures	30
		Excess of Income over	
		Expenditure	<u>15</u>
	<u>5.00</u>		<u>\$5.00</u>

(C) PLANTER, PLOT OWNERFAMILY SIZE = 4Week 1

<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Cash in Hand	5.00	2 Tinned Meat	88
		3 Cigarettes	81
Orange Receipts	7.80	1 Biscuit	3.80
		2 Herrings	60
Island Council Wages	9.00	2 lbs Salt	14
		2 Dripping	56
Remittances	3.00	2 Meat	88
		1 Mackerel	27
		Pictures	30
		2 Cigarettes	58
		2 Herrings	66
		2 lbs Biscuits	68
		2 lbs Sugar	20
		5 Homebrew	1.00
		1 Cigarettes	29
		1 Tobacco	49
		1 Paper	03
		1 Matches	20
		Pictures	90
		1 Softdrinks	15
		2 Meat	88
		2 lbs Salt	14
		Excess of Income over	
		Expenditure	<u>10.36</u>
	<u>\$24.80</u>		<u>\$24.80</u>

Week 2

Mon. Island Council	6.00	2 Meat	88
		2 Cigarettes	58
		3 Meat	1.32
		2 Cigarettes	58
		2 Meat	88
		Pictures	30
		1 Kerosene	20
		1 Cigarettes	29
		5 Beer	1.00
		3 Meat	1.32
		1 Tobacco	49
		1 Paper	03
		1 Matches	02
		Pictures	70
		3 Meat	1.32
		2 Fish	1.22
Excess of Expenditure over Income	<u>5.13</u>		
	<u>\$11.13</u>		<u>\$11.13</u>

Week 3

Boating/Reefing	1.40	1 Tobacco	49
		1 Paper	03
		1 Matches	02
Oranges	5.51	6 lbs Sugar	60
		1 Coffee	48
		1 Butter	48
		Pictures	30
		1 Fish	27
		Pictures	40
		Excess of Income over	
		Expenditure	<u>3.84</u>
	<u>        </u>		
	\$6.91		\$6.91

Week 4

Island Council	9.00	1 Meat	44
		1 Tobacco	49
		1 Paper	03
Boating/Reefing & Island Council	2.45	1 Matches	02
		1 Meat	43
		1 Fish	27
		Pictures	50
		2 Cigarettes	58
		1 Matches	02
		5 Homebrew	1.00
		Pictures	50
		Excess of Income over	
		Expenditure	<u>7.17</u>
	<u>        </u>		
	\$11.45		\$11.45

(D) PLANTER, PLOT OWNERFAMILY SIZE = 3

		<u>Week 1</u>	
<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Cash in Hand	6.00	1 Tobacco	49
		1 Tea	40
Boating/Reefing Wages	2.20	Spaghetti	15
		2 Meat	88
		Corned Beef	56
		1 Herring	33
		2 Cigarettes	58
		6 Cigarette papers	18
		4 Matches	08
		4 lbs Sugar	36
		Excess of Income over	
		Expenditure	<u>4.19</u>
	<u>        </u>		
	\$8.20		\$8.20
		<u>Week 2</u>	
Boating/Reefing	2.25	1 Tobacco	42
		3 Cigarette Papers	09
		1 Meat	44
		Excess of Income over	
		Expenditure	<u>1.30</u>
	<u>        </u>		
	\$2.25		\$2.25
		<u>Week 3</u>	
Orange Receipts	9.85	3 lbs Rope	99
		2 Corned Beef	86
		1 Casserole	34
		1 Stew	20
		1 Cooking Oil	84
		1 Tobacco	42
		3 Cigarette papers	09
		3 Matches	06
		Excess of Income over	
		Expenditure	<u>6.05</u>
	<u>        </u>		
	\$9.85		\$9.85

