THE VALUATION OF SUBSISTENCE USE OF TROPICAL RAINFOREST ON THE ISLAND OF CHOISEUL, SOLOMON ISLANDS:

A COMPARISON BETWEEN SUBSISTENCE VALUES AND LOGGING ROYALTIES

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To the villagers of Nukiki:

For I was hungry and you gave me something to eat;
I was thirsty and you gave me drink;
I was a stranger and you took me in.

Matthew 25:35

ABSTRACT

This thesis values village subsistence use of tropical rainforest and examines the socio-economic impact of rainforest logging on the island of Choiseul in the Solomon Islands.

The destruction of tropical rainforest has become a matter of major international concern. Despite strong opposition to it, tropical rainforest clearance continues at an alarming rate. Economically one of the reasons for this continued destruction is that the immediate financial benefits to be gained from the exploitation of the forest often appear to far outweigh the perhaps greater long term benefits to be gained by a lesser, but more sustainable, form of use. Considerable environmental and social costs are often incurred through forest destruction but these are not always borne by those who have profited from the destruction.

Very little research has been undertaken in the Pacific to quantify the impact of tropical rainforest logging on rural village communities. In an attempt to redress this, some four and a half months were spent in the Solomon Islands during 1991 researching and then valuing the subsistence use of tropical rainforest. The field work was undertaken in the villages of Nukiki and Kuku on the island of Choiseul. The villagers were heavily reliant on the subsistence use of the rainforest for their livelihood. Values calculated for these uses were quite substantial at $10,512.15 per annum for the average sized (seven member) household.

Using information from Nukiki and applying it to the village of Kuku, where a logging operation had trespassed on village land, it was clear that the villagers had been severely disadvantaged when their land was logged. For example, one area of 41 hectares near Kuku village, was calculated to have yielded 2,018 cubic metres in merchantable logs. The villagers were to be paid $9.00 per cubic metre which would give them a once-only royalty payment of $18,162.18. Subsistence losses from the same area were reported to be four garden sites, six nari and sulu nut trees, 21 betel nut trees, 346 sago palms and approximately 25 percent of the villagers' other useful trees such as those used for housebuilding, canoe making, medicine and food. This loss in subsistence production would be sustained over many years and was calculated to have a present value of $176,613.13. The net loss suffered by the village as a whole was therefore $158,450.95, or a substantial $7,545.28 for each of the 21 households.

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PREFACE

This thesis attempts to identify and value the subsistence use of tropical rainforest by the people of a Solomon Island village. Values derived are applied to subsistence losses suffered by a second village during logging. The value of these losses are then compared with estimated logging royalty payments.

In Chapter 1, tropical forestry as an environmental issue, is discussed in global terms whereas in Chapter 2 the tropical rainforests of Melanesia, and man's use of these forests, are examined more closely. The Solomon Islands government's efforts to develop forestry policy appropriate to the needs of an emergent nation are summarised in Chapter 3 and in Chapter 4 the research location and research methods used in the study are introduced. Chapter 5 identifies subsistence use of the forest by the villagers of Nukiki and in Chapter 6 these uses are valued. The socio-economic impact of logging on the nearby village of Kuku is examined in Chapter 7 by applying valuation data from Nukiki to the subsistence losses suffered by Kuku villagers through logging. These losses are then compared with estimated logging royalty payments. Finally, a short conclusion and summary of the thesis is provided in Chapter 8.

CHAPTER 1

TROPICAL FORESTRY: AN ENVIRONMENTAL ISSUE

The Global Environmental Movement

By the 1990's the environmental movement had attained a relatively high degree of international respectability. In its struggle to be heard the movement had gathered a considerable following, particularly among the more privileged societies of the developed world. In many respects the geographical frontiers of these nations had been overcome. Consequently the pioneering spirit of conquest and exploitation that they had so often exhibited in the enterprise of nation building, was now held in disrepute, at least in the minds of the environmentally and socially conscious.

Although it had its roots in the second half of the nineteenth century, the true environmental revolution did not occur until after World War II, with the period of greatest change after 1962 (McCormick, 1989:vii). In many respects the emergence of the movement was the result of a culmination of a number of seemingly unrelated events. These included a reaction to affluence, a fear of nuclear fallout and the considerable impact of a number of nuclear disasters. Combined, these raised public awareness of the destructive use of the environment and the long term impact this could have on mankind's ability to survive. A number of timely publications perhaps served to crystallise public opinion and the culmination of these events was to give birth to a movement which "of all the conceptual revolutions of the twentieth century, few have wrought so universal or so fundamental a change in human values as the environmental revolution" (McCormick, 1989:vii).

Faced with an often hostile array of developers, bureaucrats and other decision makers, it did not take long for the environmentalists of the 1970's to realise that the successful manipulation and use of the media was very effective in bringing about a rapid change in public and corporate attitudes. Such methods, of course, were not new. However, by the 1990's the by-now familiar pattern of identifying environmentally destructive practices and then criticising them extensively through the media, had achieved remarkable results, not only on a case by case basis but also in effecting the desired change in public and corporate attitudes.

Despite the success of the environmental movement there was a major flaw in its overall strategy. Essentially it did not tackle the underlying cause of continued environmental destruction which is the insatiable desire of the world industrial economy for natural resources. Put simply, under the current world economic system where supply and demand determine price, it is often more immediately profitable to exploit natural resources than it is to conserve them (Hardin and Baden, 1977:77). There are, however, considerable costs incurred through environmental destruction but often these are not borne by those who have profited from the destruction in the first place.

A growing recognition of this problem led to the evolution of environmental assessment procedures and following this, environmental economics. Realising that current economic analysis had failed to incorporate the social and ultimately financial costs of environmental destruction into its equations economists set about trying to value, in financial terms, the benefits bestowed upon society of an intact, or at least sustainable, environment. A growing acceptance of these practices by governments and international bodies is a testimony to the increasing impact environmental economics is having on formal sector and project planning in particular (Cleave, 1988:44-47).

Natural Resource Exploitation and International Terms of Trade

By the 1980's a number of economic observers were prophesying that the world would move increasingly towards a common global economic system, if not unified in detail at least driven by similar economic forces. The collapse of Eastern Europe's communist economic system tended to give credence to these views as also did the observed subsumption of so-called traditional subsistence economies by an increasingly dominant capitalist system. In the less developed countries of the world incorporation into this economic system was to have a dramatic impact, not only on their traditional lifestyles, but also on the environment in which they lived.

The introduction of western technology, for example, the iron axe, was recognised as providing a catalyst for change in many traditional societies (Bennett, 1987:33-38; Spicer, 1952:23-32), although to attribute all change to this factor alone would be quite inaccurate. Nevertheless, as traditional societies steadily acquired a taste for the fruits of western technology and its associated way of life, they changed, adapting and

assimilating the new with the traditions of the old. With the passage of time they were also inexorably drawn into the western economic system. There was, however, a cost to this for in order to obtain the perceived benefits of western society it became increasingly necessary to have something to exchange for them. Invariably this turned out to be labour and, if they were 'fortunate,' natural resources, for many traditional societies had little else to barter that was of value to western economies. Thus a world wide pattern of exchange and trade developed whereby the less developed nations would typically provide labour and raw materials to industrialised nations in exchange for manufactured goods, education, technology, western medicine and other 'civilising' benefits (Harrison, 1988:97-99).

The injustices and inequalities inherent in this pattern of exchange and trade have been well debated and, at the macro level at least, are outside the scope of this study. What will be examined, however, is the exploitation of a particular natural resource, tropical rainforest, and the cost of this exploitation to an indigenous subsistence society that depended on it for their livelihood.

The Destruction of Tropical Rainforest

The destruction of tropical rainforest has become a matter of major international concern and despite strong opposition to it by the conservation lobby, it continues at an alarming rate. The reason for this continued destruction is usually economic insofar as the immediate financial benefits gained from the exploitation of the forest may far outweigh the perhaps greater long term benefits to be gained by a lesser but more sustainable form of use. Considerable environmental and social costs are often incurred through forest destruction but these are not always borne by those who profited from the destruction in the first place.

An examination of the reasons why Papua New Guinean landowners allowed companies to exploit their timber resources concluded that there was an overriding desire for the basic infrastructure of development such as roads, bridges and wharves (Mitio, 1984:38-41). For this, however, the landowners often paid an inordinately high price, for example, a considerable portion of their means of subsistence, although often this was not appreciated until afterwards.

Literature on the harmful effects of deforestation in the Pacific is now becoming more common (e.g. Abana, 1989; Pernetta and Hill, 1982), but very little has been done to quantify the effect of this damage in environmental, social or even financial terms. This study, therefore, attempts to do this by identifying and valuing subsistence use of a tropical rainforest by a particular Solomon Island village, that of Nukiki on the island of Choiseul. A logging trespass in the nearby village of Kuku is also examined and the subsistence uses lost by the villagers are recorded and valued using data obtained from Nukiki. This gives some indication of the true cost of logging to the villagers of Kuku in terms of lost livelihood.

When considering the motivating factors behind the sale of tropical rainforest cutting rights it would not be unreasonable to assume that forest owners are motivated by a desire to improve their position in some way, either by obtaining cash (and thus the ability to purchase some of the benefits provided by the cash economy), or by obtaining infrastructure such as roads or wharves (which gives them access to markets and thus a similar ability to earn cash). As Mitio (1984:38-41) recorded, however, the true cost of logging, in terms of lost livelihood, is often not appreciated until afterwards. One could therefore argue that a more realistic assessment of the value of the forest may have been made had its non-timber benefits been valued in the same manner as the timber. Costly mistakes, in terms of environmental destruction and social dislocation, might then have been more readily avoided.

In forestry terms it is relatively easy to place a value on standing timber (ie. timber trees). Put simply it is just a matter of deducting processing, handling, shipping and logging costs from the appropriate market value of that particular derived wood product. Thus a forest can be readily valued for its timber content and in fact this has been the usual method of attributing financial value to tracts of forest.

Although it has long been appreciated that forests offer benefits to society other than timber, it has always been difficult to value these because they are not always 'products' that are traded on a market. In other words they have no market value so tend to be overlooked when valuing the forest. Different societies have different perceptions of their forests, but in western terms some of the non-timber benefits include erosion control, maintenance of water purity, the provision of habitat areas for wildlife and other fauna and flora, the provision of recreational opportunities, aesthetic value and of course the maintenance of the biosphere. In terms of a subsistence society

who depend directly on the forest for their livelihood, the value of the forest to these people is more immediate for from it they obtain, for example, their food, firewood, house and canoe building material, medicine and implements. Other values of cultural importance also exist. With the development of environmental economics the tools now exist to place a value, albeit in western economic terms, on these other non-timber aspects of the forest. As such they can be added to its total value and, if need be, balanced against the value of the forest as a timber resource.

Environmental Economics and the Valuation of Tropical Rainforest

The rationale behind the environmental economics approach has been based on cost-benefit analysis which is used in many quarters to assess the costs and benefits of a given activity. Cost-benefit analysis also takes into account the effect time has on these values insofar as costs or benefits occurring at some time in the future are considered in terms of their present value by discounting at an appropriate interest rate. Conversely a present cost or benefit can be considered as a future value by compounding it by this interest rate. Whereas previously this approach assessed the financial costs and benefits of a particular project it often failed to take into account the wider social and environmental effects the project might have had on the community in which it was located. Some activities or projects caused more harm than good although again this was not always appreciated until afterwards (Roche, 1989:16-21).

Over a period of time increasing emphasis has been placed on trying to value these wider social and environmental factors so that now a distinction is made between a purely financial analysis and an economic analysis. The latter incorporates, as best as it can, these wider factors.

The valuation of the wider social and environmental factors has been termed non-market valuation. It incorporates a number of different techniques (Meister, 1990:18-35; Hufschmidt et al, 1983:66-67 and 170-260). As an economic tool the methods used are relatively new and, in many situations, untested. The valuation of subsistence use of tropical rainforest is a case in point. Although some work has been done on the economic value of non-timber forest products (de Beer and McDermott, 1989:148-156) there is considerable scope for improvement and adaptation in the use of these

techniques. This study is an attempt to adapt and apply a simple variation of non-market valuation to subsistence uses of tropical rainforest by Solomon Island villagers. In order, however, to determine the importance of the forest to the villagers themselves, as opposed to outside interests, it has been necessary to establish its value to them, albeit in western economic terms. A large portion of this study is therefore social in nature, being devoted to describing the villagers' use of the forest and the significance of this use in terms of its contribution to village culture and livelihood.

CHAPTER 2

THE TROPICAL RAINFOREST OF MELANESIA

A Global View

As a child of the 1950's I always associated tropical rainforest with the adventures of Tintin and the erstwhile, if somewhat inebriated, Captain Haddock in the steaming jungles of South America (Herge, 1962). This perception of adventure, danger and intrigue, although highly romanticised, was perhaps not so far from the truth, for the jungles of South America and indeed the tropics as a whole, have become the scene of many a drama as man has sought to possess the riches contained therein.

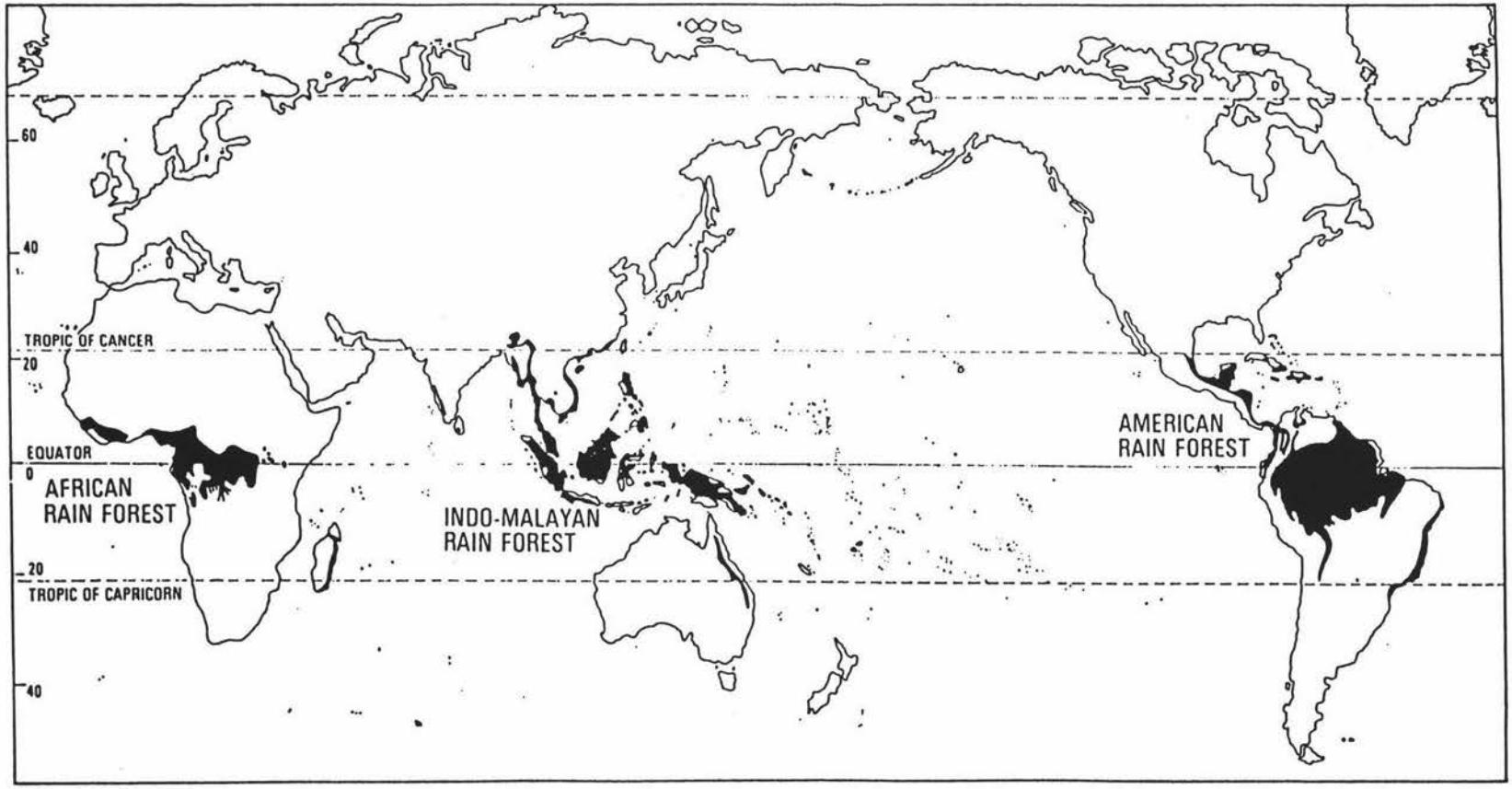
The riches of the tropical rainforest are many and varied but with each succeeding generation the perception of these riches changes. The imprint, however, of human endeavour in the forest remains, often as a mute and sometimes puzzling testimony to the life and aspirations of a long forgotten age.

The rainforests of Melanesia, the subject of this chapter, have had a long history of human use. However, to understand man's impact on these forests it is necessary first to understand where these forests fit within the global context. Once this has been established the human impact on the forest will be considered for it is man's changing use of the forest and his perception of its value, that is the main concern of this study.

The term 'tropical rainforest' was first coined by A.F.W. Schimper in his classic work *Plant Geography* of 1898. Although rainforest occurs outside the tropics Schimper made the distinction between areas where there are seasonal water shortages and the ever-wet tropics, where water shortage is minimal or non-existent. Schimper described tropical rainforest as dry land forest that "is evergreen, hygrophilous in character, at least thirty metres high, rich in thick-stemmed lianes and in woody as well as herbacious epiphytes" (Schimper, 1903:266 from Whitmore, 1975:3).

The tropical rainforests of the world occur in three major blocks (see Figure 2.1). The best known and most extensive are the American rainforests which are centred on

FIGURE 2.1: DISTRIBUTION OF TROPICAL RAINFOREST



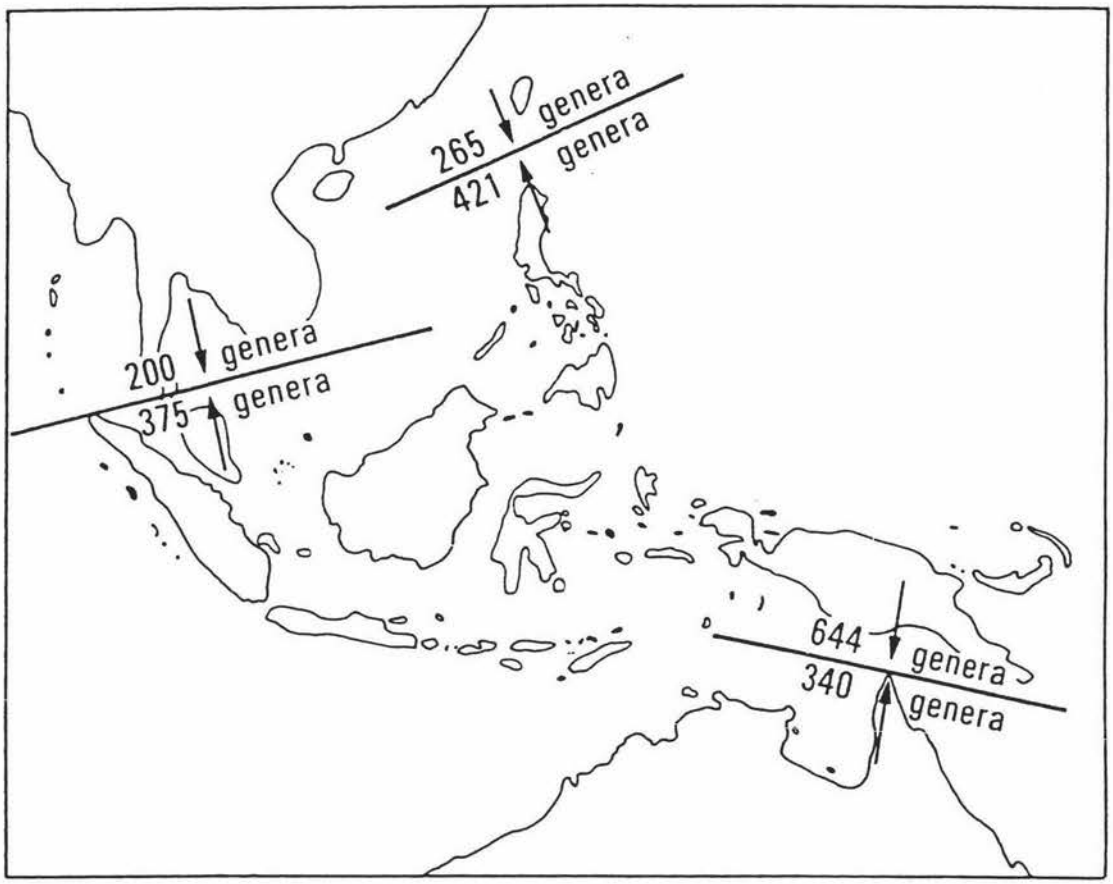
Source: Whitmore, 1975:3

and include the forests of the Amazon Basin. The Indo-Malayan rainforest is the second most extensive block and in the mid 1970's it had been the most extensively modified by timber extraction. The third block is the African rainforest. This is centred on the forests of the Congo Basin (Whitmore, 1975:3-4).