(E) PLANTER, PLOT OWNER, CASUAL LABOURERFAMILY SIZE = 2

		<u>Week 1</u>	
<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Cash in Hand	4.00	6 lbs Sugar	60
Orange Receipts	5.00	2 Meat	43
Public Works Wages	10.00	1 Butter	42
		1 lb Onions	10
		Pictures	30
		2 lbs Sugar	18
		1 Gallon Benzine	78
		3 Meat	1.32
		6 lbs Sugar	60
		2 Meat	88
		1 Butter	42
		Vodka	3.00
		1 Carton Beer	3.50
		Pictures	30
		2 Meat	88
		Excess of Income over	
		Expenditure	<u>5.29</u>
	<u>\$19.00</u>		<u>\$19.00</u>
		<u>Week 2</u>	
Ministry of Works	17.00	3 lbs Sugar	60
		1 Meat	44
		1 Coffee	50
		1 Butter	42
		1 Cheese	20
		1 Fish	66
		2 lbs Onions	20
		Bread	20
		2 lbs Rice	20
		Soap	20
		1 Cigarettes	29
		1 Carton Beer	3.50
		1 Bottle Whiskey	3.00
		Excess of Income over	
		Expenditure	<u>6.59</u>
	<u>\$17.00</u>		<u>\$17.00</u>

Week 3

Public Works Wages	10.00	Pictures	30
		4 lbs Sugar	40
Orange Receipts	5.28	2 Meat	88
		4 Meat	1.76
		Pictures	30
		1 Vodka	3.50
		1 Gallon Petrol	78
		Excess of Income over	
		Expenditure	<u>7.36</u>
	<u>15.28</u>		<u>15.28</u>

Week 4

Public Works Wages	11.00	2 Meat	88
		5 lbs Sugar	50
		1 Matches	28
		Pictures	20
		1 Benzine	78
		2 Fish	56
		1 lb Butter	42
		2 lbs Rice	20
		6 Cans Beer	90
		Pictures	30
		2 Soap	44
		2 Biscuits	56
		1 Coffee	52
		Excess of Income over	
		Expenditure	<u>4.46</u>
	<u>11.00</u>		<u>11.00</u>

(F) PLANTER, PLOT OWNER, PROFESSIONALLY EMPLOYEDFAMILY SIZE = 10

<u>Week 1</u>			
<u>Income</u>	<u>\$. c.</u>	<u>Expenditure</u>	<u>\$. c.</u>
Cash in Hand	25.00	Motor Cycle Deposit	50.00
		2 Tobacco	54
Coffee	39.00	1 Casserole	31
		1 Corned Beef	55
Salary	31.00	2 lbs Onions	24
		1 Spaghetti	20
		1 Corned Beef	43
		3 Ice Cream	30
		Village Collection	4.00
		1 Corned Beef	43
		1 Corned Beef	45
		12 Bread	20
		2 Envelopes	02
		1 Cigarettes	25
		1 Match	02
		E.D.F. Loan	2.00
		Motor Cycle Deposit	5.00
		P. Puruto. (Goods)	4.17
		Co-op. Store	10.65
		Pictures	30
		1 Beef	45
		2 Softdrinks	26
		1 Corned Beef	44
		Cigarettes & Matches	27
		1 Corned Beef	43
		1 Cigs & Matches	27
		2 Butter	68
		1 Cut Bread - 1 tin	3.55
		1 gal. Home Brew	1.00
		2 Herrings	62
		2 Tobacco	54
		4 Corned Beef	1.76
		Bread	30
		Pictures	30
		Excess of Income over	
		Expenditure	<u>4.07</u>
	<u>\$95.00</u>		<u>\$95.00</u>

Week 2

	2 Singlets	1.84
	4 Corned Beef	1.76
	1 Irish Stew	24
	1 Casserole	45
	Pictures	30
	1 Towel	80
	1 Hair Oil	30
	6 lbs Sugar	54
	2 lbs Malt	50
	2 Tobacco	54
	1 Cheese	23
	1 Soap	20
	1 Milk	55
	1 Beef	45
	1 Bag Flour	2.25
	5 yds Paren	3.75
	1 Razor Blades	25
	1 Casserole	45
	1 Cigs & Matches	29
	2 Tobacco	54
	2 lbs Onions	20
	1 Softdrink	13
	1 Cigarettes	25
	3 Batteries	57
	2 Cigarettes	50
	2 Matches	04
	Village Collection	3.40
	2 Tobacco	54
	2 Corned Beef	90
	2 Irish Stew	48
	1 Cheese	27
	1 Ice Cream	10
	Pictures	60
Excess of Expenditure over Income	<u>24.21</u>	<u>        </u>
	\$24.21	\$24.21

Week 3

Citrus Receipts	6.00	2 Tobacco	54
		2 - 12 ozs Corned Beef	90
Citrus Receipts	33.19	Bread	20
		1 medium Cut	27
Salary	31.00	1 Cigarettes 1 Match	27
		Tractor hire	3.00
		2 Gunny Sacks	50
		E.D.F. Loan	2.00
		Housing Loan	6.00
		Motor Cycle Deposit	30.00
		8 lbs suag @ 9c.	72
		2 lbs Malt @ 27c.	54
		4 lbs Sugar @ 10c.	40
		2 - 12 ozs Corned Beef	90
		2 Cigarettes & 1 Match	52
		2 - 1lb Corned Beef	1.10
		2 lbs Rice	28
		1 gal. Home Brew	1.00
		6 lbs Sugar @ 9c.	54
		2 lbs Malt	50
		Church Collection	30
		Excess of Income over	
		Expenditure	<u>19.71</u>
	<u>        </u>		
	\$70.19		\$70.19

Week 4

Coffee Receipts	12.81	2 Tobacco	54
		1 Casserole	31
		1 Spaghetti	25
		2 lbs Sugar	20
		1 Soap	14
		1 Spaghetti	31
		1 lb Onions	14
		2 lbs Sugar	20
		1 lb Rope	33
		1 Cigarette & Match	27
		Picture show	10
		1 lb Cut bread	30
		1 Vaiora	14
		1 Cigarettes	25
		2 Ice Cream	20
		4 lbs Sugar	40
		1 Soap	25
		2 lbs Rice	28
		2 Cigarettes	50
		1 Corned Beef	44
		2 Medium Tobacco	54
		Pictures	90
		2 Soft drinks	26
		4 lbs Malt	1.00
		7 lbs Sugar	77
		Excess of Income over	
		Expenditure	<u>3.79</u>
	<u>        </u>		
	\$12.81		\$12.81