The Indo-Malayan rainforest is, in many respects, similar to the African and American rainforests in structure and species physiognomy. The species contained within each of these forest tracts are, however, entirely different and there are few genera in common (Whitmore, 1975:4). The Indo-Malayan rainforest, or rainforests of the Far East as they are sometimes called, are perhaps the most spectacular of the three tropical rainforest blocks for within them occur forests of the grandest structure and probably the greatest richness in terms of plant and animal life (Whitmore, 1975:4). Within the Indo-Malayan rainforest there are distinct variations in vegetation type. Consequently it can be subdivided into a number of zones. To the botanist the area extending through the Malay archipelago from Sumatra in the west to mainland Papua New Guinea in the east is known as Malesia. The forests of this area are exceedingly rich in plant species and do not merge gradually with the adjacent drier regions. Van Steenis (1950, from Whitmore, 1975:5) showed this quite dramatically by plotting the number of genera in each geographical area. As a result he was able to identify distinct botanical boundaries, or 'demarcation knots,' where species distribution varied markedly from one area to another. Essentially these coincided with the major forest type boundaries (see Figure 2.2) (Whitmore, 1975:5).

Although there is a distinct difference in forest types between Papua New Guinea and north Australia, there is no such distinction, for example, between the Papua New Guinea mainland and the other islands of Melanesia to the east. Melanesia which, in botanical circles, includes the Bismarcks, Solomon Islands, Vanuatu, New Caledonia and Fiji as well as Tonga and Samoa, is floristically the poor relation of Malesia. In essence there are fewer plant families and those which are present have fewer genera and fewer species (Whitmore, 1966:1). Thus as the tropical rainforest extends eastwards and southwards into the Melanesian archipelagoes it becomes progressively attenuated with increasing floristic poverty (Whitmore, 1975:4).

FIGURE 2.2: THE PRINCIPAL "DEMARCATION KNOTS" OF MALESIAN FLORA



Source: van Steenis (1950) from Whitmore, 1975:5

The Forests of the Solomon Islands

Extensive stands of tropical rainforest dominate the Solomon Islands, in fact so much so that 88 percent of the land is forest covered. The forests and vegetation of the Solomon Islands are comprised of 12 biomes or major ecological communities. These are:

a. Lowland rainforest.

b. Mountain forest.

c. Mossy or cloud forest.

d. Riverine forest.

e. Swamp forest.

f. Mangrove forest.

g. Atoll or beach forest.

h. Woodland.

i. Scrub.

j. Open woodland or serpentine vegetation.

k. Dwarf shrubland.

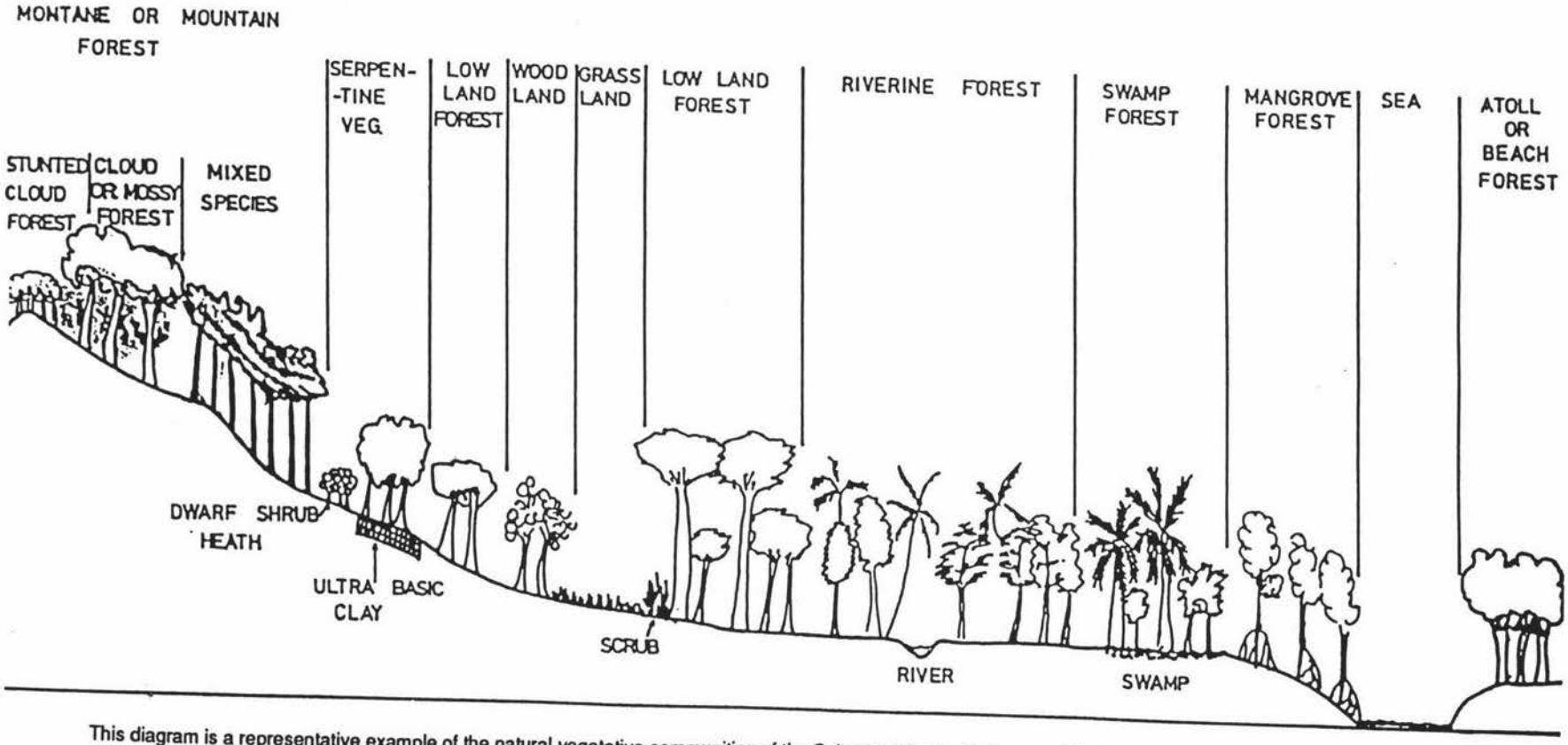
l. Grassland.

(Foreign Investment Bulletin No.5, October 1984).

A profile of the regional forest communities of the Solomon Islands is given in Figure 2.3.

Of the Solomon Island forest types the most distinctive variant, according to Whitmore (1966:3), is the type found on ultrabasic igneous rock. Outcrops of this occur mainly on south Santa Isabel and south east Choiseul. This forest type differs in several major respects from normal tropical rainforest in that it is of lesser height and contains far fewer tree species. The few species that do grow on the ultrabasics often develop in large, almost pure, stands whereas in normal rainforest such species are scattered throughout the forest. The most striking of these pure stands is malasalu (*Casurina papuana*) the small leafed, greyish crowns of which readily identify the underlying ultrabasic rock. Sometimes the forests on the ultrabasics are burnt prior to hunting. After

FIGURE 2.3: PROFILE OF THE REGIONAL FOREST COMMUNITIES OF THE SOLOMON ISLANDS



This diagram is a representative example of the natural vegetative communities of the Solomon Islands. Various combinations may be present or absent on any given island.

Source: Foreign Investment Bulletin No.5, 1984

a few firings the forest does not return and is replaced with open heath communities comprised of bushes and ferns. Elsewhere in the Solomon Islands a few species are most commonly found on, or even restricted to, the calcareous soils that develop over coral. An example of this are the *Celtis* species (Whitmore, 1966:3).

There are very few lowland forests in the Solomon Islands that have not been disturbed by man. In fact some of the most valuable timber trees grow most densely on old garden sites. On the few islands which still retain some primary vegetation from sea level to mountain top (eg. Kolombangara and Vangunu), there is a progressive change in the forest and species. Big leafed buttressed trees 35-45 metres tall, big woody climbers and big leafed epiphytes can be found at low elevations, whereas on the mountain tops the trees are only 6-12 metres tall and have smaller leaves. Here woody climbers are infrequent and the forest interior is draped in a mass of ferns, mosses and hepatics.

Although this kind of forest succession is found throughout the tropics the most striking feature of the Solomon Islands is that these zones are highly compressed compared with big mountain ranges elsewhere. An example of this is the 'mossy forest' which can be found as low as 700 metres on Vangunu whereas in the mountains of Papua New Guinea it does not occur below 2100-2400 metres. This compression is most dramatic in the Santa Cruz Islands where several species that are found only at high altitudes on other islands of the Solomon Islands group, occur almost at sea level. These lowland forests also have several other montane features (Whitmore, 1966:4).

Man, Subsistence Agriculture and the Rainforest

Subsistence economies have formed the basis for Melanesian existence since time immemorial. As a system it evolved to suit local conditions and as such varied from area to area. It was not a static system and successfully incorporated change such as that illustrated by the introduction of the sweet potato to Siwai on Bougainville before the nineteenth century (Connell, 1978:43). The common factor, however, amongst subsistence economies regardless of variation in detail, was that to survive as they did they had to be sustainable. Those that practised otherwise, in the end perished.

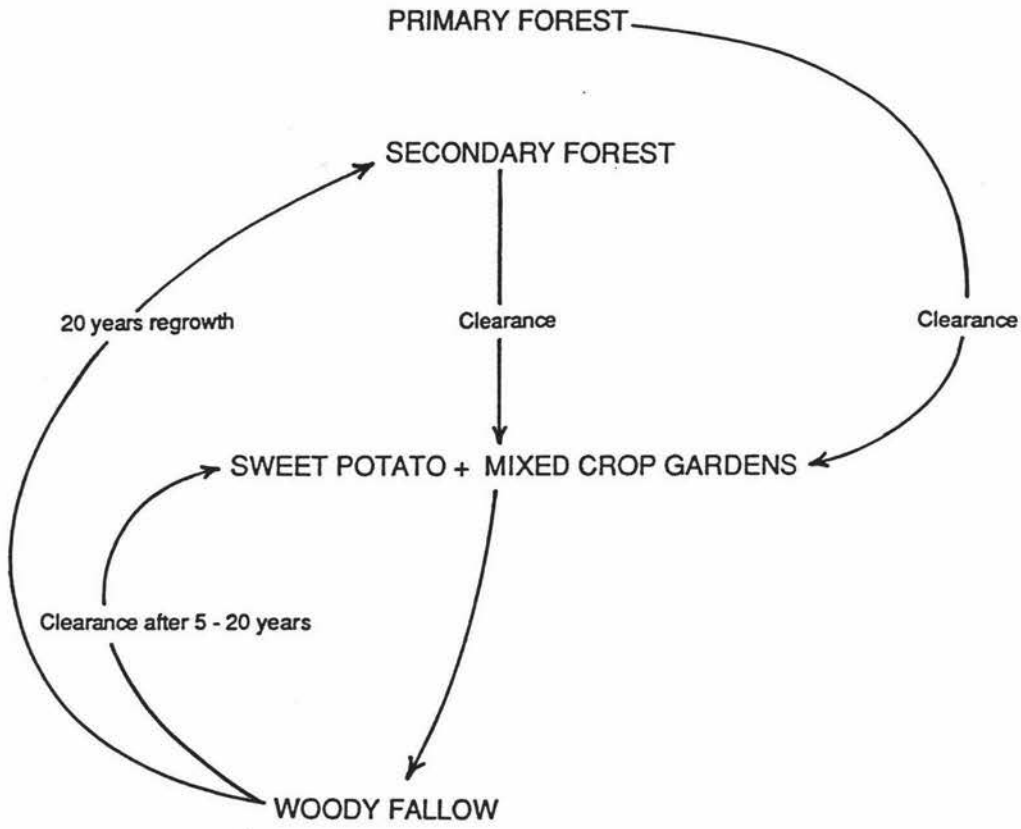
Speaking of the Maring people of Papua New Guinea, Clarke (1977, from Bayliss-Smith, 1982:28) observed that:

> The Maring have existed for centuries with stone age habits and technologies; under the same conditions their survival could be projected far into the future, whereas the habits and technologies of the industrial world point to imminent collapse.

In a relatively closed society, such as was typical of pre-contact Melanesia, territorial frontiers often could not be readily expanded except by migration, conquest or slightly more incipient means such as intermarriage! The only way, therefore, to ensure long term survival was to adopt sustainable resource utilisation and population control strategies. Once adopted these were embodied in custom and tradition and although their origins became clouded by the passage of time they nevertheless ensured the continued survival of those who practised them.

In subsistence economies both the land and the sea are the providers. Although there are several main types of subsistence agriculture, and many variations within these types, the most widely practised land-based production system is that of shifting, or swidden, agriculture. In tropical rainforest areas, for instance, the forest is cleared by cutting and burning in order to establish garden sites. These gardens are cropped for a period then abandoned as soil fertility declines. Another area is then cleared and planted. In forest areas regeneration usually occurs readily on the abandoned plot which ideally should lie fallow for up to twenty years before the cycle is repeated. By allowing the forest to regenerate, soil fertility is rejuvenated by way of the nutrient cycle. In situations where the fallow period, for example, is reduced by the need to support a larger population there is insufficient time to allow for this regeneration. Thus there is a gradual conversion to scrub or grass land. Often associated with this is a decline in soil fertility which, in turn, leads to a requirement for greater areas of arable land if the same population level is to be sustained (see Figure 2.4) (Macewan, 1978:11).

FIGURE 2.4: SUBSISTENCE GARDEN CYCLE



After: Macewan, 1978:13

Land Use in Transition: Melanesian Society Changes

The introduction of western civilisation has had a profound effect on Melanesia. Consequently the Melanesian societies of today are in a process of transition from the old to the new and from the traditional to the modern. This change affects every aspect of society and of course creates tensions and dilemmas, particularly between generations. Such changes, of course, influence considerably the attitude Melanesians have towards the land. Whereas in the past tradition and custom determined how the land was allocated, used and cared for, new constraints and new requirements are now being imposed on the land, the most significant, perhaps, being its ability to earn cash. The resulting attitudinal changes cannot, of course, be viewed in isolation but rather must be seen in the light of the wider changes that are taking place in those societies. Many perspectives could be taken but perhaps these changes are nowhere more pronounced than in rural Melanesian villages, the one-time heart of the Melanesian way of life but now rapidly being overshadowed by the growing urban areas of the new Melanesia.

Based on studies in two Fijian villages, Brookfield (1973) observed that the importance of subsistence agriculture was declining in the modern village economy. Although subsistence agriculture is still widely practised, along with supplementary hunting, fishing and gathering, there is an increasing emphasis on growing commercial crops for cash. Wage employment is also becoming an important means of earning cash and along with this there is an increasing specialisation of labour as well as the evolution of the local business entrepreneur (Brookfield et al, 1973:78-79).

In pre-contact times the village was reasonably self-sufficient. Because of this factors such as village location and size were determined by access to food, political groupings and how well the village could be defended. In the modern village, however, location becomes very much linked to communication and associated commercial opportunities, access to educational and social services and of course the availability of food. There is also an increasing emphasis on the individual ownership of land with the evolution of the independent farmer and the need for capital investment in the land if cash cropping opportunities are to be maximised. Village size is determined by what the village economy can support (Brookfield et al, 1973:78-79).

The village power base is also changing. Whereas in the past the chief, or big man, and perhaps associated village elders, had even the power of life and death over the errant villager, there is now a reliance on typically western forms of justice such as community councils, government officials, the police and magistrates (Brookfield et al, 1973:78-79). The business entrepreneurs, be they traders, carriers, plantation owners or independent farmers, are also wielding increasing influence through their commercial activities. This is often at the expense and authority of the traditional big man (Connell, 1978:252) if he himself has not given himself to these pursuits (see Table 2.1 for a summary of attributes of Fijian villages in three time zones).

In summary, the centripital forces that hold people in villages are diminishing (eg. leadership, tradition and reciprocal assistance), whereas the centrifugal forces that were once almost non-existent are now rapidly increasing. These, among other things, include a strong desire for freedom from family obligations and restrictions, the attractions of urban life, opportunities for higher incomes, status and western possessions as well as the desire for further education (Brookfield et al, 1973:78-79). In the words of Acquaye and Crocombe (1984:12):

> In no field has this phenomenon (of experiencing the pains and problems of transition) been more pronounced or produced more problems and questions than in the conception and use of the land.

TABLE 2.1: SUMMARY OF THE ATTRIBUTES OF FIJIAN VILLAGES IN THREE TIME ZONES

Attributes	*Pre-contact village*	*Post-Cession village*	*Village of the 1960s*
Major goals	Survival in war Food and shelter Preservation of social unit Protection of lands	Food and shelter Preservation of social unit Retention of lands European goods	Continuance of social unit (diminishing) Personal freedom and status European possessions and foods European style houses Capital goods (ploughs, etc.) Health services and education Good communications with urban areas
Economic base	Swidden agriculture Hunting, fishing, gathering Static stone-age technology Minimal specialization	Swidden agriculture Hunting, fishing, gathering Contract labour wages Tax garden surpluses Minimal specialization	Swidden agriculture (declining) Limited hunting, fishing, gathering Commercial crops Wages Incipient entrepreneurial activities Incipient specilization
Location regulators	Defence Access to food Political groupings	Access to food Administration Health	Health Communications Commercial opportunities or access to food Education and social services Ownership of land
Size regulators	Minimum viable defence force Maximum which food supply would support	Minimum viable production group Maximum which food supply would support	Virtually no minimum Maximum which total local economy would support
Population regulators	Balance of high birth and death rate Battle casualties Migration to safety	Balance of low birth rate and high death rate Migration to work	Balance of high birth rate and low death rate Migration to work (largely in urban areas) Independent farming
Decision-making	Hereditary chiefs and community councils	Hereditary chiefs and community councils Appointed chiefs Government officers and magistrates	Hereditary chiefs (declining) Community councils Government officers and magistrates
Agency enforcing decisions	Life or death power of chief Community attitudes	Community attitudes Native police (jail and fines)	Individuals and groups Community attitudes (declining) Police and Fijian Provincial constables (jail and fines)
Centripetal forces	Safety Leadership Tradition Group organization—reciprocal assistance	Leadership Security Tradition Group organization—reciprocal assistance	Tradition Security (diminishing) Sense of identification Limited reciprocal assistance Official restraints on out-migration
Centrifugal forces	Nil	Desire for cash income—labour contracts Incipient desire for freedom from from community obligations and restrictions	Strong desire for freedom from community obligations and restrictions Attraction of urban life Opportunities for higher incomes Desire for higher status Education

Source: Brookfield et al, 1973:78-79

The Rainforest: A Source of Cash

The impact of modern economies has led to an "increased notion of the value of land and cash crops" (Acquaye and Crocombe, 1984:19). Similarly, and of particular environmental significance, has been the monetisation of natural resources. The resource, whether it is fish, crabs, coffee or timber, is seen as a means of obtaining cash at village level (Pernetta and Hill, 1982:319-332). As a result the "increased use of natural resources is likely to be a natural consequence of production for cash being added to production for subsistence needs" (Pernetta and Hill, 1982:325). In other words, use of natural resources increases as villagers seek to produce a surplus for cash over and above their traditional subsistence needs. In many instances the motivation of individuals will be to maximise their cash return. In such a situation, and with weakening traditional social constraints, there is little heed for the long term consequences of a depleted natural resource. The monetisation of natural resources, therefore, has had a profound effect on the manner in which these resources are viewed. The sea, land and forests, it follows, contain commodities that can be traded for cash, which in turn provides the necessities of life. The cash then becomes the provider and the awareness that man is part of the ecosystem and that his livelihood depends on this awareness is forgotten (Togolo, 1982:339-347).

This scenario is common to man and is well described by Garret Hardin (1968) in his classic environmental doomsday essay *The Tragedy of the Commons*. Using the parable of the commons on which a number of herders grazed their cattle he gave the following illustration:

> A particular number of cattle at a particular time ate grass at the same rate as it grew - supply and demand were in perfect balance. Then one herder concluded that he would add one more cow and reap the benefits while the costs were spread among the other herders, whose cows had to settle for less. He also concluded that if he did not add an extra cow, the other herders might, and they would then reap the benefits at his expense. The only rational solution was to add a cow. But every other herder reached the same conclusion and decided that they must introduce additional cows. Thus each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination to which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all (Hardin, from McCormick, 1989:73).