BIBLIOGRAPHYUnpublished Works

- Allen B.J., 1969, The Development of Commercial Agriculture on Mangaia, Social and Economic Change in a Polynesian Community. MA Thesis, Massey University.
- Bassett, I.G., 1965, Population and Land Use on Aitutaki (Ms and maps), Massey University.
- Belshaw, H. and Stace, V.D., 1955, A Programme for Economic Development in the Cook Islands. (cyclostyled). Dept. of Maori and Island Affairs, Wellington.
- Burgess, G.J., 1947, The Impact of Western Economic Life upon the Cook Islands. MA Thesis, Canterbury University, Christchurch.
- Crocombe, R.G., n.d., Excerpts from early writings of travellers and missionaries on Atiu including Gill, C.J., LaMont, Nightingale Williams, J., & Harris G. Vaine Rere, Teenui Village, Atiu.
- Dare, A.O. and Stracey, D.M., 1961, Report on Financial Aspects of the Citrus Replanting Scheme in the Cook Islands. (cyclostyled). Dept. of Maori and Island Affairs, Wellington.
- Douglas, E.M.K., 1965 Migration of Cook Islanders to New Zealand. MA Victoria University of Wellington.
- Fletcher, W.A., 1959, A Report on Citrus Growing in the Cook Islands. (cyclostyled). Dept. of Maori and Island Affairs, Wellington.
- Food and Agricultural Organisation, 1950, World Census of Agriculture: Report on the Cook Islands. Dept. of Maori and Island Affairs, Wellington.
- Gerlach, J.C., 1953, Interim Report: An Agricultural Survey of Rarotonga, Aitutaki and Atiu. (cyclostyled), Dept. of Maori and Island Affairs, Wellington.
- \_\_\_\_\_ 1954, Report on an Agricultural Survey of the Lower Cook Group (cyclostyled). Dept. of Maori and Island Affairs, Wellington.
- \_\_\_\_\_ 1956, Report on an Agricultural Survey of the Northern Cook Group. (cyclostyled). Dept. of Maori and Island Affairs, Wellington.
- Gilson, R.P., 1952, Administration of the Cook Islands. MSc Thesis, University of London. Alexander Turnbull Library, Wellington.
- Jolliffe, W.H., 1953, Forestry in the Cook Islands. Dept. of Maori and Island Affairs, Wellington.
- \_\_\_\_\_ 1957, Supplement to Forestry in the Cook Islands. Dept. of Maori and Island Affairs, Wellington.
- Kolff, J., 1965 The National Income of the Cook Islands, MA Thesis, Victoria University of Wellington.
- Mathews, L.J., n.d. Weed Control Cook Islands. (cyclostyled). Dept. of Maori and Island Affairs, Wellington.

Unpublished Works

- Rere, V., n.d. Extracts on Atiu from numerous official sources.
- Sadaraka, S.M., 1961, Factors affecting the Development of Commercial Agriculture in the Cook Islands. MA Thesis, Victoria University of Wellington.
- Stone, D., 1967, Political Resurgence in the Cook Islands: The Path to Self-Government (2 vols.). MA Thesis, Auckland University.
- Tiller, L.W., 1958, Agricultural Problems and the Scope for Agricultural Research in the South Pacific Islands. Dept. of Maori and Island Affairs, Wellington.

Published Works

- Allen, B.J., 1968, Agricultural Development Programmes in the Cook Islands. Comment, 37.
- Baker, M.B., 1952, Citrus Growing in the Cook Islands. N.Z. Sci. Review 10, 185-187.
- Barrau, J., 1958, Subsistence Agriculture in Melanesia.
- \_\_\_\_\_ 1960, Plant Introduction in the Tropical Pacific: Its Role in Economic Development. Pac. View. 1: 1-10.
- \_\_\_\_\_ 1961, Subsistence Agriculture in Polynesia and Micronesia. Bernice, P. Bishop, Mus. Bulletin 223.
- \_\_\_\_\_ 1963, Plants and Migration of Pacific Peoples.
- \_\_\_\_\_ 1965, Le Humide et le Sec. J. Polynes. Soc. 74, 329-346
- Bassett, I.G., 1965, Transport and Development in the Cook Islands. N.Z. Geogr. Soc. Record 40: 10-13.
- \_\_\_\_\_ 1967, South Pacific Perspective: Cook Islands at Independence.
- \_\_\_\_\_ (ed) 1968, Pacific Peasantry. Case Studies of Rural Societies
- Basset, I.G. and Thomson, K.W., 1968, Land Use and Agrarian Change on Aitutaki. S. Pacif. Bulletin 18: 25-30
- Beaglehole, E., 1947, Trusteeship and New Zealand's Pacific Dependencies. J. Polynes. Soc. 56, 128-157.
- \_\_\_\_\_ 1948, Social and Political Changes in the Cook Islands. Pac. Affairs XXI: 4, 384-398
- \_\_\_\_\_ 1958, Social Change in the South Pacific: Rarotonga and Aitutaki.
- Beckett, J., 1964, Social Change in Pukapuka. J. Polynes. Soc. 411-430
- Belshaw, G.S., 1964, Changing Melanesia: The Social Economics of Culture Contact.
- \_\_\_\_\_ 1966, Traditional Exchange and Modern Markets.
- Belshaw, H., 1955, The Communities Project Approach to Economic Development. S. Pac. Comm. Tech. Paper 84.
- \_\_\_\_\_ 1960, Some Pacific Island Problems. Pac. View. 1: 125-142