While factors clearly exist to motivate individuals to convert natural resources into cash, other forces also come into play. At the macro level, governments of less developed countries (LDC's), faced with problems such as rapid growth in population,

malnutrition, low life expectancy, illiteracy or underemployment and urban drift are increasingly turning to the exploitation of natural resources as a means of providing cash to help overcome these problems (Pernetta and Hill, 1982:319-332). Forests, for example, are seen as a source of export income to supply funds for the improvement of welfare or the repayment of national debt; forest projects can provide local income through timber royalties and roads established for logging in remote areas can provide access for future cash crop development.

The True Cost of Logging the Rainforest

Natural resource exploitation, although a quick and sure generator of cash, often creates more problems than it solves. These are not always immediately evident and often are not borne by those who have profited from, or exploited, the natural resource in the first place. In the case of logging, long term environmental and social degradation often occurs. There is a

> loss of the community's resource base in terms of wildlife, building materials, wild food plants, social problems resulting from disruption of customary lifestyles as a consequence of paid employment during fixed hours and soil loss and deterioration (Pernetta and Hill, 1982:319-332).

The environmental degradation is not only limited to the land but impacts severely on the marine environment as well.

> The effects of logging around Walter Hanganu's village on Makira (Solomon Islands) can be seen clearly from the air. Rivers with catchments in logging areas dump their muddy discharge far out to sea, covering the once pristine reefs surrounding the island with a fine layer of silt. Those which meander through virgin forest and farming land run clear and clean (Pacific Islands Monthly, 1989 Vol.59 (19):20).

Numerous other examples abound but perhaps one of the most poignant tales of the harm forest destruction can cause was told by Wezip Aloloum, a villager from Jobto in the Madang District of Papua New Guinea:

> I have strong feelings on this matter. Jant (logging company) came and cut down the trees and spoiled the spirits of my ancestors; they spoiled the places where my forefathers planted their gardens and the place where they took clay

for pots. They spoiled these things but they did not help me properly in return with money or something. I asked them but they did not help me. Therefore I am sad and angry with the company and the Office of Forests.

This is what happened to my land which the company logged. The machines dug up the ground and now the soil has lost its goodness. It's like the soil in Port Moresby now. If I plant banana, sweet potato or taro, they will not grow well. The leaves will be yellow. When we tried to make gardens in the cleared areas it was of no use.

The main thing I am worried about is my clay pit for making pots. The spirit woman who looked after the pots and cooked food in them has gone away.....That clay pit was like money to my ancestors. They paid for their wives with the clay pots. They ate pigs from their friends because of them.....It is now five years since the company cut the timber and spoiled this area. I have been watching but the clay has not returned.

Another problem is wildlife. Where they have cut down the forest there is no wildlife because there is no food for them. Even where the forest has not been cut down, there is still not very much wildlife. There are no goura pidgeon, cassowary bird, bird of paradise and wallaby left.....I would not like my grandchildren or their grandchildren after them to be short of wildlife, and to say: Father did not think of those of us who were coming later. He thought only of himself, and finished off all the birds and the animals, so that now I have none (Aloloum, 1982:217-220).

In his paper *Logging is no Development*, Bill Abana (1989) discusses the impact of logging in rural Solomon Islands: The economy of Makira Province, the area of Abana's study, is predominantly one of subsistence or shifting agriculture. Approximately 90 percent of the provincial population is engaged in this activity and is expected to remain so for many years to come. The only cash earning opportunity the rural people have available to them is from copra production.

Within the Province are some 72,000 hectares (ha) of accessible forest land. This is located on the island of San Cristobal and contained, it was estimated, some two million cubic metres (m^3) of marketable timber. Between 1982 and 1987 some 153,567 m^3 of logs with a value of $12,342,875.00 was extracted from this resource. Royalties were paid directly to the land owners although no record of these payments was kept by the Forestry Division of the Ministry of Natural Resources. It is, however, estimated that payments to the land owners could have been in the order of between six and seven percent of the total log value. This would equate to between $700,000.00 and $800,000.00 (Abana, 1989:57-61).

Although this was a very large sum of money for the Solomon Islanders, by western standards it was a relatively small percentage of the total log value even after logging and shipping costs were taken into account. Furthermore if the Solomon Islanders used their money in a similar way to the neighbouring Bougainvilleans, who received some compensation money for the mining of copper on their land, only a mere trickle would find its way into business outlets (Bedford and Mamak, 1977:81). In reality, these compensation payments, along with wages earned in the mining venture, contributed to the rapid acceleration of change in material standards of living in southeast Bougainville (Bedford and Mamak, 1977:85). Oliver (1973:189-209, from Bedford and Mamak, 1977:85-86), reviewing the impact of a century of European contact on Bougainville diets, housing styles, clothing, transport, accumulation of wealth, ownership of property and other facets of social and economic life, noted that in many respects Bougainvilleans were now less able than formerly to fulfill their goals of good living.

The Bougainvillean situation closely resembles that of Makira Province in the Solomon Islands where Abana (1989:57-61) complained that logging caused a lot of damage to soils and therefore problems of erosion; there was a breakdown in the nutrient cycle due to the loss of trees and animals; soil compaction reduced drainage and the rooting capacity of the soil; logging was counterproductive to subsistence agriculture because the heavy loss of organic matter left the subsoil infertile; land disputes caused social problems between villagers and logging companies; land owners received only small amounts of money for their logs and trees and the money received only benefitted a few people; working conditions were not normally favourable for local employees and there was considerable damage to and destruction of custom *tambu* sites. Abana was forced to conclude that the negative impact of logging was considerable, indeed so much so that "logging was no development at all."

CHAPTER 3

THE SOLOMON ISLANDS

The Emergent Nation

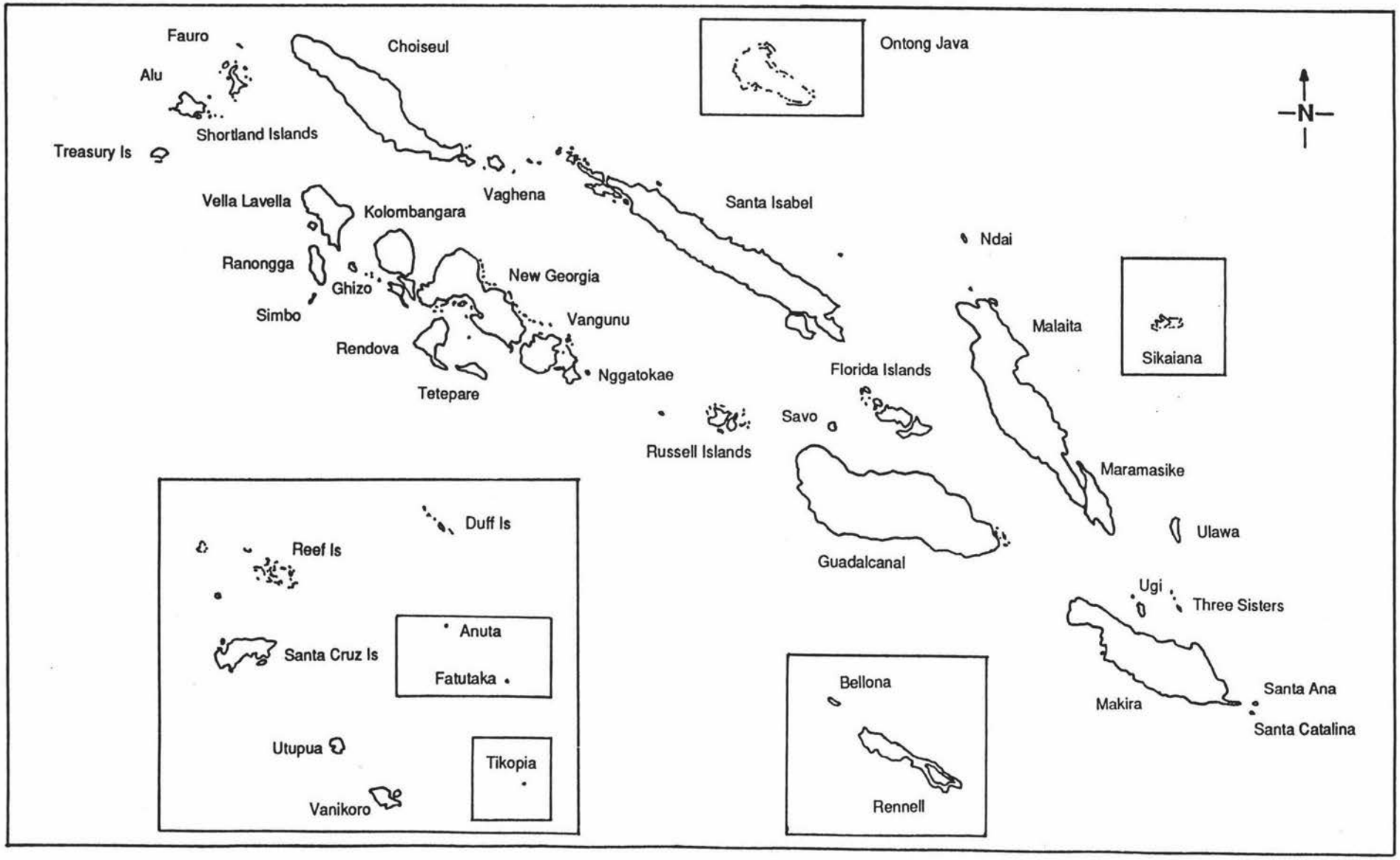
On the 7 July 1978 the Solomon Islands gained independence from Britain. In many respects the British Solomon Island Protectorate, as it was formerly known, was reluctant to accept early independence for, by western standards, development in the emergent nation had only just begun. Even now after thirteen years of independence, the nation is still only laying the foundations of a modern economy and government structure (Rafferty, 1989:187).

The Solomon Islands are a scattered chain of islands (see Figure 3.1). Although ethnically they are largely homogeneous, almost 94 percent being Melanesian, the majority of the 300,000 or so people depend almost wholly on a subsistence economy based on traditional village structures. The topography of most of the six large islands is mountainous and communities have thus tended to congregate on the narrow coastal strips where soils are better, fishing is available and access is easier. These coastal communities are usually small and isolated from one another. This isolation, which is both physical and social, acts as a considerable handicap to balanced economic development (Rafferty, 1989:187).

As an emergent nation the challenges facing the Solomon Islands are many. In its 1988 annual report the Central Bank of the Solomon Islands was optimistic, stating that the country had a good chance in the year ahead to lay the foundations for sustained economic growth through the next decade. Whether economic growth is sufficiently large and well distributed to bring about real increases in the welfare of Solomon Island villagers remains to be seen. Meanwhile, however, the country relies heavily on foreign aid from Britain, Japan, Australia and New Zealand as well as international development agencies to support its fledgling economy (Rafferty, 1989:187).

One of the major challenges facing the Solomon Islands is its rapidly increasing population. At 3.5 percent per year it is one of the highest in the world. This means that 58 percent of Solomon Islanders are currently under the age of 20. This poses major

FIGURE 3.1: SOLOMON ISLANDS



problems for the government as it attempts to provide an adequate health care and education system as well as meeting increasing demands for employment and better housing. Progress in these areas has been slow (Rafferty, 1989:187).

Indicative of its relative underdevelopment, in 1987 only 17 percent of the Solomon Islands population between the ages of 15 to 60 was in formal wage-earning employment. The national accounts also show an economy that is struggling. Although exports have risen considerably, imports have risen even faster. Further exacerbated by high shipping costs, the trade gap is widening and the country is heavily dependent on aid to bridge this gap (Rafferty, 1989:187).

Although great attempts have been made to diversify exports the Solomon Islands has no industrial base and, like most less developed countries, is limited to exporting primary produce. This includes copra, logs and timber, fish and palm oil and, more recently, cocoa (Rafferty, 1989:187). The inherent weakness in the Solomon Island economy is illustrated by the huge range of goods it imports. Staple items such as food and fuel feature strongly which is indicative of the Solomon Islands' underdeveloped state (Rafferty, 1989:187).

Early Forest Policy

Faced with a widening trade gap, a burgeoning population with an ever increasing expectation of wealth and material prosperity, it is not surprising that both landowners and the Solomon Islands government show a readiness to convert their tropical rainforest to much needed cash. Although new development projects are being sensibly based on the assets the country has such as plantations, small holder agriculture, forestry, timber and sawmills, fishing and fish processing, ship repair and tourism, its dependency on aid does make it vulnerable to political pressure. Timber production has been particularly susceptible to this pressure (Rafferty, 1989:188).

Although the Solomon Islands is not the only country where timber licences have been awarded for political favours, the government is now becoming aware of the need to ensure that the exploitation of this resource is placed on a sustainable basis. Common to logging operations in tropical rainforest elsewhere, many reported

infringements of logging regulations go unchecked, standards of environmental husbandry are frequently very poor and neither the government nor customary landowners are able to verify independently the value of logs exported. This has damaging implications in terms of both the landowners' and governments' ability to collect revenue (Rafferty, 1989:188).

The development of a forestry policy for the Solomon Islands has been a long and protracted affair. In essence it has been highly dependent on the land policies of the time. These have proved to be a thorny issue, typical perhaps of the problems encountered elsewhere in the Pacific where European concepts of land tenure have been used to try and define the more flexible indigenous systems.

In 1952 a government forestry department was set up but it did not have forestry legislation to work to until 1960. This delay was brought about by the need to wait for a report by the Allan Land Commission (1957), and the resulting first version of a new Land Titles Ordinance which was introduced in 1959 (Lamour, 1979:107). The proposed legislation was based on two concepts: 'forest reserves' and 'forest areas.' The forest reserves were to be land allocated to long term forestry use, whereas the forest areas were to be a short term means by which logging on non-government owned land could be controlled. It was hoped that the forest reserves, which were intended to be public land, would include vacant land found by the Land Trust Board proposed by Allan (Lamour, 1979:107).

By 1961 it had become clear to the Forestry Department that the Land Trust Board would find no vacant land per se. Through the Lands Department it then vigorously set about purchasing customary land, the intention being to retain a portion of these areas for replanting after logging with the balance reverting back to the original landowners. The areas designated for replanting were considered to be the future production forest estate. In 1963 large scale logging of the forest reserve land owned by the government commenced although the declaration of these reserves was held up by the need to excise the areas that would be returned to the original owners after logging (Lamour, 1979:107-108).

In 1968 seventeen forest area declarations were made. The consequences were, however, disastrous:

> Despite all efforts to explain, both prior to and following the declarations, that their sole purpose was to put the government in a position of effective control over the use and development of the country's timber resources, the declarations led to misunderstandings, suspicion and a strong element of active opposition. The particular concern was expressed that the owners use and development of their land would be impeded (Forestry Department Annual Report 1968:1, from Lamour, 1979:108).

A White Paper, which at that time was being presented to the Legislative Council, had to be amended as a result of this row. The subsequent new Ordinance, which was presented in 1969, provided for licencing and a weaker form of forest areas whereby control was restricted to water catchments only. These were called 'controlled forests.' Forest reserves became 'state forests' in recognition of the fact that control could really only be applied to land that the government actually owned (Lamour, 1979:108-109).

The White Paper of 1968 represented a departure from previous policy in that it concentrated, among other things, on production forestry rather than protection forestry. As a result of this plan, which was intended to consider integrated development needs, the country's natural resources began to be exploited at a faster rate (Lamour, 1979:109).

In the climate created by this new economic policy the Forestry Department seriously considered abandoning its sustained yield policy. Although it decided against this, there was nevertheless a relaxation in attitude towards leasing land and an acceptance that in many instances replanting was less likely. The constraint on reafforestation, it appeared, was not so much the availability of land, but rather the country's lack of resources to conduct a large scale reafforestation programme. The only comfort that could be taken from the increased rate of deforestation was that the need to retain substantial timber reserves in order to sustain timber yield had diminished with the advent of faster growing plantation species and the increased marketability of smaller logs (Lamour, 1979:109).

By 1974 the option of negotiating or leasing timber profits through the Land and Titles Ordinance had collapsed. Although it had worked well enough on Isabel Island, and partly on Kolombangara, bitter disputes arose on New Georgia. As a result of this a policy review committee was formed. In its 1975 report it recommended that:

> ...timber right agreements should preferably be signed between the tribe or the clan and the government, naming the timber company if appropriate. The agreements should not involve the registration of customary land, but should deal only in timber rights needed to allow working and extraction (Forestry Policy Review Committee, 1975:paragraph 5, from Lamour, 1979:110).

Other recommendations made by the Committee were that disputes over timber rights be resolved by the newly formed Local Council Area Committees and that replanting should proceed as fast as possible on government land. Joint ventures between the people and the government were also encouraged. The Bill, which incorporated these recommendations, finally became law in January 1978 (Lamour, 1979:110-111).

A Critique of Early Forest Policy

It is interesting to note that Solomon Islanders themselves had very little involvement in shaping the early versions of Solomon Island forest policy (Lamour, 1979:111). It is therefore small wonder that the earlier policies proved unworkable. Although Solomon Islanders were adequately represented in the 1974 Review and were in fact formative in the decision making, there were many forestry issues still unresolved.

From a development point of view long term investment in reafforestation has been determined largely by land purchases conducted before 1914, for it is really only this land that has become available to the government. Concentrated as it is in a few localities it is highly unlikely that the government owned land is distributed in a manner that is appropriate to the needs of the Solomon Islands today. As such the already existing problems of uneven development have been further exacerbated (Lamour, 1979:112).

Another problem results from the government's inability to invest in land other than its own. There is increasing intra-governmental competition for available land and this is not always resolved in the most rational manner. Often allocations are made as a result of inter-ministerial bargaining so much depends on personality and who is away on holiday at the time! (Lamour, 1979:112-113).

The Forestry Policy Review Committee's recommendations of 1974 seemed to offer a chance to redirect logging, and subsequent reafforestation, away from the diminishing stocks of government land, and thus towards a more rational plan of development. However, these policies were only partially successful. Although timber cutting rights have certainly been issued in areas where, under previous legislation, they were opposed, very little in the way of planting has been undertaken on customary land. Private owners, it seems, are reluctant to release their land for long periods to allow long term investment in afforestation (Lamour, 1979:117-118). There are, of course, perfectly rational economic reasons why land owners may not want their land replanted, or the timber on it conserved, but from a national perspective it has become a matter of major concern that the forest resource is being depleted faster than it is being re-established. As such the earlier policy of sustainability seems to have been well and truly compromised.

Attempts to Halt Forest Depletion

In an attempt to address the problems caused by earlier forest policy a further review was undertaken in 1983. This resulted in a new National Forest and Timber Policy which was approved by the Solomon Islands Government in 1984. The new policy called for maximum local processing of logs, minimum wastage and increased investment in the forestry sector. The 1985-89 National Development Plan reiterated this policy by encouraging large scale reforestation programmes, the control of harmful logging practises, more local processing plus market studies and diversification. It also tried to ensure that the government and land owners received a fair return from logging. Unfortunately achievement in this area fell well short of expectations largely due to inadequate forest legislation and a lack of public awareness and involvement (Ministry of Natural Resources, 1989:5).

A further review of forest policy and legislation therefore became necessary and this was undertaken in 1989 with the help of the Food and Agricultural Organisation of the United Nations. Recognising the importance of the forestry sector as a source of revenue and employment, as well as the strong links between the forests, land and people, this policy attempts to strike a balance between the utilisation of forest

resources, the conservation of the environment and the maintenance of the social fabric of the nation. The policy is based on six imperatives which are seen as essential to the long term survival of the forestry sector. These are listed as:

Protection:	Ensuring that the nation's forests are not destroyed or degraded, watersheds are protected and soil erosion prevented, flora and fauna are conserved, genetic resources maintained and sacred and historical sites are safeguarded.
Sustainable Use:	Wise management and utilisation of the forest resources to maintain their productivity and develop their potential contribution to the national economy and welfare of the people.
Basic Needs:	Providing the population with essential food, water, fuel, building materials and recreation from the forests.
Development:	Exploiting the potential of the forests to yield an increasing supply of forest products, income, tax revenue, foreign exchange, employment and other benefits; controlling the pace and direction of change to avoid socially unacceptable side-effects; encouraging Solomon Islander's participation in timber growing, harvesting and processing; investment to increase the productivity of the forest resource.
Participation:	Collaboration between the national government, the provinces and customary owners in the control and management of forests for the benefit of all and with respect for the legitimate interests of each.
Distribution:	Sharing the benefits derived from the forest so that all sections of the community gain their fair share while, at the same time, accept an appropriate share of responsibility for maintaining and improving the forest resources (Ministry of Natural Resources, 1989:5-8).

Having listed the imperatives upon which policy is based, the 1989 Forest Policy Statement then proceeds to identify how it could be translated into reality. Notwithstanding this, it was the 'imperative' of basic needs that most interested me insofar as it dealt with the non-timber values of the forest. It was on this that my research concentrated.