- Britten, E.J., 1968, The Problem of Agricultural Education in the South Pacific. S. Pacif. Bulletin, 18: 21-25
- Bohannan, P., 1963, Land, Tenure, and Land Tenure. In Beiryuk, R. (ed). 1963 African Agrarian Systems.
- Boserup, E., 1965, The Conditions of Agricultural Growth: The Economics of Agrarian Growths under Population Pressure.
- Canter-Visscher, J.W., 1963, Growing Pineapples on Mangaia. S. Pacif Bulletin 13.
- Cook Islands Review, 1952-69, Monthly News Review.
- Crocombe, R.G., 1961, A Modern Polynesian Cargo Cult. Man. 28: 1-2
- \_\_\_\_\_ 1961, Land Tenure in the Cook Islands. A symposium on Land Tenure Problems. Tenth Pac. Sci. Congress, Honolulu.
- \_\_\_\_\_ 1962, Development and Regression in New Zealand's Island Territories. Pac. View 3: 17-32
- \_\_\_\_\_ 1964, Land Tenure in the Cook Islands.
- \_\_\_\_\_ 1965, The M. 'Buke Co-operative Plantation. New Guinea Research Bulletin 7.
- \_\_\_\_\_ 1967, From Ascendency to Dependency: The Politics of Atiu. J. Pac. Hist. 2: 97-111
- \_\_\_\_\_ 1968, Improving Land Tenure. S. Pac. Comm. Tech. Paper 159.
- Cumberland, K.B., 1948, New Zealand's Pacific Island Neighbourhood. The Post War Agricultural Prospect. N.Z. Geogr. 5: 1-18.
- \_\_\_\_\_ 1951, Geography and Land Use Survey in the Southwest Pacific: A Review and Suggestion. N.Z. Geogr. 7: 139-153.
- \_\_\_\_\_ 1954, Southwest Pacific.
- \_\_\_\_\_ 1962, The Future of Polynesia. J. Polynes. Soc. 386-396
- Curson, P.H., 1968, Some Demographic Aspects of Cook Islanders in Auckland. Proc. 5th New Zealand Geogr. Soc. Conference, 67-74
- \_\_\_\_\_ 1968, Avarua, Cook Islands. S. Pacif Bulletin 18: 41-47
- \_\_\_\_\_ 1970, The Cook Islanders in Thomson, K.W. and Trlin, A.D. (ed). Immigrants in New Zealand, 168-195
- Dalton, G., 1961, Economic Theory and Primitive Society. Am. Anthropol. 61: 1-25.
- Douglas, E.M.K., and Johnston, K.M., 1965, Cook Islands: Implications for Independence. Comment 25: 11-13
- Emerson, J.S., 1902, The Pua Game of Atiu. J. Polynes. Soc. 11: 191
- Evans, F.C., 1956, Ecosystem as the Basic Unit in Ecology. Science, 123: 1127-1128.
- Essai, 1961, Papua and New Guineau.
- Firth, R., 1939, Primitive Polynesian Economy.