CHAPTER 4

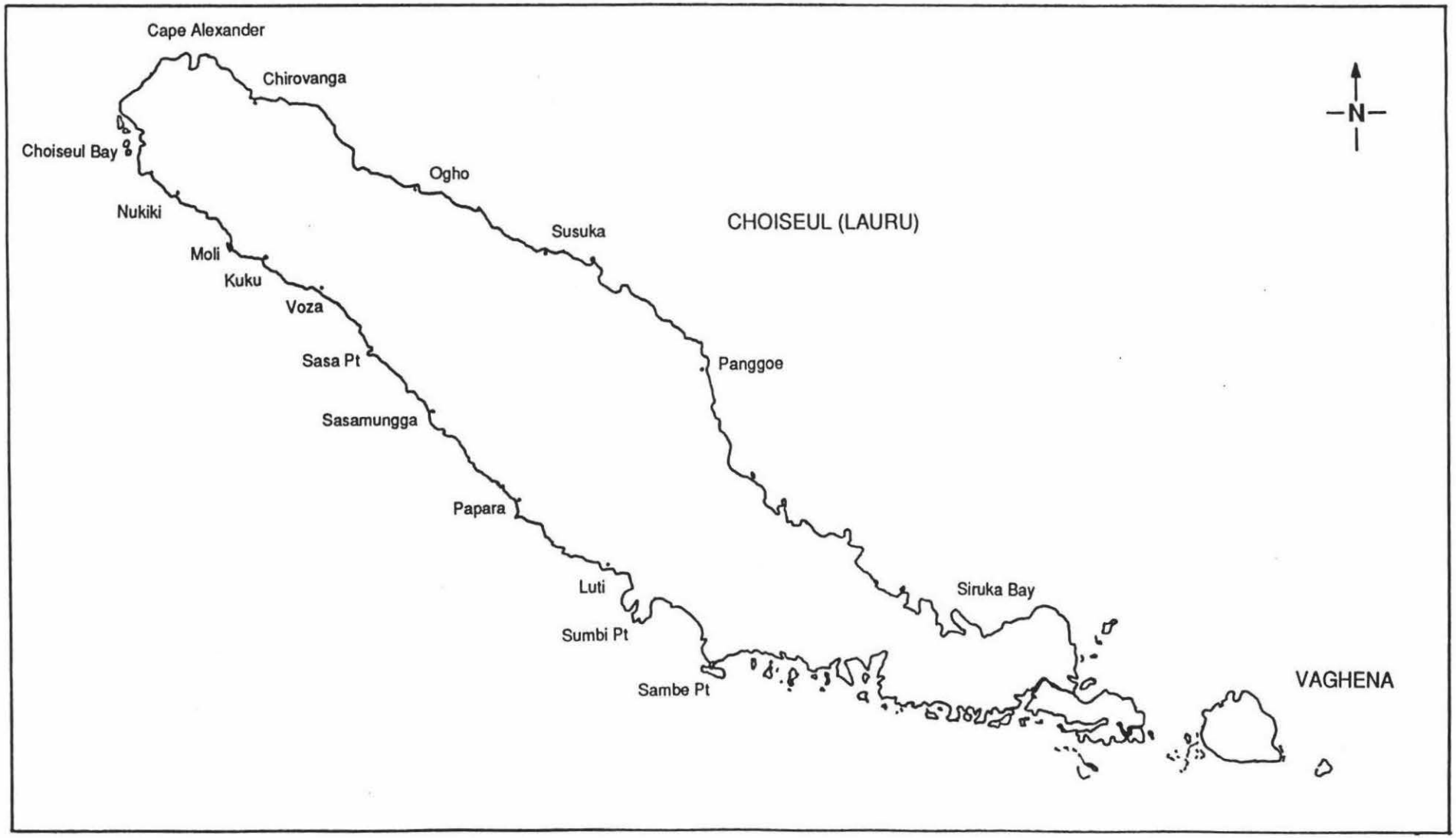
RESEARCH LOCATION AND METHOD

Getting There

Although the waters of the Solomon Islands had served traders as a passage to the East from Port Jackson, and whalers as a hunting area for the sperm whale since the 1790's, it was not until the latter part of the nineteenth century that New Zealand became directly involved with the Solomon Islands. Initially through traders and missionaries, this contact was further strengthened in World War II when New Zealand armed forces served alongside Americans in the liberation of the Solomon Islands from occupying Japanese forces. Since my own childhood was laced with stories of my father's World War II navy days in the Solomon Islands it is perhaps not surprising that I should choose these islands as a location for my research on the subsistence use of tropical rainforest. This choice was considerably assisted by the fact that I also had two friends working there as foresters and it was they who were to be instrumental in helping me to gain access to the area. Without their help, and that of the New Zealand High Commission, I would have found it difficult to arrange a research location and gain the official permission that was so necessary for my project.

I had originally intended to undertake research in the villages of Paradise and Kolombaghea on the island of New Georgia. Paradise was, at the time, located in an unlogged area and reliant on subsistence use of the forest for its livelihood, whereas Kolombaghea is in an area that had been logged previously. My friend had gone to considerable lengths to make it possible for me to enter these areas but in its final stages of approval my research permit was declined by the Minister of Natural Resources. It seems my research could have been politically embarrassing. At this point my prospects for conducting research in the Solomon Islands appeared decidedly bleak but a fortuitous contact by my friends opened the door for me to conduct research on the island of Choiseul (see Figure 4.1). This was a location I had previously rejected due to its isolation. Finally then, four months after I applied for it and after 12 months of preparation, my official research permit was granted. Much relieved I was to learn later that I had been given unusually favourable treatment as it normally takes nine to 12 months for such a permit to be granted.

FIGURE 4.1: CHOISEUL (LAURU)



Once I had the permit I did not waste any time in getting to the Solomon Islands. I arrived in Honiara on 7 May 1991 and spent the next three weeks finalising permit requirements and purchasing stores and equipment necessary for a three month spell in the field. In the end this comprised some 11 cartons of miscellaneous stores, canned food, hard navy biscuits and other 'delectables,' two drums of kerosene, a sack of rice and other equipment such as kerosene lanterns, a pressure stove, bucket and plant press. I had come from New Zealand armed with some basic camping gear, mosquito net, a comprehensive first aid kit and a good selection of stationery and photographic equipment. This was to stand me in good stead.

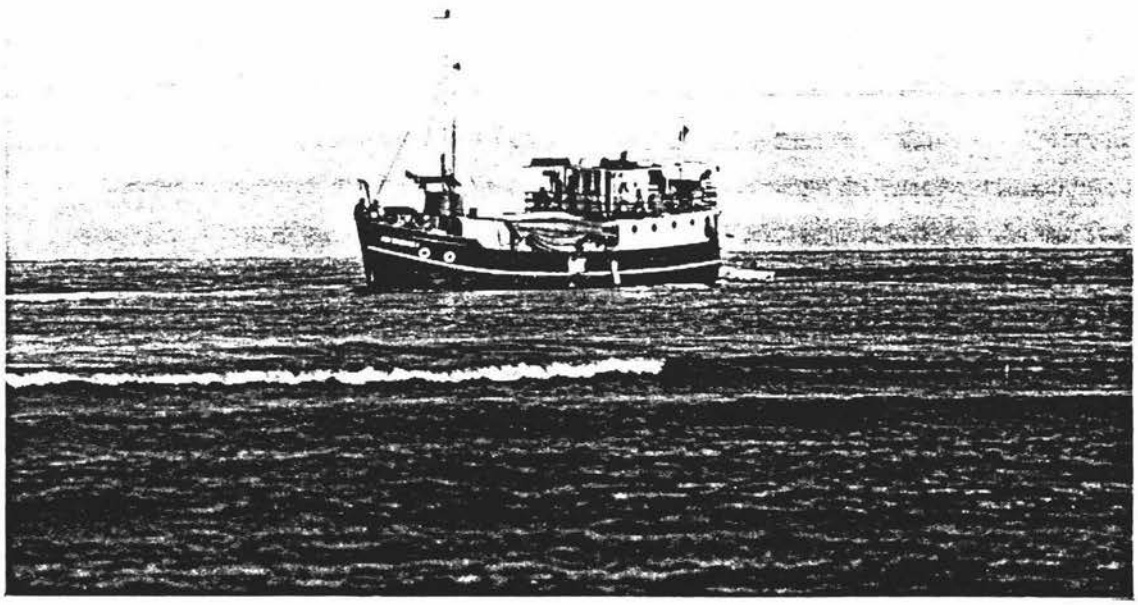
Nukiki, the village where I was to conduct my research (see Figure 4.1), proved to be an ideal location. However, because I had to take a large quantity of stores and equipment I could not fly there. Rather, I had to endure a three day boat journey, something I did not relish having already spent 30 uncomfortable and sleepless hours on a slow boat to Gizo. Although not easy at the time, in hindsight the boat journies were an excellent introduction to the islands and one that I was much richer for having done. Not only did they help me to get the feel of the place geographically, they also introduced me to Solomon Islanders in their own environment. In reality the two boat journies I undertook served as my entry point into rural Solomon Island society, a society where I was to find friendship and a kindness that still warms me as I recall my days spent in the islands.

Choiseul

Choiseul is remote and it is large. Covered entirely in forest, my lasting impression of it is of bush clad mountains, often mist shrouded, reaching down to the shoreline. Small coconut plantations are frequent along the coast and periodically a leaf house or two can be seen from a passing ship or boat. Villages, often covered with a haze of smoke from cooking fires, are scattered along the coast. The only access to them is by sea.

Time stands still on Choiseul. Nature prevails. Nature is bountiful. Dolphins leap out of the sea as do tuna, sailfish and flying fish. Overhead the frigate bird circles, a sinister shape in the overcast sky. Inshore black ducks and reef herons can often be seen winging their way over the reefs and in the forest raucous hornbills can sometimes be

sighted. Crocodiles inhabit the sluggish tidal rivers. A village friend told me to put away my watch in Nukiki as I would not need it. That was good advice because the rhythm of life was not determined by the clock, but rather by the moon, the tides and the weather. When it was dry gardens could be harvested but when it was wet they could not as the walking tracks to them were impassable. When the moon was full the offshore current was weak and the fishing was good but it was a waste of time fishing during the old moon. Daily the reef lay covered then exposed in an endless cycle as the tide came in and then went out again. Somehow the rhythm of village life seemed to mirror this pattern and was interrupted only by an event such as a visiting boat or canoe.



PHOTOGRAPH 1: *M.V. Thomas E.* Small coastal trading vessel sailing past Nukiki. Bougainville in the background.

Nukiki was ideal for my research as the village was almost entirely dependent on the land, forest and sea for its livelihood. Shifting agriculture provided the basis for village subsistence and that, together with the produce of the forest and the sea, meant that the villagers were relatively well off for food and shelter. Cash was generated almost entirely from copra production but because copra prices were so low and plantation size limited by terrain, the villagers ability to earn money was limited.

I was well provided for in Nukiki. The leaf house I had been loaned was very comfortable and the people of Nukiki spent many hours with me patiently explaining their customs, answering my questions and taking me on field trips to look at their gardens, collect plant specimens or look at the impact of logging on adjoining villages. I am enormously grateful for this, not only for the wealth of data I was able to collect, but also for the friendship they gave me and for an insight into a way of life that was not my own. Indeed it was a privilege.

Field Research Control Plan

Prior to leaving New Zealand I had prepared what I termed a field research control plan. This was a blueprint for my field research and as such outlined the research procedure I intended to follow as well as a means of focusing my research objectives. As the field location was unknown when the field research control plan was prepared there was always the likelihood that modifications to the research procedure would have to be made in the field. As it transpired Nukiki fitted very neatly the society I had hoped to study so very few modifications to the main tenets of the plan were necessary. The research procedures, as prescribed by the field research control plan, are briefly summarised and an explanation is given as to how these were applied in the field.

Selection of Research Site

My intention was to select as my main research area a village that was surrounded by, and dependent on, unlogged tropical rainforest for at least part of its livelihood. A comparison was then to be made with a similar village that was located in logged forest

preferably of the same forest type. Subsistence uses of the forest were to be identified and valued in the unlogged village and loss of any of these uses was to be noted for the logged village. The purpose of all this was to assess the true cost of logging to a particular village in terms of lost livelihood and to assist in answering the question: "Does the clearing of tropical rainforest constitute development at the village level, or does it in fact lead to further underdevelopment?"

Because I had never been to the Solomon Islands before I had to advise my contacts there of my research requirements and rely on them to select an appropriate village site. In spite of the earlier setback and subsequent change in potential research sites, the last minute switch in locations did not prove to be disadvantageous at all. Nukiki more than fulfilled the requirement that the village be dependent on subsistence use of the forest (this was to include garden sites) for a large part of its livelihood. Only 11 kilometres from Nukiki Eagon Resources Development Co. Ltd. was logging at Moli (see Figure 4.1). This was the only logging operation on Choiseul and had commenced in 1989 after six years of lobbying by the company (The Ombudsman's Report of 1990 described in considerable detail the problems encountered with this logging operation - see Appendix 1). Although there was no logging on Nukiki village land it was being undertaken on land belonging to nearby villages. There were indeed strong kinship ties between Nukiki, Moli and other villages affected by the logging operation. Because of these links I was able to record the effects of logging on land belonging to Kuku village (see Figure 4.1) and thereby fulfill my own research requirements of comparing a logged area with an unlogged one.

Research Method

In total I spent almost four and a half months in the Solomon Islands. As intended some three months of this was field research conducted in the village while the rest of the time was spent making logistical arrangements, collecting data elsewhere and waiting patiently, an acquired skill that is so necessary for successful integration into the Solomon Islands' way of life.

The owner of the house I had borrowed, Ruth Liloqula, had provided me with an introduction to her kin folk who were still resident in Choiseul Bay and Nukiki. Because of this I was made very welcome and given every cooperation in both my research and

my day to day requirements such as transport by canoe and the delivery of mail. Nukiki was comprised of nine villages or hamlets, each with a different name but all considered part of Nukiki. Logistically it would have been impossible for me to study them all in the time I had available so I mostly confined myself to the village of Tarepasika, which in the local language of Vasiqasiqa meant, 'place in the mangroves.' I did, however, collect supplementary information from residents of other villages including the original village of Nukiki. Being the main village, Nukiki contained the service facilities such as the school and teachers' houses, the church, minister's house, pastor's house and guest house. There was also a soccer field which served as the school playing field. A bell, which was in fact a large acetylene bottle with the end cut out, was struck to herald significant daily events in village life such as morning *lotu*. The note emitted by this bell was rather flat!

Although many villagers had learnt some English at school most were out of practice or did not feel confident using it. Communication was not, however, a major problem for, although I had to rapidly learn to speak pijin, the villagers knew enough English to cover for my mistakes while my proficiency improved. Practically all my interviews and conversations were conducted in pijin although one principal informant (and friend) spoke excellent English.

I had expected that I would have to rely on principal informants to introduce me to the village way of life. In reality two men, Solomon Zarabule and Leslie Inokana, acted in this capacity and were extremely diligent in providing me with information and making sure I was well looked after. Although both lived in Tarepasika they were leaders in the wider community. Solomon was a leader in the church as well as being a member of the School Committee and chairman of the School Finance Committee, while Leslie was chairman of the Nukiki Village Committee plus chairman of the Church Leadership Committee.

During my time in Nukiki I lived in a leaf house that stood right on the beach at the mouth of the Talaevondo Stream. Because it was slightly separated from the villages it was dubbed 'lonely point' by the villagers although in reality I seldom lacked for company as someone would always be calling in for a chat, or to bring me food, or to just pass the time with me.

My research involved systematically, although not always sequentially, working my way through the research questions listed in my research control plan. This included a general description of the villages, the determination and recording of land tenure, customs and forest use, household use of the forest of which gardens were the most significant, and such matters as tree tenure and use of common land. Information on seasonal garden production and seasonal availability of forest food was collected for incorporation into a seasonal food production calendar and a calculation of the value of all these forest uses was made. Finally an assessment of forest uses that were lost through logging was undertaken. This, of course, involved many discussions, interviews and field trips. My field trips involved going *wokabaot* and, when I was not accompanied by a guide, I was often joined by a band of children who were initially quite intrigued with my habit of wandering about armed with pencil, notebook and camera to record things.

A pattern of doing things soon evolved whereby I would usually discuss my research intentions with either Solomon or Leslie, my principal informants and, if I had not already made my own arrangements, they would set up interviews for me or undertake to collect the necessary information. This involved them in many hours of often quite painstaking work collecting and collating information. Solomon in particular was extremely diligent in this respect and as such I was able to record a lot of detailed information in a relatively short time.

I had intended to select and interview a sample of households within my chosen village but as events unfolded in the field I tended to use the network of people I had made contact with to glean information. As there were no marked variations between households in forest and land use, I interviewed a number of households on each topic until I became sure that I had determined the predominant pattern of use. Tarepasika, the village I got to know best, contained 16 households. I got to know seven of these quite well so in effect sampled 44 percent of Tarepasika households. Members of additional households outside Tarepasika were also interviewed, sometimes to cross check information and sometimes because they were key people in the community.

There was much less social interaction between men and women in Nukiki society than I was used to in my own. Consequently I found myself mixing socially with the men but did not feel free to do so to the same extent with the women. This is not to say there was no social contact for they were very kind to me and we would often exchange pleasantries as we washed *calico* together down at the stream. There was just a

shyness and as a consequence most of my interviews were with men. This meant that most of my insights into Nukiki society were through the eyes of men. However, as I got to know everyone better I got the distinct impression that the women were quite adept at expressing their concerns to, and through, the men so I have no reason to believe my view of Nukiki society was not representative.

Recording Information

I used a notebook and a jotter pad to record all interviews and other information. This was unobstructive during an interview and, because I later wrote up the data in a journal, it gave me the advantage of crystallising my thoughts on the matter. In all I kept three journals; a day to day journal, a folder containing interviews and a personal diary. The day to day journal chronicled events as they unfolded, who was interviewed and any thoughts or observations I had on the society I was studying. In addition to containing actual interviews the interview folder was also used to record other factual observations such as market prices, the impact of logging on Kuku village or timber volume yields and stumpage prices. The personal diary, on the other hand, was used to record personal thoughts, experiences and frustrations as well as anecdotal information gathered along the way. In addition to the journals I accumulated a number of reports, maps, publications, enactments and newspaper clippings. These were filed and catalogued accordingly. Solomon Islands 'Delight Hard Navy Biscuit' boxes made excellent in-field filing cabinets!

I had a small hand held tape recorder with me, not for the purpose of interviewing as this would have been too disconcerting for the interviewees, but rather as an alternative means of recording my own notes. For example, to use in the bush when it was too wet to use a notebook. As it transpired I never used it. To my disappointment it did not even have enough power to play the two C90 tapes I had so painstakingly recorded my favourite music on. Fortunately, however, I had an excellent little short wave radio which kept me in touch with the rest of the world.

I had purchased a large quantity of film for my research and was fortunate in that I had a good and versatile 35mm camera. This survived the rigours of the humid and damp tropical climate and produced a credible pictorial record of life in Nukiki, both on

slide and colour print film. Clambering around hillsides in the hot tropical sun usually left me dripping so it was a major job to keep the camera dry. The often wet canoe trips were equally challenging but a New Zealand cornflakes packet, in addition to providing me with a rare in-field culinary treat, proved to be an excellent waterproof camera bag. Most people were only too pleased to be photographed so I often acted as village photographer as well as researcher. Double prints enabled me to give away copies of individual and family portraits and thereby return some of the kindness I had been shown.

CHAPTER 5

SUBSISTENCE USE OF TROPICAL RAINFOREST BY NUKIKI VILLAGERS

Nukiki Village

Nukiki is situated on the coast eight kilometres to the south east of Taro Island, the government administrative station located in Choiseul Bay. Nukiki in fact comprised of some nine villages, each having originated as a family settlement that had separated from the original village of Nukiki. Sited between the coconut plantations, the villages extend some four kilometres along the coast. Sailing past Nukiki on a canoe journey from Choiseul Bay to Moli one would first encounter Vuvugala, Wakatipu, Nukiki, Tarepasika, Maluku, Kalakalaqa, Tuana, Lonely Point and finally Sivusivu (see Figure 5.1 for map of Nukiki and associated tribal land areas). As access is by sea only, canoes, many of them motorised, ply up and down the South Choiseul coast, as do the occasional trading launch or small coastal vessel.

Because the villages are located between mangrove swamps and coconut plantations on a relatively narrow coral coastal terrace, village size tends to be relatively small (for example Tarepasika comprised 17 families). A walking track forms the main access through these villages and the houses are usually built on either side of it (see Figure 5.2 for map of Tarepasika and Nukiki villages). Nukiki village was particularly cramped but the other villages were more spacious with a greater distance between buildings. The villages were generally very tidy, with regularly swept earth areas around each house and the occasional small enclosed *sup sup* garden. Chickens, cats and dogs wandered around at will. Within the villages the majority of buildings were leaf houses. Made with material obtained from the forest, these houses took their name from the cladding used on the walls and roof. This was made from the leaf of the sago palm (*Metroxylon spp*), hence the name leaf house. Generally, these houses were very well maintained, the leaves being replaced every three to five years. I was, however, interested and amused to note that the villagers begrudged the work involved in re-leafing a house in the same way as New Zealanders begrudge having to repaint their houses every five to ten years. Consequently in the eyes of the villagers, a house built

FIGURE 5.1: NUKIKI AND ASSOCIATED TRIBAL LAND

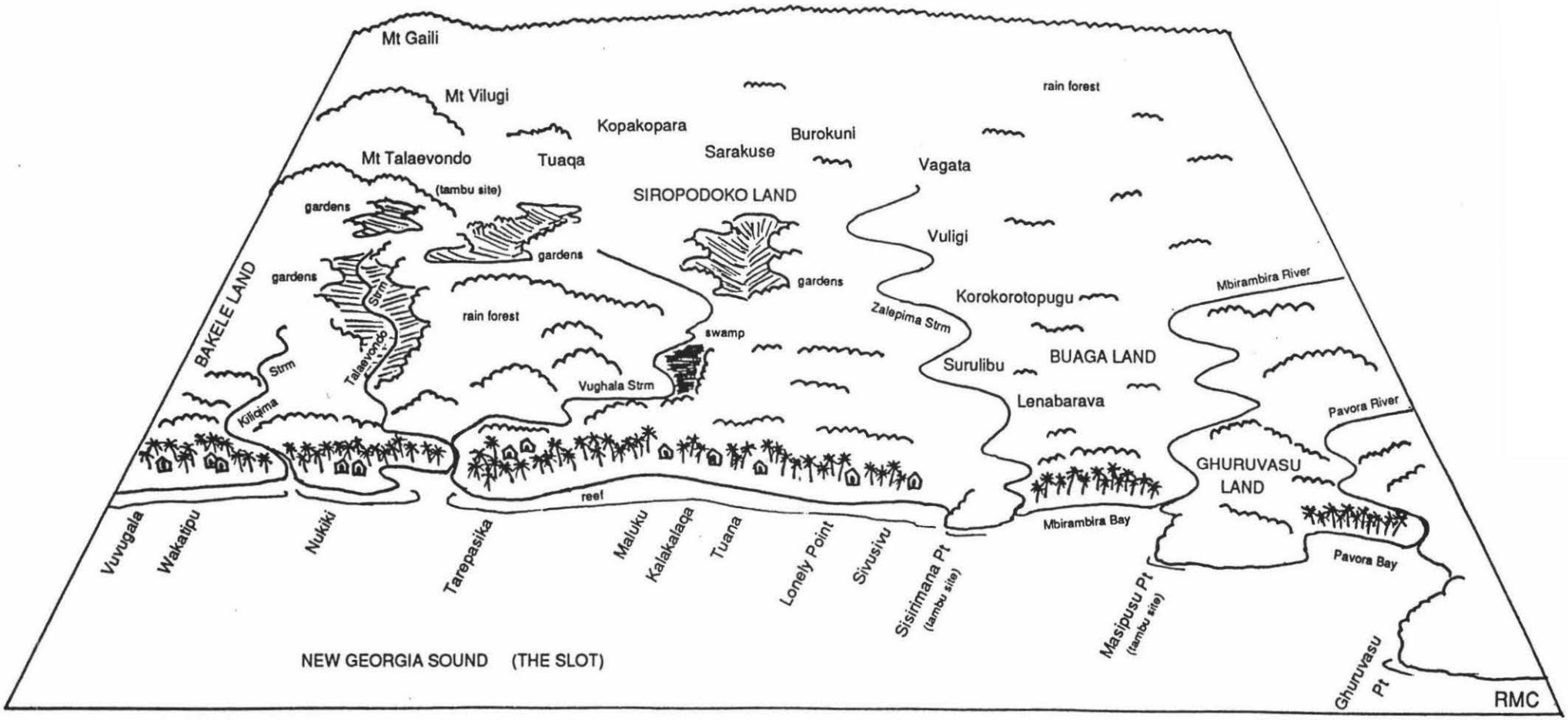
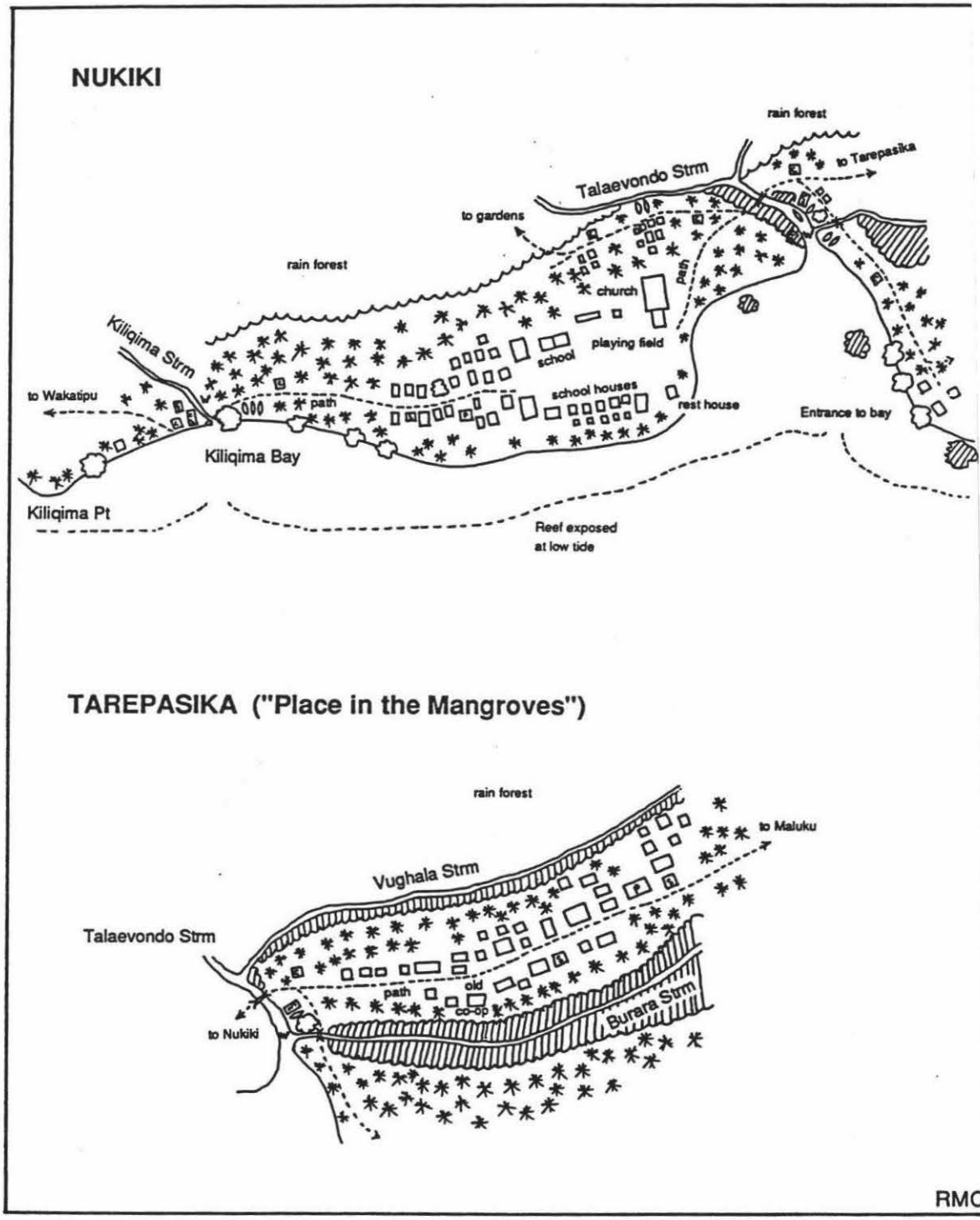


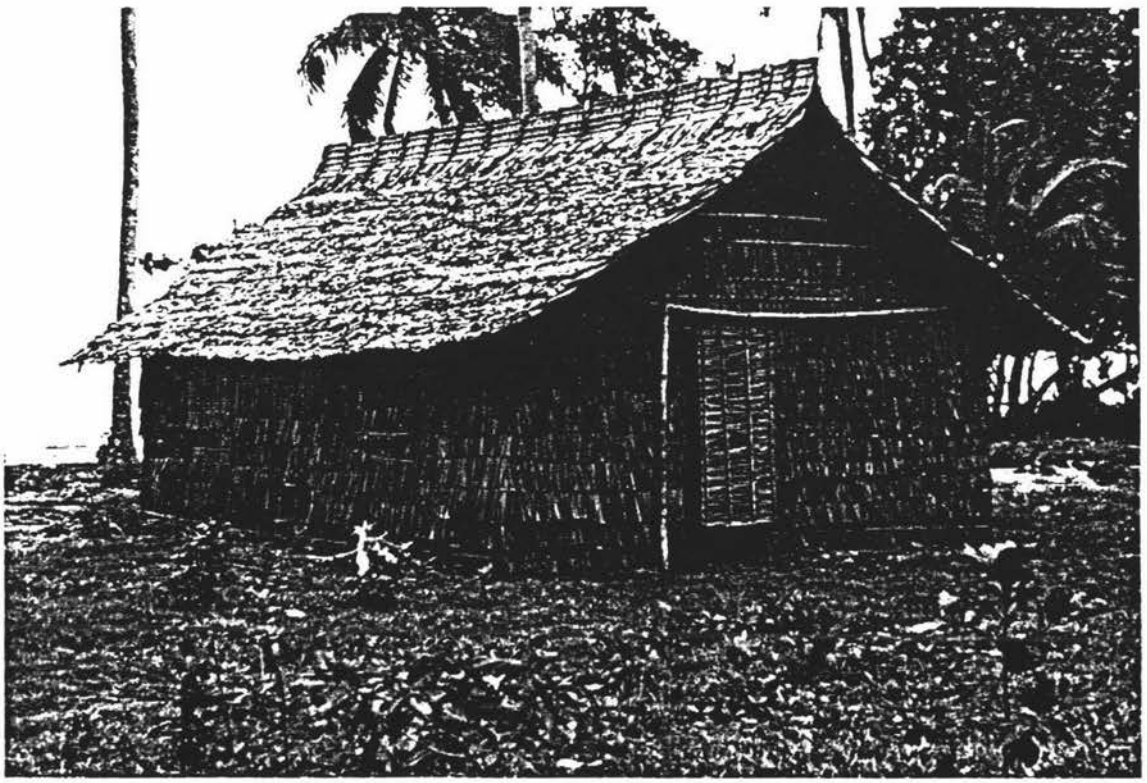
FIGURE 5.2: VILLAGE MAPS



KEY

	Coconut plantation	W	Washing place
	Canoe		Mangroves
CS	Canoe shed	S	Store
C	Copra drier	P	Permanent house
	Leaf house		Bridge

PHOTOGRAPH 2: Tarepasika village.

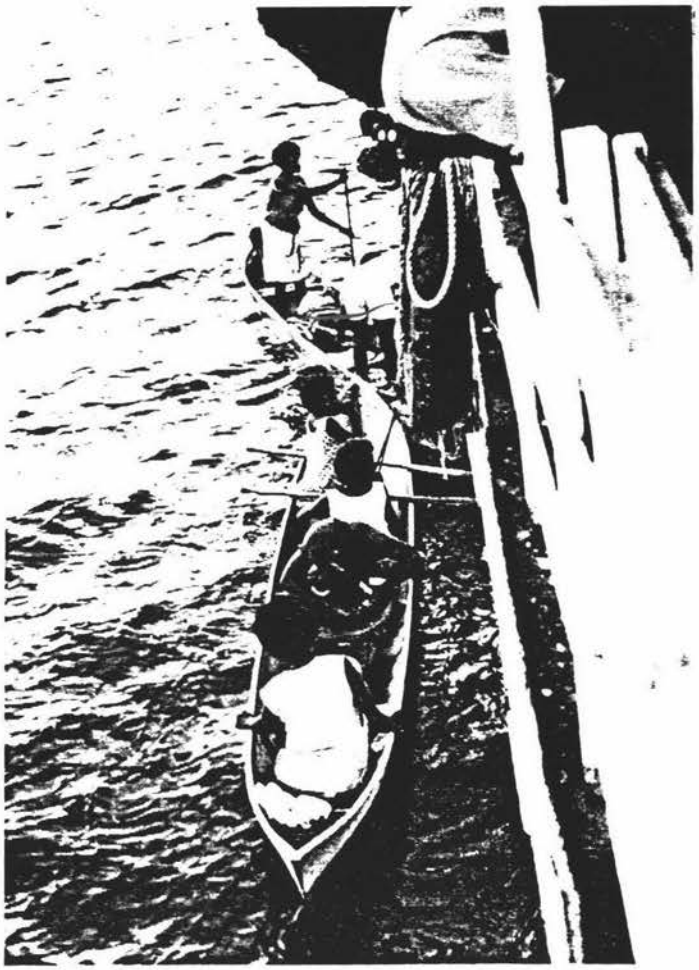


PHOTOGRAPH 3: Nukiki village rest house.

of 'permanent material' (ie. sawn timber, fibrolite and corrugated iron) was considered desirable if one could afford it even though they were often much hotter in the tropical climate than leaf houses. Apart from the new church and three leaf buildings with corrugated iron roofs, I noted only three 'permanent houses' in the greater Nukiki area.

In July 1991 the population of Nukiki was 408. Of this 177 were adults and 231 children under the age of 16 years. Family size was by New Zealand standards, very large and it was not uncommon for a family to have seven to ten children. In fact a family with five children was considered to be small and when I said that I had only two children there was disbelief and one or two sideways glances. I hastily explained that most people had small families in New Zealand now! With 57 percent of the Nukiki population aged 15 years or less there was, however, concern among the villagers that, in time, their land resources would be insufficient to support their steadily increasing population. Although there was a primary school in the village there were very few places available in the one secondary school on Choiseul (or in any other secondary school for that matter), so higher education opportunities for village children were severely restricted. Coupled with limited formal sector employment opportunities, both at the local and national level, many of today's young people would stay in the village for most of their lives. Consequently they would remain dependent on their land for their livelihood.

For the Nukiki villager day to day transport was either by foot or by canoe. Every household had at least one canoe, this being a locally made wooden dugout of varying length but generally in the order of 3.5 to four metres. Within each village one could usually find a couple of very large dugout canoes fitted with a transom capable of carrying an outboard motor. These canoes could carry a dozen or so people and could be as long as six or eight metres. Often these were very well made and when under-way sliced through the water in a most impressive manner. Because of their low free-board one tended to get wetter than in the fibreglass canoes and if the boat did not have a hard chine they felt unstable. However, this was not a problem to the villagers as, brought up on the water's edge, they were excellent seamen. Because of this my frequent sea journies by canoe were most enjoyable although somewhat of an adventure, particularly in rough weather.



PHOTOGRAPH 4:
Canoes alongside trading vessel *M.V. Bona*, South Choiseul coast.

Children played in canoes from a very early age and it was not unusual to see small boys paddling around in baby sized canoes. The villagers would often stand up to skull their canoes and a lasting memory I have is of village boys singing at the top of their voices as they surfed into the mouth of the Talaevondo Stream in their canoes at sunset.

Well used pathways linked the various villages and gardens. Although the villagers sometimes wore jandals (thongs) they usually walked bare foot. As a result the soles of their feet were hard and calloused, so much so that they could walk across sharp coral without pain.

The pattern of village life revolved very much around the church and the gardens. While the church provided the spiritual and social focus to the community it was the gardens that provided the villagers with most of their food. Consequently gardens

featured prominently in their thinking. Prepared using shifting or swidden cultivation methods, these gardens were located in the forest anywhere from 15 minutes to one hour's walk away from the villages. While each family may have two or three gardens it was more common for the gardens of the older generation to be located nearer their resident village than those of the younger generation. As the population increased the younger generation had to walk further into the forest to establish their garden sites. The population increase also impacted on the garden cycle, with fallow periods being as short as three or four years depending on the size of the family's holdings and the number of mouths they had to feed. A consequence of this was that forest land, once converted to gardens, had insufficient time to regenerate fully between cultivation periods (I estimated a period of 15 to 20 years would be needed for high forest to develop).

While western society has become highly specialised and, as a consequence, the division of labour highly differentiated, this was not the case in Nukiki. Western society, for instance, would make a distinction between forest use and garden production. However, in Nukiki garden production was very much integrated with the villagers' use and perception of the forest. No distinction was made between the two and because of this, and the fact that the garden cycle was reliant on forest regeneration to maintain garden fertility, I have viewed gardens as a forest use. As I was to observe when looking at a logging operation on land belonging to a neighbouring village, any modification to the forest had a major impact on garden production and in fact was one of the villagers' main points of contention about logging.

Formal sector employment, except in the case of the teachers and minister, was not available in the village. Village life was, however, quite structured, both in terms of how the community was administered and how the people used their time. Although the pace of life was relaxed there was a daily, and a weekly, village routine. For example, the daily routine, as anywhere, varied between households. However, sometime between 5.30 and 6.00 am the village pastor rang the village bell calling the people to have their family prayer time. A morning church service, *lotu*, was held at 7.00 am but I had it on good authority that only the most devout made it to these services! The villagers had two main meals a day, usually both consisting of sweet potato supplemented by another vegetable or some fish. The morning meal was eaten any time between 7.00 and 10.00 am depending on what work had to be done, whereas most people had their evening meal around 7.00 pm. The rest of the day was spent

working in the gardens or doing the chores necessary to keep the village and households functioning.

During the week Monday, Tuesday and Saturday were family work days when family members would spend their time in the gardens, coconut plantation, would go fishing, diving or hunting, repair or build houses, canoes or implements, cut and carry firewood, or undertake other household chores. Wednesday and Friday were designated as community work days when, for example, men would work on the church or school buildings and Thursday was women's fellowship day when the women would get together and the men would do the household chores. Sunday was a day of rest and worship.

Work was often a communal affair in Nukiki although there was a definite distinction between jobs done by men and those done by women. I did, however, get the impression that these distinctions were beginning to blur, particularly in the area of household duties. I was, however, still one of the few men to be found washing clothes at the river! The division of labour in Nukiki society was therefore between sexes rather than across the society as a whole. While there was some specialisation most men, for example, seemed to be able to turn their hand to house building, garden clearing, canoe making, hunting, gathering, fishing, copra drying and perhaps diving. The women's knowledge of gardening, on the other hand, was more specialised than that of the men. As a people, the villagers had a very detailed practical knowledge of their natural world; the forest and its fauna, uses of trees and plants, herbal medicine, the habits of birds and other forest dwelling animals and the uses to which these could be put. As well as being excellent bushmen they had a very good knowledge of the sea knowing intimately the influence of the moon on the tides, currents, weather and marine life. In the time I lived in Nukiki I developed a great deal of respect for the villagers' knowledge and specialised use of their natural world as it was far more comprehensive than that held by most members of my own society.

Nukiki Village Land

The villages of Nukiki are located on land belonging to the Bakele, Solomo and Siropodoko people (see Figure 5.1). Because of this, and because of marriage with

members of other tribes, there was a mix of tribal connections within the villages. However as my research was centred primarily on the village of Tarepasika, and as this was located within Siropodoko land, I limited myself to researching the customs of, and exploring the land territory controlled by, the Siropodoko people.

In former times the coastal land between the Talaevondo Stream, Zalepima Stream and reaching inland to the sites known as Tuaqa, Kopakopara, Sarakuse, Burokuni and Vuligi, belonged to the Solomo people (see Figure 5.1). However, eight generations ago the Solomo people fought against a neighbouring tribe, the Ghuruvasu, who lived to the south east of the Zalepima Stream. These people were too strong for the Solomo to defeat on their own so they enlisted the help of their Siropodoko neighbours who were living inland in an area now known as the middle bush. In return for this assistance the Solomo people promised to give the Siropodoko *kesa* (custom money) for any Siropodoko men that might be killed. The ensuing battle was a stiff one indeed and many Siropodoko were killed. So many in fact that the Solomo did not have enough *kesa* to pay for all the deaths. In order to meet this debt it was agreed that Solomo land would be given to the Siropodoko instead. A payment such as this, where land is given as payment for spilled blood, is known as *panaka* in the Vasiqasiqa language and was the explanation given as to how the Siropodoko people acquired the land on the coast and why the Solomo people left the area to make way for them.