- Firth, R., 1957, We the Tikopia.
- \_\_\_\_\_ 1959, Social Change in Tikopia.
- \_\_\_\_\_ 1963, Money, Work and Social Change in Indo-Pacific Economic Systems. Social Change in Economic Development, UNESCO.
- \_\_\_\_\_ 1963, Essays on Social Organisation and Values.
- Fisk, E.D., 1962, Planning in a Primitive Economy: Special Problems of New Guinea. Econ. Record 39: 462-478
- Fosberg, F.R. (ed), 1963, Mans Place in the Island Ecosystem.
- Foster, G.M. 1962, Traditional Cultures and the Impact of Technological Change.
- \_\_\_\_\_ 1965, Peasant Society and the Image of Limited Good. Am. Anthropol 67: 293-315
- Fox, J.W., 1948, New Zealand and the Pacific: Some Strategic Implications. N.Z. Geogr. 4: 15-28
- Geertz, C., 1966, Agricultural Involution: The Process of Ecological Change in Indonesia.
- Gilson, R.P., 1950, Some Administrative Problems in the Cook Islands. S. Pacif. Bulletin 4: 12.
- \_\_\_\_\_ 1954, The Foundations of Cook Island Land Policy. S. Pacif. Bulletin 7: 948-955.
- Gerlach, J.C., 1958, Tropical Agriculture.
- Gourou, P., 1959, The Tropical World.
- Grange, L.I. and Fox J.A., 1953, Soils of the Lower Cook Group. N.Z.D.S.I.R. Soil Bureau Bulletin 8.
- Hagen, E., 1962, On the Theory of Social Change: How Economic Growth Begins.
- Herskovits, M.J., 1955, Cultural Anthropology.
- Hogbin, I., 1958, Social Change.
- Hogbin I., and Lawrence, P., 1967, Studies in New Guinea Land Tenure.
- Hooper, A.B., 1961, Migration of Cook Islanders to New Zealand. J. Polynes. Soc: 11-18
- \_\_\_\_\_ 1961, Cook Islanders in Auckland. J. Polynes Soc: 147-194
- Hoselitz, B.F., 1963, Main Concepts of the Analysis of the Social Implications of Technical Change. In Hoselitz, B.F., and Moore W.E. (ed), Industrialisation and Society.
- Johnston, K.M., 1962, Research Notes, Social and Economic Change in the Cook Islands. Pac. View. 2: 101-103.
- \_\_\_\_\_ 1967, Village Agriculture in Aitutaki. Pac. View. Monograph 1.
- Johnson, W.B., 1951, The Citrus Industry of the Cook Islands.
- \_\_\_\_\_ 1953, Land, People and Progress in the Cook Islands. Econ. Geogr. 2: 107-124.

- Johnson, W.B., 1959, The Cook Islands. J. Trop. Geogr.
- Kolff, J., 1965, The Economic Implications of Self-Government for the Cook Islands. J. Polynes. Soc. 74: 119.
- Kai Kai Iwasi, 1959, Problems resulting from Participation in Economic Development, with reference to Land Tenure and growing of permanent crops. S. Pac. Forum: 17-21.
- Lamont, E.H., 1967, Wild Life Among the Pacific Islanders.
- Leibenstein, H., 1957, Economic Backwardness and Economic Growth.
- Marshall, P., 1930, The Geology of Rarotonga and Atiu. Bernice P. Bishop, Mus. Bulletin 72, Honolulu.
- Massal, E. and Barrau, J., 1956, Food Plants of the South Pacific. S. Pac. Comm. Tech. Paper 94.
- McArthur, N., 1961, Population and Social Change: The Prospect for Polynesia. J. Polynes. Soc. 70: 393-400
- \_\_\_\_\_ 1964, Contemporary Polynesian Migration from Samoa and the Cook Islands. J. Polynes. Soc. 73: 336-337
- \_\_\_\_\_ 1966, Essays in Multiplication: European Seafarers in Polynesia. J. Pac. Hist. 1: 91-105
- Moore, W.E., 1955, Economy and Society.
- Northey, I.F., 1965, Self-Determination in the Cook Islands, J. Polynes. Soc. 74: 112-119
- New Zealand Meteorological Service, 1963, Meteorological Notes 3B, Cook Islands.
- Peren, G., 1947, Agriculture of Samoa, Cook Islands and Fiji.
- Pitt, D., 1961, Some Obstacles to Economic Development in Fiji and Island Polynesia. J. Polynes. Soc. 71: 110-116.
- Redfield, R., 1956, Peasant Society and Culture.
- Sahlins, M.D., 1958, Social Stratification in Polynesia.
- \_\_\_\_\_ 1962, Ecology and Anthropology: A Symposium. Am. Anthropol. 64: 15-59.
- \_\_\_\_\_ 1964, Culture and Environment.
- \_\_\_\_\_ 1965, Variation and Adaptability: A Symposium. Am. Anthropol. 67: 400-443.
- Salisbury, R., 1962, From Stone to Steel.
- Schwimmer, E., 1965, The Cognitive Aspects of Culture Change. J. Polynes. Soc. 74: 149-181
- Schultz, I., 1964, Transforming Traditional Agriculture.
- Sloan, N.R., 1954, Leprosy in Samoa and the Cook Islands. S. Pac. Comm. Tech. Paper 69.
- Smelser, N.J., 1963, Mechanisms of Change and Adjustments to Change. In Hoselitz, B.F. and Moore, W.E. (ed), Industrialisation and Society.
- Stace, V.D., 1954, The Pacific Islander and Modern Commerce. S. Pac. Comm. Tech. Paper 54.

- Stace, V.D., 1955, Economic Survey of Western Samoa. S. Pac. Comm. Tech. Paper 91.
- Steward, J., 1965, Theory of Cultural Change.
- St. John, H., 1958, Nomenclature of Plants.
- Stone, D., 1965, The Rise of the Cook Islands Party. J. Polynes. Soc. 74: 80-111.
- \_\_\_\_\_ 1965, Self Government in the Cook Islands. J. Pac. Hist. 1: 168-177.
- Summerhayes, C.P., 1967, Bathymetry and Topographical Lineation in the Cook Islands. N.Z. J. Geol. and Geophys. 6: 1382-1399.
- Tempany, H. and Grist, P.H., 1958, An Introduction to Tropical Agriculture.
- Tully, J., 1967, Agricultural Extension in Developing Countries. S. Pacif. Bulletin 17: 21-16.
- Ward, R.G., 1961, A Note on Population Movements in the Cook Islands. J. Polynes. Soc. 71: 1-11.
- \_\_\_\_\_ 1965, Land Use and Population in Fiji.
- Watters, R.F., 1960, The Nature of Shifting Cultivation. A Review of recent Research. J. Trop. Geogr. 14: 35-50
- \_\_\_\_\_ 1961, Problems of Development in Fiji. Pac. View 2: 155.
- Wolf, Peasants.
- Wood, B.L., 1967, The Geology of the Cook Islands. N.Z. J. Geol. and Geophys. 6: 1429-1445.
- Wright, A.C.S., 1963, Soils and Land Use of Western Samoa. D.S.I.R. Soils Bureau Bulletin 22.
- Zimmerman, H., 1964, Introduction to World Resources.

#### Government Records

- Cook Islands Department of Agriculture Records.
- Cook Islands Department of Health Records.
- Cook Islands Department of Justice Records.
- Cook Islands Fruit Control Records and Files.
- Cook Islands Internal Affairs Records.
- Cook Islands Land Court Records.
- Cook Islands Treasury Records.
- Atiuan Administration Records.
- Atiuan Fruit Control Records and Files.
- New Zealand Department of Maori and Island Affairs: Records and Files, Wellington.

Maps

New Zealand Dept. of Lands and Survey, 1958. Aerial Photograph of Atiu.

Hunt, P.J., 1969, Topographical Map of Atiu. Photogrammetry Dept.,  
Otago University, Dunedin.

Cook Islands Survey Department - Cadastral Map of Atiu.

Cook Islands Survey Department 1968 - Maps of the Cook Islands.