As with the previous Solomo occupants the boundaries of the Siropodoko land around Nukiki are clearly defined and in fact were in the process of being formally recorded through the Land Working Committee of Lauru at the time I was undertaking my research. While this land was held in common by the Siropodoko people, families, or individuals, from within the Siropodoko tribes could take up land within the tribal commons and thus acquire exclusive rights to a particular area. These rights were obtained by working an area of the common land, or by planting something on it. For example, bush land that was part of the commons could be claimed as a garden site. Clearing of the bush would commence and from this time that land would be considered the property of the person or the family that worked on it. Likewise someone might plant a tree; a sago palm, nari nut, betel nut or qaluveko for canoe building for instance and that tree would then belong to that person. As well as appropriating land for themselves, the Siropodoko inherited land from previous generations. Land appropriated by a man

would thus be handed down to his sons and subsequently became the exclusive property of his family. Nukiki society was, at least in former times, patrilineal. It seemed to me, however, that nowadays there was considerable flexibility in the system of inheritance and a more liberal approach to land allocation between sons as well as daughters was taking place. There were, however, still rules governing land transactions and the right of tenure and it was the chiefs who were the guardians of these customs.

The chiefs were democratically elected, one from each of the four tribes that comprised the Siropodoko people. These tribes had their origins in the four children of Dokakalo, the first Siropodoko chief to settle in the Nukiki area after it was vacated by the Solomo. The names of these tribes were Moqerego, Dokakalo's first born son; Sarekana, his second born son; Nanavua, his daughter and Ugumatakana, his last born son. Although land holdings amongst the four tribes were well and truly mixed, the people still identified with a tribe (or tribes) and in turn used that tribal affiliation to elect a chief whose job it was to make sure land boundaries and people's property rights were respected. For ease of administration, however, the Siropodoko land was simply divided into four areas, each chief having jurisdiction over one of these. Thus a chief would represent all people within that area, not just members of his own tribe.

Custom dictated that land could not be sold. A land owner could, however, allow a friend to use his land provided the approval of the chief was first obtained, but the friend could never gain title to this land. As well as land, trees which had an established owner, could also be inherited by subsequent generations. Often in the case of coconut plantations, for example, where available land suitable for plantations was limited, ownership could be quite diverse. Trees simply belonged to those who planted them or to the owner of the garden on which they naturally occurred. To avoid the problems associated with diverse ownership in subsequent generations it was not uncommon for a man to allocate his land or trees to a particular son or daughter, as the case may be, upon his death. Because, however, copra production was one of the few ways the people had of earning cash this did not appear to be done with coconut plantations. Instead the plantation was shared by the sometimes many inheriting families who agreed among themselves on an allocated time in which each could make copra. If an outsider married into the tribe they could acquire use of common land only through their spouse. However, if their spouse died they could not inherit this land but could retain the use of it for as long as they needed it. Their children, through the connection of the spouse, could, however, inherit this land.

Such was the pattern of land tenure in Nukiki. It is a system that relies on unlimited common land being available to absorb tribal expansion. That the land supply was, in fact, finite was a matter of increasing concern for the villagers who could foresee the day when their land resources would be exhausted. As their population continues to grow each subsequent generation is pushed further away from the village in their quest for land. Although this trend is partially offset by inheritance, this is not enough to prevent the eventual depletion of the common land. If accepted, family planning would seem to be a relatively simple way of solving this problem.

Use of the Village Land

The forest, the land and the sea provided the villages of Nukiki with most of their livelihood. As a source of food and material one supplemented the other and to make a distinction between them would, in many respects, have been artificial. Their knowledge of the natural world certainly extended across the boundary between the land and the sea and to concentrate on only one aspect of this environment and not the others would be to misrepresent what was a complex, but interrelated, situation. What happened in one area always impacted elsewhere in the natural environment. Nevertheless, unlike the Nukiki villagers, my knowledge of the natural world was, to a greater extent, specialised and this limited me to studying village use of the forest, land and natural areas down to the shoreline. It was not until near the end of my stay in the Solomon Islands that I donned mask, fins and scuba gear to explore the underwater world beyond the reef but unfortunately this was well outside my research area so was not directly relevant to my study.

Climatic Influence on Use of Land

Located in the tropics, seasonal variations in the climate of Choiseul were not great. Although the villagers did make a distinction between the dry season (April-October) and the wet season (November-March), disturbed weather patterns meant that my sojourn during the 'dry season' was particularly wet.

Most food crops were available throughout the year. A notable exception, however, were the fruit and nuts of forest trees but as these provided relishes only, the seasonal variation in their availability did not affect the staple diet of the villagers. Food production was influenced to a much greater extent by monthly variations in weather and tidal patterns which, the villagers told me, were directly related to the position of the moon. This then determined the food harvesting, planting and fishing patterns. For example, during the old moon there is a lot of rain, the currents are strong and the fish do not feed much. Harvesting gardens in very wet conditions is difficult because tracks are impassable and there is little point in fishing when the fish are not biting. Conversely during the full moon there is little rain, the current is weak and the fishing is excellent. Melons are best planted when the moon is full. The villagers were able to describe in detail weather, tidal and fish feeding patterns at the various stages of the lunar cycle and these are recorded in Figure 5.3.

Village Gardens

Cultivated using swidden or shifting agriculture methods, the gardens were clearly the main source of staple food for the Nukiki villagers. Located up to three or four kilometres from the villages these gardens were established in areas that had been cleared of bush. Topography did not limit the location of the gardens and often they could be found on quite steep terrain. In one garden I estimated slope to be as steep as 30 degrees (see Photograph 6), and even more in several places.

The gardens of the Tarepasika and Nukiki villagers were located in the Talaevondo, Barabara, Malatakana, Narimadaka/Libakuda and Vughala areas (see Figure 5.4 for map of village gardens). Access to the gardens was by way of bush tracks and, if the weather had been particularly wet, these became virtually impassable. Geologically the land on which the gardens were located was limestone karst country. As such it was fertile and relatively stable in spite of its steepness. Gardens, initially established in the vallies, had crept up the hillsides as the villagers' demand for garden space had increased. From the air it was clear that the gardens had penetrated the foothills in an almost even line behind the flat but relatively narrow coastal shelf (see Photograph 7).

FIGURE 5.3: LUNAR CYCLE *

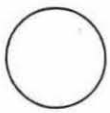
NEW MOON

The time of the new moon is called "lokavulu."
Dark all night, moon "comes up" in the west.
Lots of rain at this time.
Tidal currents strong, sea rough.
Fish feeding but strong currents make fishing harder.
High tide in the evening.
Hermit crabs come out.

FIRST QUARTER

Moon visible first half of the night only, "comes up" above.
Rain stops.
Hermit crabs hide again.
Tidal current still strong.
High tide at night.
Fish feeding but strong currents still make fishing harder.

FULL MOON



Moon visible all night, "comes up" in the east.
Little rain.
Tidal currents weak.
High tide early in the morning and big tidal changes.
Fishing is good.

THIRD QUARTER

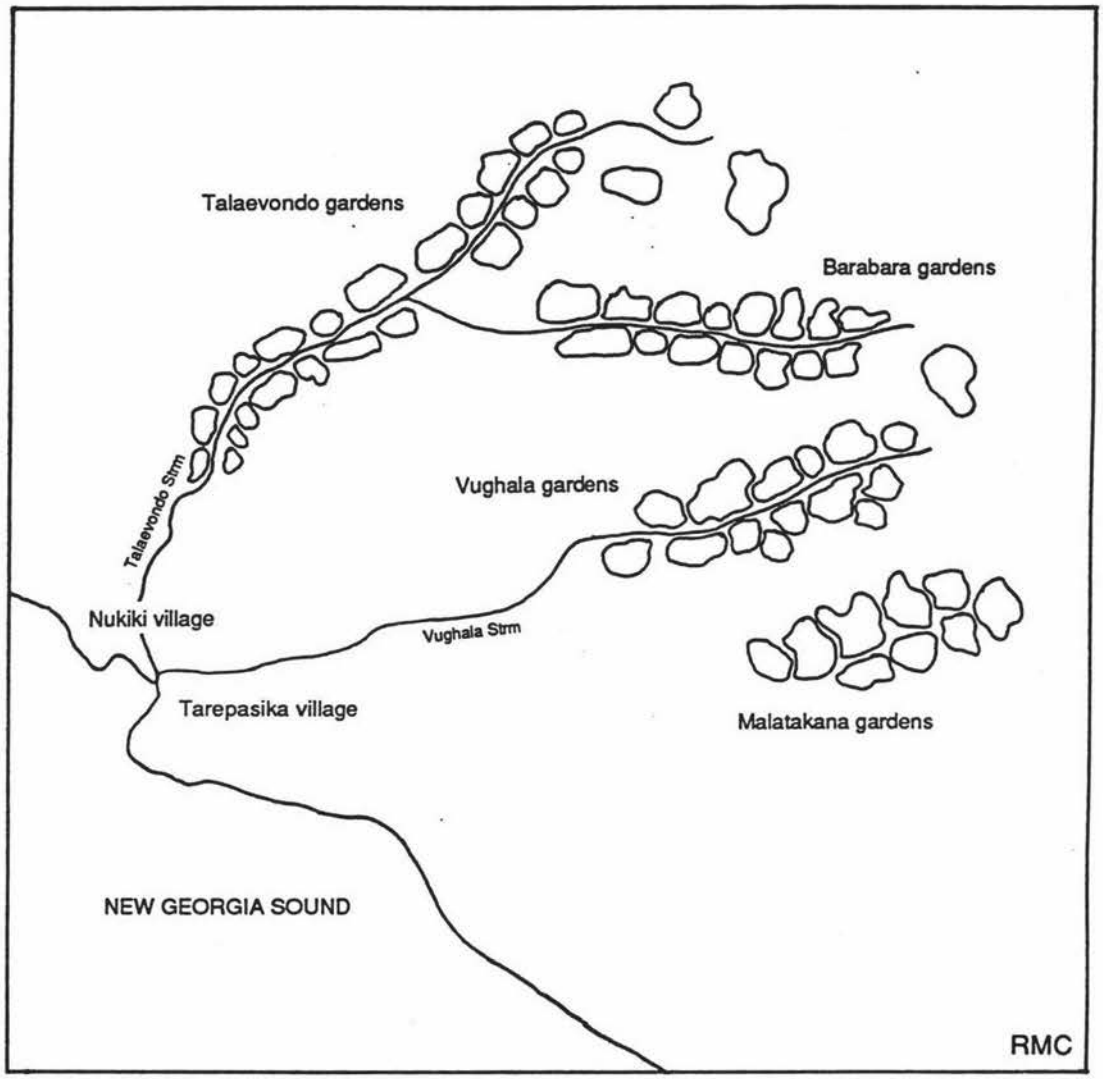
Moon visible second half of night only, "comes up" above.
Not much rain.
Tidal currents weak and tides not so pronounced.
High tide during the day.
Fishing is good.

OLD MOON

Dark all night, moon "comes up" in the east.
Lots of rain.
Strong tidal currents.
Fish do not feed much so fishing poor.
High tide in the afternoon.

* Lunar cycle as related by Solomon Zarabule.

FIGURE 5.4: NUKIKI AND TAREPASIKA VILLAGE GARDENS

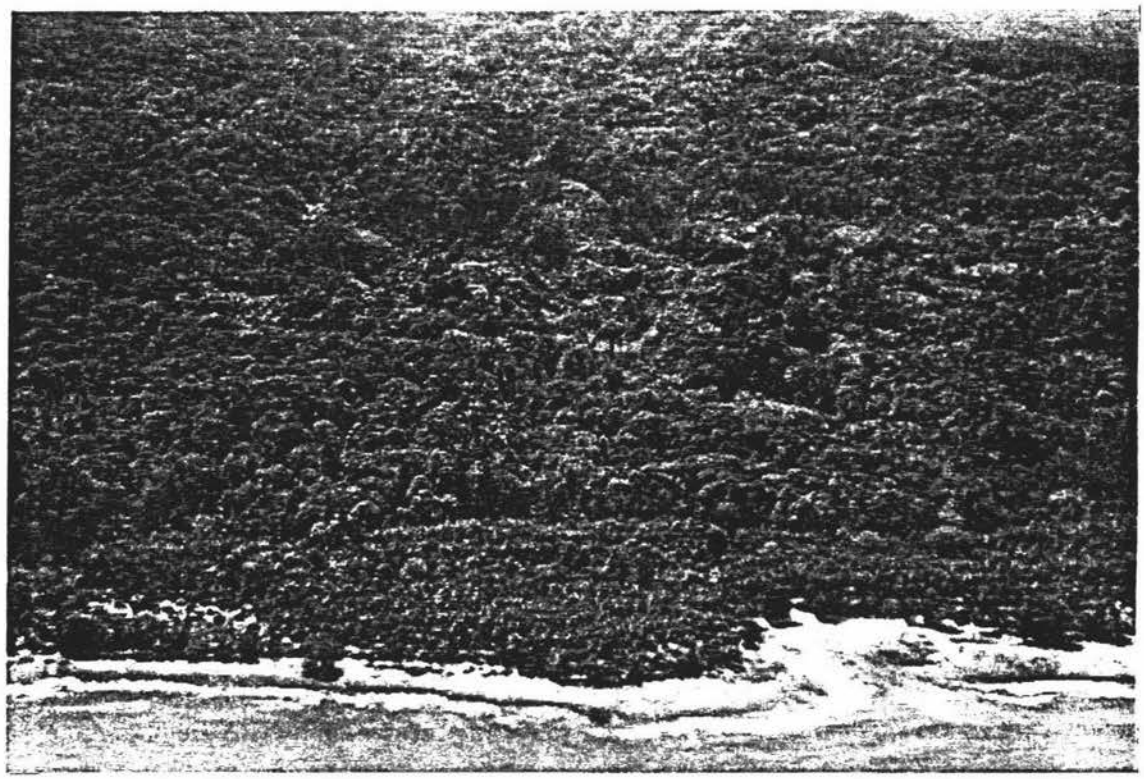


PHOTOGRAPH 5: Mt. Talaevondo garden site.

PHOTOGRAPH 6:

Thirty degree slope,

Mt. Talaevondo gardens.



PHOTOGRAPH 7: Aerial view of Wakatipu village and the Mt. Talaevondo gardens. Coconut plantations on the uplifted coral terrace in the foreground.

Garden Production

Before infestations of the taro beetle (*Papuana spp*) and taro blight (*Phytopthora colocasiae*) depleted taro crops in the post World War II period, taro had been the staple diet of the villagers. Now sweet potato had taken its place. Consequently the daily diet of the villagers usually consisted of sweet potato either boiled in coconut milk or baked in an *umu* (stone oven). It was often supplemented by greens such as local cabbage or pumpkin sprouts, fish or banana, depending on what was available at the time. Most villagers normally ate two main meals a day and these were both were similar in composition. Diet appeared fairly plain, however when I listed the different variety of vegetables grown by a number of households, it was surprisingly comprehensive. Included in this list were yams, taro, tapioca, local cabbages, pumpkin, cucumber, tomatoes, spring onion or shallots, beans, banana, pineapple, peanuts,

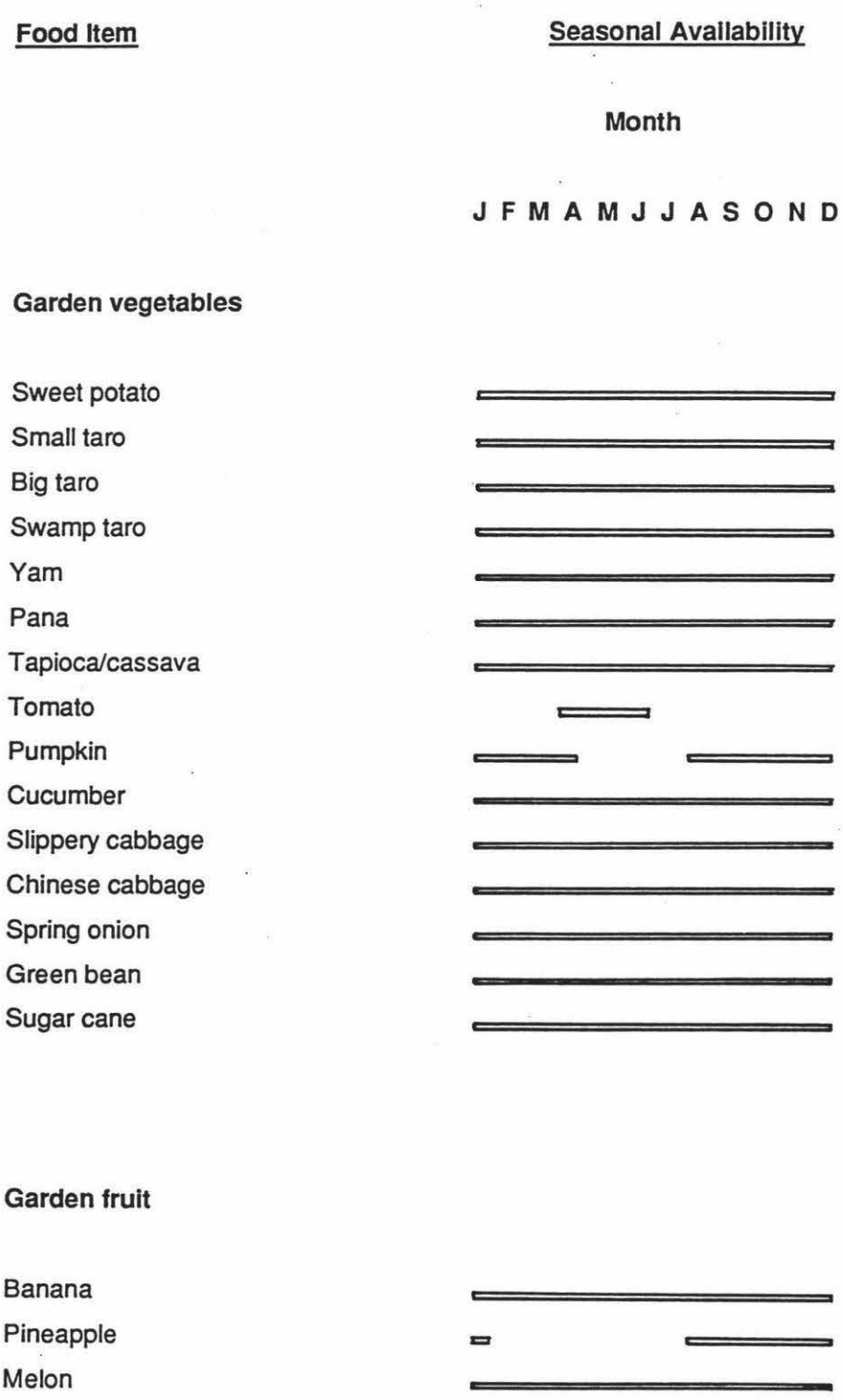
oranges, breadfruit, pawpaw, mango and of course the ubiquitous sweet potato. Unlike in some areas the villagers of Nukiki were blessed with good soil and, at the time of my study, sufficient garden land. Consequently they did not suffer seasonal shortages of garden food. There were, however, seasonal variations in crop availability and this, as well as a fuller list of vegetable and other food varieties grown in the gardens, is listed in Table 5.1. Seasonal availability of garden and bush food is shown in a seasonal food calendar (see Figure 5.5).

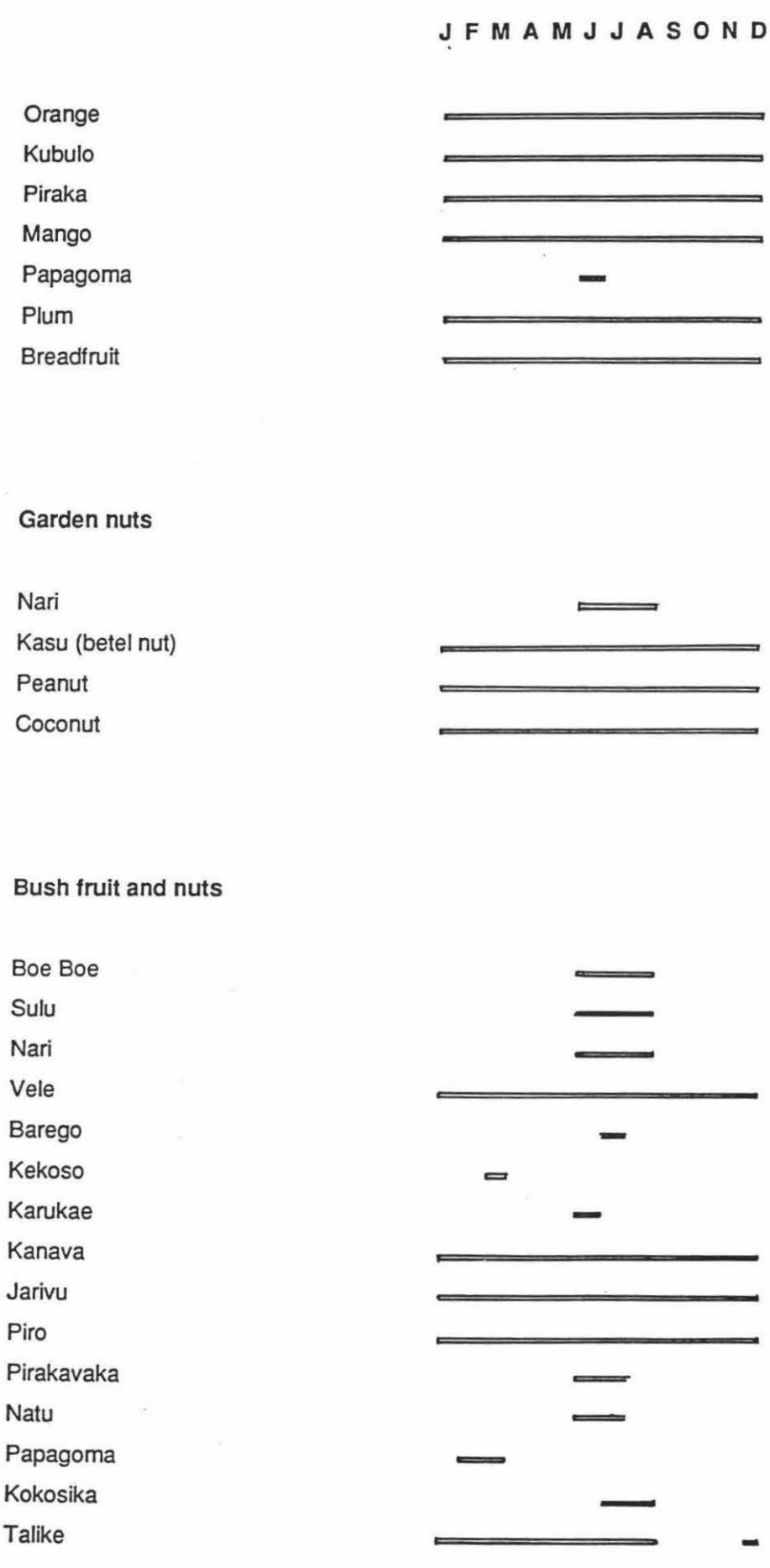
The planting and tending of gardens was the responsibility of the women. However, the heavy work of clearing the bush and making the garden site ready belonged to the men. The clearing of garden sites totally destroyed the forest cover but because only hand methods were used soil disturbance was minimal. Had these gardens been located in an area that was geologically less stable erosion could have occurred, but as it was the porous limestone karst country absorbed much of the run-off thus maintaining water quality. Unlike the logging area to the south east of Nukiki the streams still ran clear in the garden areas. Having been a forester I could not help but notice the number of good timber trees felled to waste and burnt in the garden areas. When I asked if these could not be used for house or canoe material a villager explained that they had more accessible trees closer to the village and that the timber on many garden sites was too far away from the village to be of practical use. Everything had to be carried by hand so it was hard work trying to transport anything over land. Because standing trees shade the garden and reduce soil fertility few trees are retained in garden areas regardless of whether or not they would provide useful building material. The only exceptions were the particularly prized trees such as the nari nut, betel nut or sago palm and these, more often than not, had been planted. Gardens, however, were not always contiguous so there was often common bush land between garden sites. This was a source of firewood and timber for building purposes if it was within reasonable distance of the village.

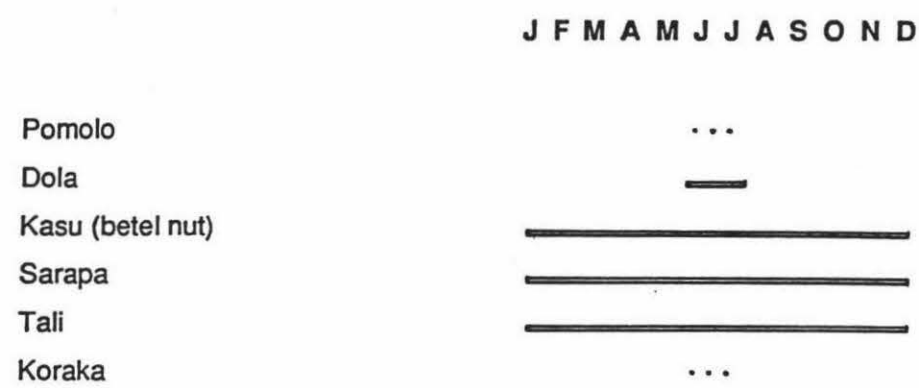
Forest Produce

The forest surrounding Nukiki was a major source of produce. Not only did it provide building material for houses and canoes, but it also provided firewood for cooking and copra production. In addition it was a source of medicine, fruit, nuts and edible shoots

FIGURE 5.5: SEASONAL AVAILABILITY OF GARDEN AND BUSH FOOD




J F M A M J J A S O N D
Orange
Kubulo
Piraka
Mango
Papagoma
Plum
Breadfruit
Garden nuts
Nari
Kasu (betel nut)
Peanut
Coconut
Bush fruit and nuts
Boe Boe
Sulu
Nari
Vele
Barego
Kekoso
Karukae
Kanava
Jarivu
Piro
Pirakavaka
Natu
Papagoma
Kokosika
Talike



Bush food plants

(Refer to Tables 5.1 and 5.2)

and leaves; it provided a habitat for edible wildlife as well as providing materials for implements or tools such as bows and arrows, spears, brooms or brushes. Candles, glue, string and bindings were also made from material obtained from the forest. The people of Nukiki benefitted from the forest in other ways as well, some more tangible than others. A number of *tambu*, or sacred, sites were located in the forest and much of the people's custom, or history, was associated with the forest (See Appendix 2 for Nukiki custom stories).

Perhaps less tangible, but in fact more significant, was the fact that the forest protected the land, guarding against soil erosion and rejuvenating soils that would otherwise have been leached in the wet tropical climate. This had a direct effect on water quality and the fisheries, both fresh water and marine. In villages to the south east, where forest had been removed by logging, soil fertility and subsequently garden productivity, had declined. Increased runoff, coupled with soil disturbance by bulldozers, had led to erosion and a decline in stream water quality brought about by siltation. Flash flooding and stream aggradation had also occurred. Through the sedimentation of feeding areas and the interruption of the food chain, fishing in the area had declined. The consequences of this were disastrous for those villagers whose livelihood had depended on a productive natural environment.

Food Obtained from the Forest

The forest played a supplementary role in providing food for the villagers of Nukiki. Garden produce was supplemented with fruit, nuts, shoots or leaves gathered from the forest and from time to time edible wildlife was obtained as well. This included birds, bats, frogs, lizards, possums, wild pigs and freshwater fish. Table 5.2 lists the various sources of forest food. It includes forest trees, plants, birds and other edible wildlife. The seasonal availability of forest food is included in a seasonal food calendar (see Figure 5.5).

Two methods were commonly used to catch birds for food: snaring them or shooting them with a bow and arrow. The snare was constructed using a string loop made from the azopane tree (see Table 5.7). This was placed on a branch of a tree near the trunk

so the bird could approach it from one direction only. Some fruit was placed in the middle of the loop and when the bird fed on it the snare was pulled tight (see Figure 5.6).

Although the Nukiki villagers have Vasiqasiqa names for all the birds in their area it was necessary for me to translate these into common names. This was done with Solomon Zarabule, one of my principal informants, using the book *Birds of the North Solomons* (Hadden, 1981). Where photographs were not available for Solomon to identify the birds I matched descriptions on a best fit basis. Because, however, verification in the field was not undertaken my nomenclature may contain some errors.

Pig hunting was a sport enjoyed by some villagers. On a trip to his Barabara garden site Gerald Pitakoe showed me a spear he kept handy in his garden. As Gerald's garden was at the far edge of the garden areas and hard up against uncleared bush, he was sometimes troubled by pigs damaging his crops. Sometimes his dogs would bail up a pig so Gerald would grab his spear and bush knife and give chase. Just like hunters anywhere Gerald enjoyed a good *stori* about 'the big one that didn't get away.'

Food Obtained from Areas other than the Forest

Because additional important sources of food were also obtained from areas outside the forest these have been listed separately in Table 5.3. This includes seabirds and of course salt water fish. The reef provided the villagers with shellfish plus bait fish that were used in their frequent fishing expeditions beyond the reef. My study did not include the fisheries in any detail, although I did obtain some information on fishing, diving for trochus shell and spear fishing beyond the reef.

Turtles

From time to time the villagers caught a turtle and used its meat as food. Turtle eggs were also eaten. Before logging caused siltation and aggradation in the Pavora River (see Figure 5.1), two species of turtle used to come and lay their eggs on the beach in

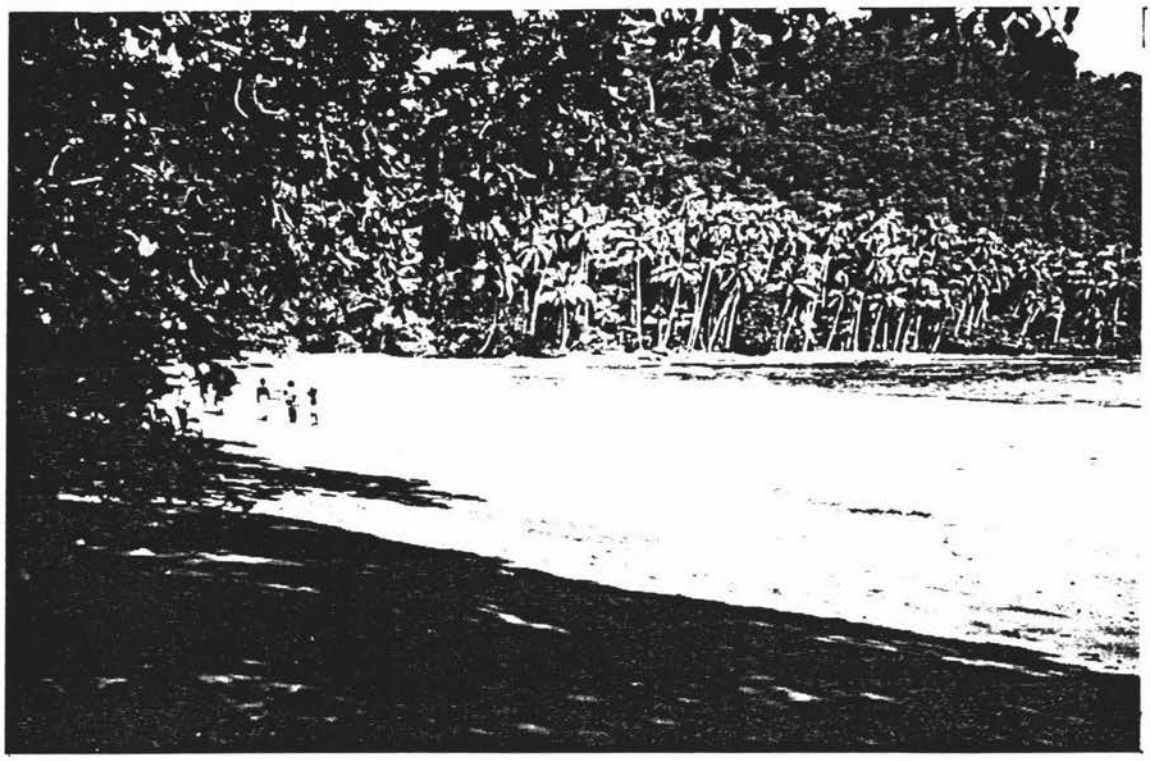
Pavora Bay. These were described to me as the big black turtle with a soft shell and the hard shelled turtle (see Chapter 7). These were respectively named mokolo and teqe in the Vasiqasiqa language. Of these mokolo was the more frequent visitor to the bay. Pavora Bay and Mbirambira Bay were unusual in that they were not enclosed by a reef, hence their beaches were exposed to the open sea and this made them suitable as turtle nesting sites. Use of Pavora Bay had, however, declined since the siltation had occurred.

Fishing

Fishing was usually done from canoes using nylon fishing lines, hooks and an iron bolt or a stone as a sinker. Bait fish were obtained by spearing them or catching them by hand in the river mouth or on the reef at low tide. Octopus was also a favourite bait and these were also caught by hand on the reef. Sometimes women stood on the edge of the reef to fish at low tide but I do not recall seeing any men doing this. Conversely it was only the men and boys I observed fishing from canoes.

Diving

Frequently one or two canoes would be positioned just off the reef while their owners went diving. Sometimes this would be to collect trochus shell, a source of cash, and other times it would be for spear fishing. Using home made wooden spear guns that fired a wire spear (see Figure 5.7), and wearing small swimming goggles, the owner would hold on to a rope attached to his canoe and dive down until the pressure around his goggles hurt his eyes. Spear fishing at night using an underwater torch was especially productive as the fish were sleepy and easy to spear. Crayfish were also easier to catch because they would come out of their holes to look at the light.



PHOTOGRAPH 8: Beautiful Pavora Bay.

PHOTOGRAPH 9: Fishing for bait fish inside the reef at Nukiki.

FIGURE 5.6: BIRD SNARE

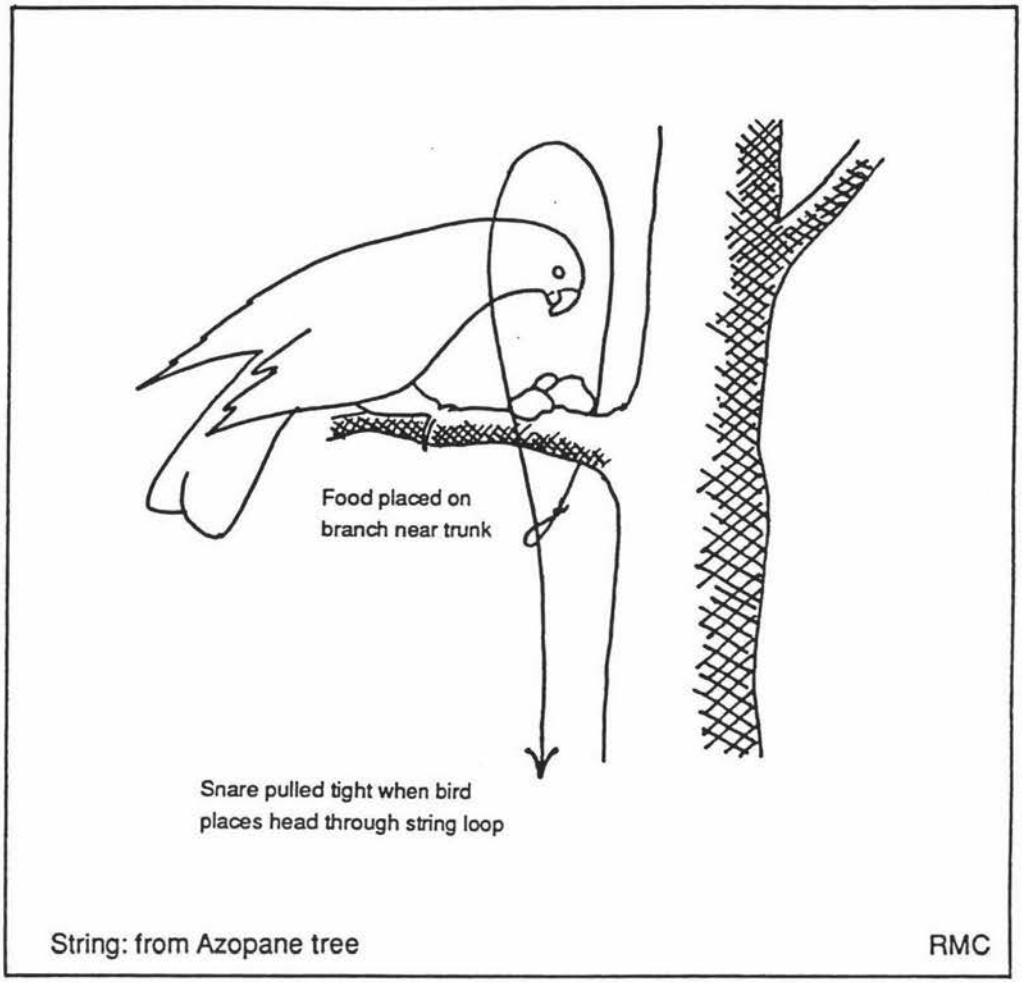
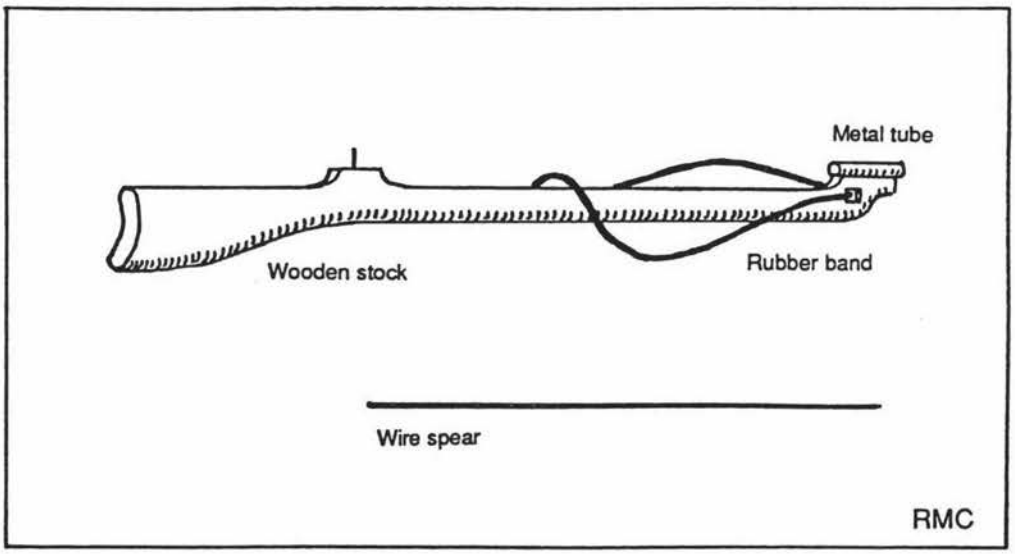


FIGURE 5.7: UNDERWATER SPEAR GUN



Forest Produce other than Food

Firewood

Although kerosene was readily available in the Solomon Islands the villagers of Nukiki could not afford to use it for cooking (although they did use it sparingly for lighting). Consequently all their meals were cooked over a fire. The usual method of cooking was to boil vegetables in pots over an open fire but quite frequently an *umu*, or stone oven, was used. The stones were first heated in the fire and once this died down vegetables, fish or tapioca pudding wrapped in nuale or banana leaves were placed on the hot stones. Everything was then covered with leaves thus allowing the food to bake within the *umu*.

These cooking practices made firewood a very important item of forest produce. Firewood trees could be claimed in any area of common land but once a tree had been cut down it became the property of the person who felled it. It was then up to this person to decide whether or not they would share the tree with other families or keep it for their own use. Maintaining the supply of firewood had traditionally been the responsibility of the women although it was usual for the men to fell the trees and in many cases to chop them up. The carrying of firewood, however, seemed to be still the women's lot.

Both the husband and the wife would respect any agreement made by their partner to give someone else access to their firewood supply. Wastage by another villager was, however, frowned upon and I was shown a tree that had been felled and partially cut but left to rot. Apparently the *offender* had cut the wood too long for his wife to carry!

In addition to using firewood for cooking it was also used for drying copra. Copra was graded according to its quality and a premium price was attached to the higher grades. Smoky and poorly dried copra was lowly graded (grade 3) and attracted the lowest price. The choice of firewood was therefore particularly important as some species burned hot and clean and others were very smoky. Kivili and mangrove wood, for example, were considered to be excellent copra drying firewood and capable of producing premium grade (grade 1) copra. Coconut shells were also very clean-burning

Table 5.4 lists some of the tree species used as firewood.

House construction

Although several families in the Nukiki area had obtained cash from working relatives to build houses from 'permanent material,' the majority of Nukiki villagers had very little cash. Consequently most village houses were made from bush material.

Leaf house construction was a specialised business and made ingenious use of available bush material. I was fortunate in that I could observe, photograph and make notes on several building projects during my stay in Nukiki as housebuilding (or rebuilding) was always being undertaken somewhere. Leaf house construction is best described diagrammatically. Thus Figure 5.8 shows the method and sequence of construction as well as the bush materials used in building a leaf house. The use of timber and other bush material for house construction was quite specialised. Table 5.5 lists house building trees and plants and the uses to which these species were put.

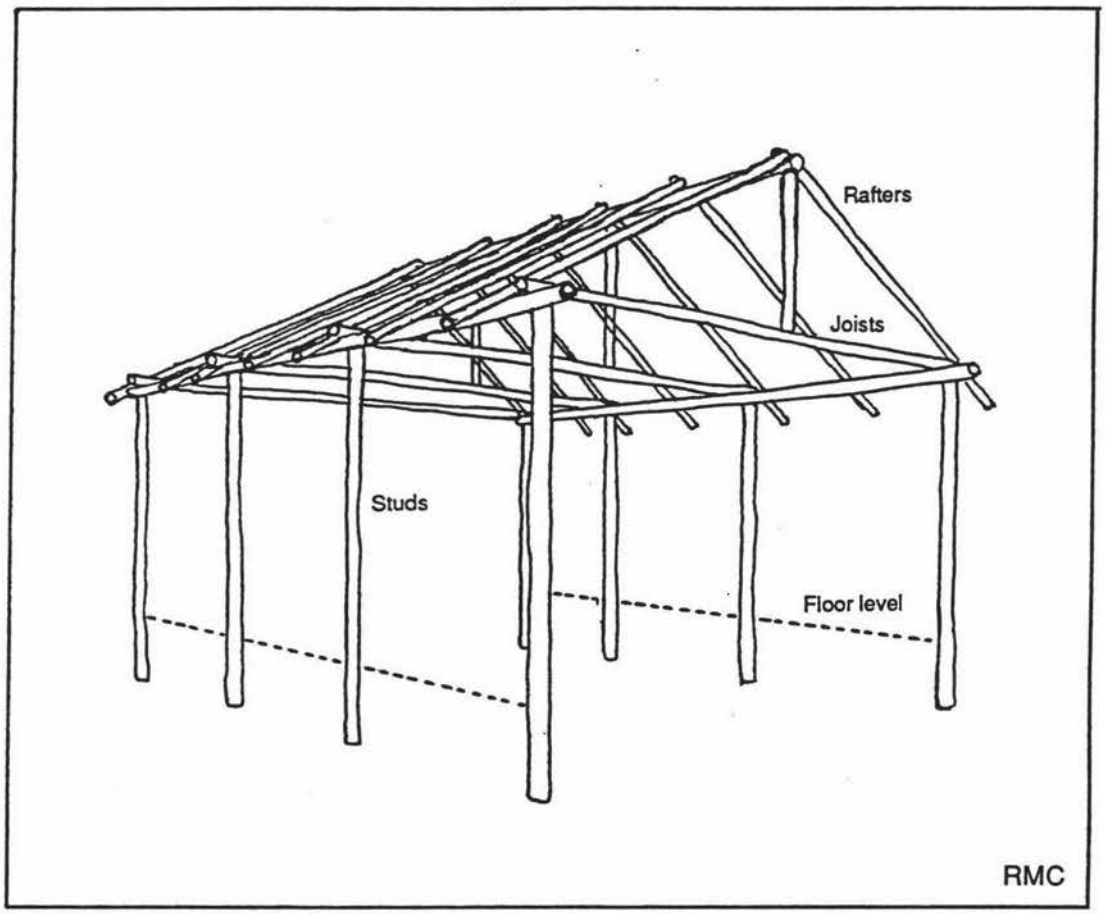
Canoe building

There was no shortage of canoes in and around the villages of Nukiki. Every family seemed to own, or have access to, at least one canoe although I did note that it was mostly the men who paddled them. Canoes came in two main sizes. The most numerous type was the double ended, 3.5 to four metre, dugout. This was paddled by hand and was used for fishing, daily transport and for carrying small loads of copra. In many respects it was the Nukiki version of the family car. These canoes were made locally and I was able to observe a number in various stages of construction in the Nukiki area and at Moli, where the logging operation had provided an abundant supply of small logs suitable for canoes. Unlike the Maori canoes of old the villagers did not burn out the inside of the canoe but rather relied on axes, and possibly adzes, to shape the log (see Photograph 12).

Because suitable timber trees had been depleted around Nukiki the larger six to eight metre canoes were no longer made locally but were imported from places like Vella Lavella. Some villagers had planted replacement trees but it will take some twenty years before these are of suitable size. Table 5.6 lists tree species used for canoe building.

TABLE 5.8: LEAF HOUSE CONSTRUCTION

Leaf House Framing



Battens: Vilaki, Rumese, Sarende, Kodama, Qema, Qalu, Naqeme (not shown)

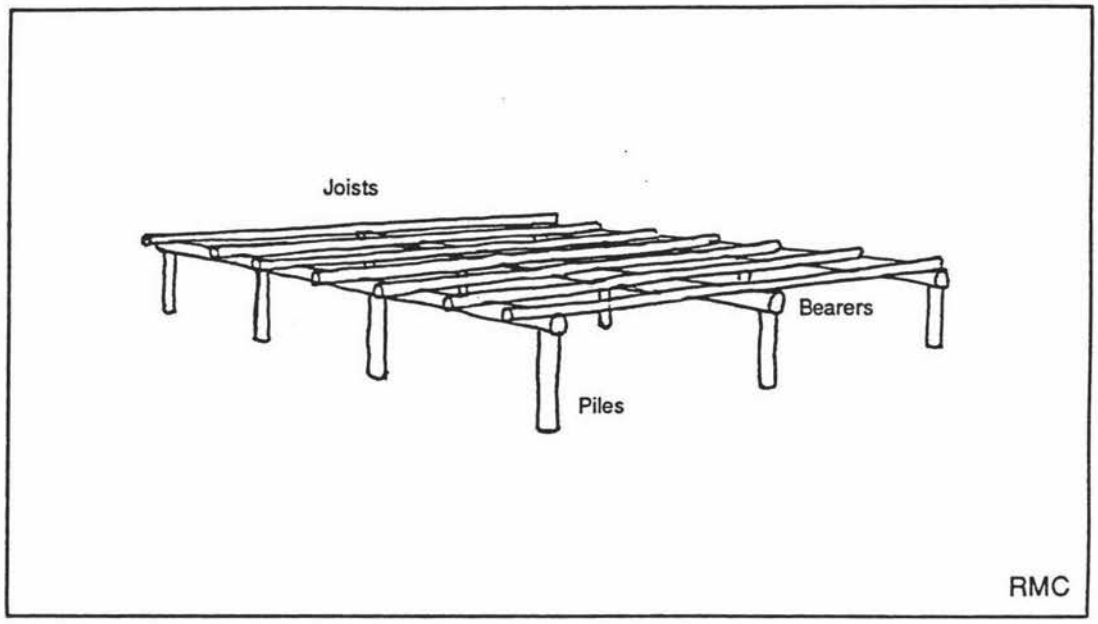
Lashing: Siku, Sudulu, Sasake (not shown)

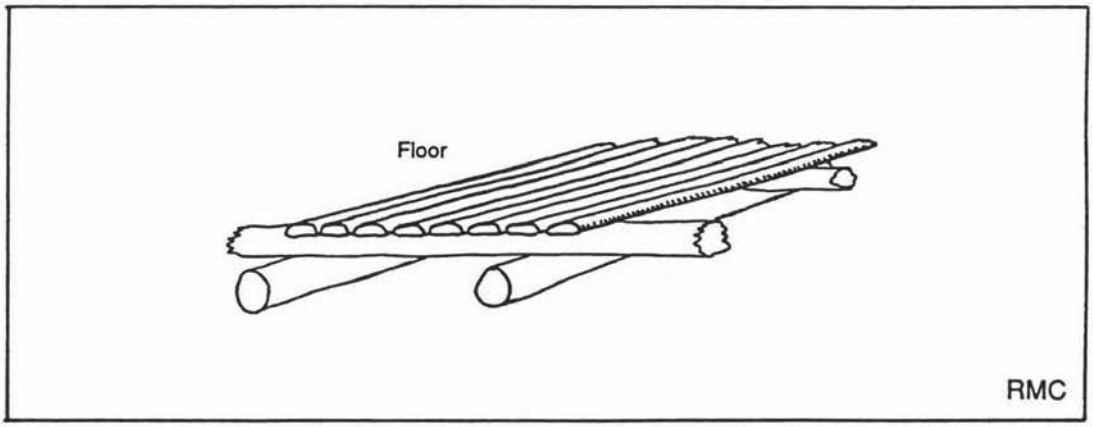
Rafters: Vilaki, Rumese, Sarende, Kodama, Qema, Qalu, Naqeme, Zago, Sisinivu, Kivili

Studs: Gurama, Vedeke, Podovaritora

Joists: Gurama, Vedeke, Qema, Qalu, Naqeme, Tunima, Sisinivu, Kivili, Podovaritora, Garagara

Foundations and Floor





Piles: Gurama, Vedeke

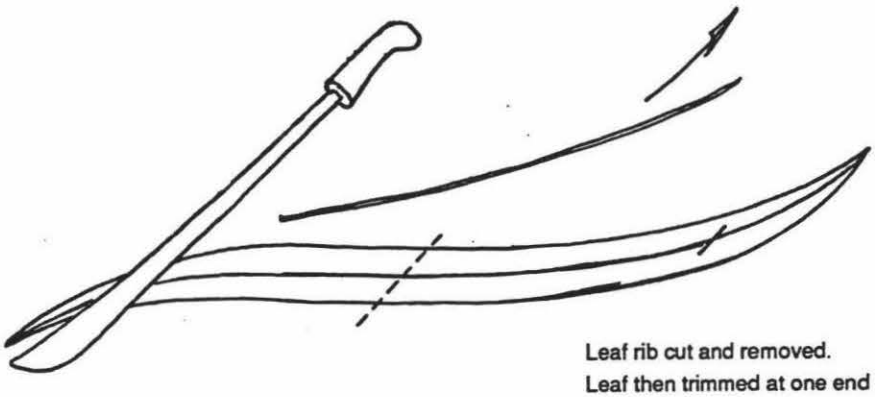
Bearers and joists: Gurama, Vedeke, Qema, Qalu, Naqeme,

Tunima, Sisinivu, Kivili, Podovaritora, Garagara

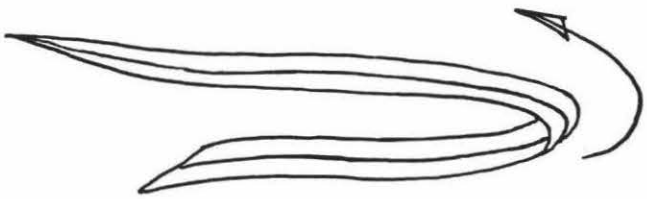
Lashing: Ponolo

Flooring: Garagara, Viluaka, Baluve, Kudaesoro, Modo, Jarivu (Stems are split)

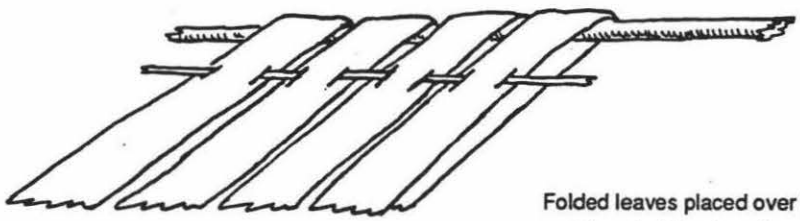
Leaf Panel Construction



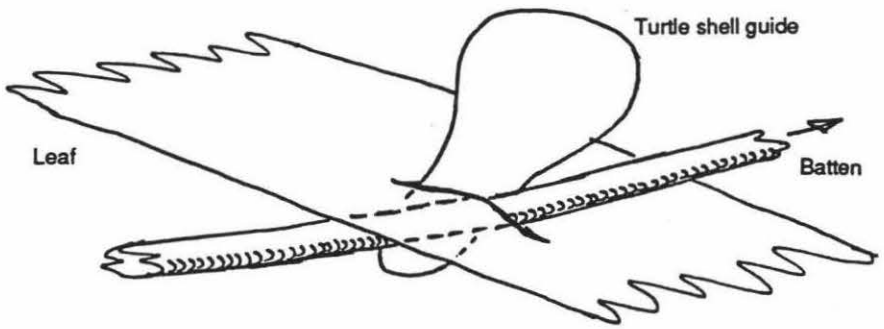
Leaf rib cut and removed.
Leaf then trimmed at one end



Leaf folded in two



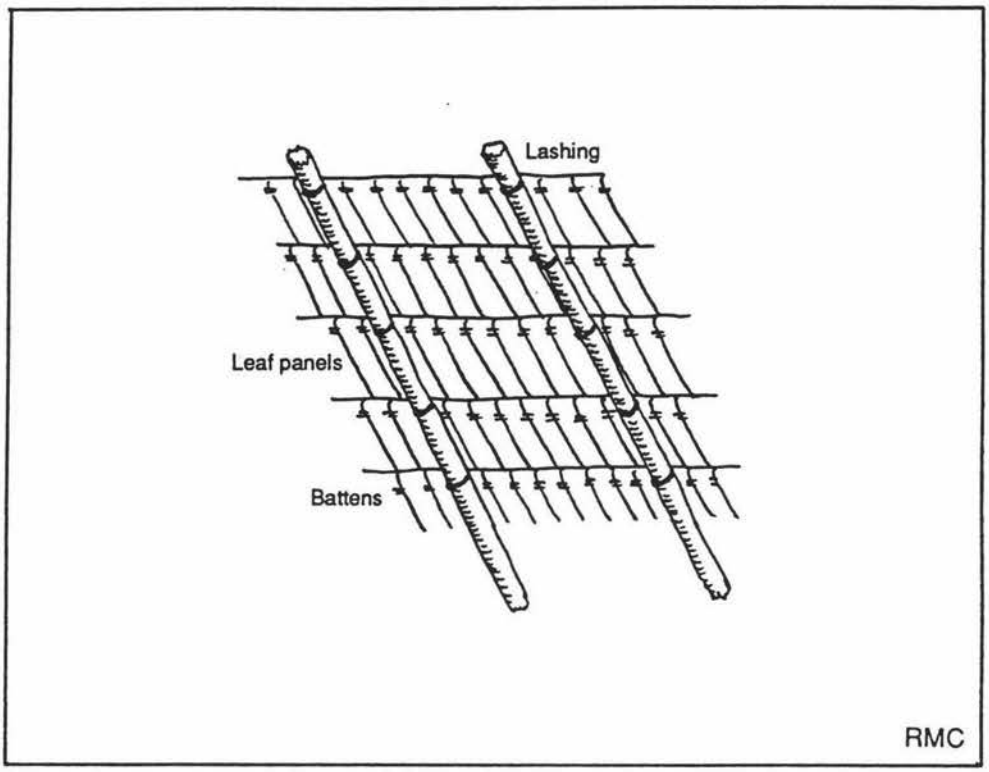
Folded leaves placed over batten and then held in place by another batten which is woven in and out of the leaves



A small guide made from turtle shell is used to slit the stems and direct the batten in and out as it is woven through the leaves

RMC

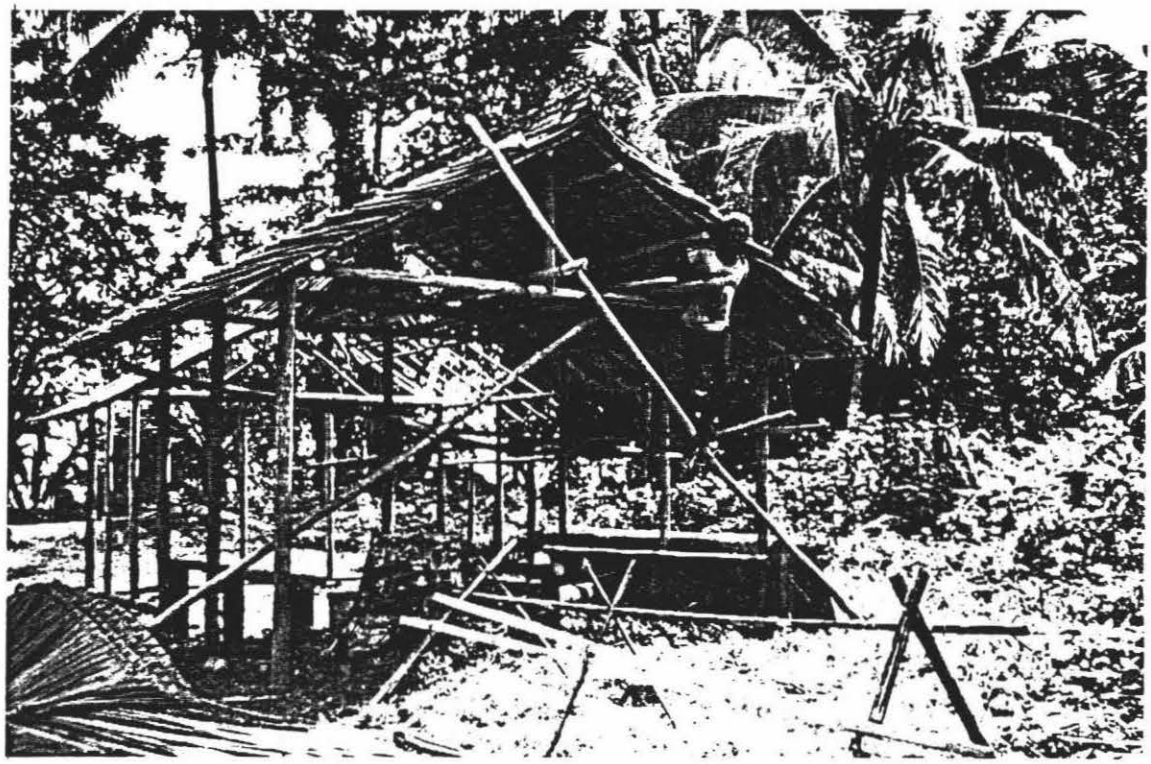
Attachment of Roof and Wall Panels



Leaf: Bia (Sago palm)

Battens: Jarivu, Kaqe, Koraka

Lashing: Siku, Sudulu, Sasake



PHOTOGRAPH 10: Building a leaf house, Wakatipu village.

PHOTOGRAPH 11: Putting the roof on a leaf house, Tarepasika village.

PHOTOGRAPH 12: Canoes under construction, Moli.

Miscellaneous Forest Produce

A variety of implements, tools and other miscellaneous benefits were obtained from the forest. In the time I had available I was only able to record a number of these uses. These are described below as well as being listed in Table 5.7.

Candles

Candles were made from the resin of the danisi, nari, sulu and malaenari trees. To obtain it a cut was made in the bark and the resin bled into a tin. Sometimes a naturally occurring pool of resin was used. This often formed where a branch had been broken.

Once obtained the resin was rolled in the leaves of the siku tree to form a tight candle-like rod up to one metre long, depending on the preference of the maker. I was told that the resin of all four trees gave off a nice smell when burning although I did not see (or smell!) any of these candles myself. Nowadays they were only made when the villagers could not afford to buy kerosene for their hurricane lanterns or when kerosene supplies in the trade store ran out.

Torches

Sometimes when a torch was needed a coconut frond would be burned. I saw three or four people using these while they were fishing in the river mouth one evening. If there was no moon the villagers would also use them while travelling about after dark.

String, string bags and netting

The traditional way of making netting was to peel away the bark of the modo, varu or lutu tree until the soft cambium layer was reached. This was then peeled from the tree in narrow strips and these were rolled between the hand and the leg to make string (see Figure 5.9).

String made from the cambium of the modo tree was used to make string bags which were the universal carry-all in the villages. To carry them the women would place the handle around their foreheads and sling the bag over their back. In this way they carried quite heavy loads. Nowadays most string bags are made from nylon, often gleaned by patiently unthreading rice bags. Plenty of string bags were still, however, made in the customary way.

The cambium of the lutu tree was used to make bow strings whereas that of the varu tree was used to make fishing nets.

Brooms and brushes

Brooms and brushes were made by tying together bundles of sago or coconut leaf ribs (see Figure 5.10). The rib of the sago leaf was removed when the leaf was made into house roof or wall panels.

In addition to the brushes made from sago and coconut palm leaf ribs another part of the coconut palm was also used as a yard broom. This was the branch that bore the coconuts (see Figure 5.10).

Bows and arrows

Bows and arrows were very common in Nukiki. They were used to shoot birds and sometimes fish. When a man went *wokabaot* he often took his bow along with him in case he should come across something that was worth shooting (see Table 5.2 for a list of edible birds).

The bow was made from the wood of the kaqe tree whereas the bow string was made from the cambium of the lutu tree (see Table 5.7). Nowadays string for the bow is often bought in trade stores or gleaned from elsewhere. The arrows were made from the leaf rib of the sago palm and were fashioned using the long bush knives that villagers always carried with them. The point of the arrow was at the base of the leaf, and the arrow flights were made from sections of the leaf that had been retained on the rib (see Figure 5.11).

Spears

Spears used for dancing ceremonies were made from the wood of the pipiro tree. However, the more common spear that was used daily for catching fish or for pig hunting had a wooden shaft to which was attached a steel tip. In the case of the fish spear, three prongs of stiff wire were tied on with a finer gauged wire (see Figure 5.12), whereas the hunting spear often had a small knife embedded in the tip of the wooden shaft. This was also tied on with thin wire (see Figure 5.12).

FIGURE 5.9: STRING MAKING

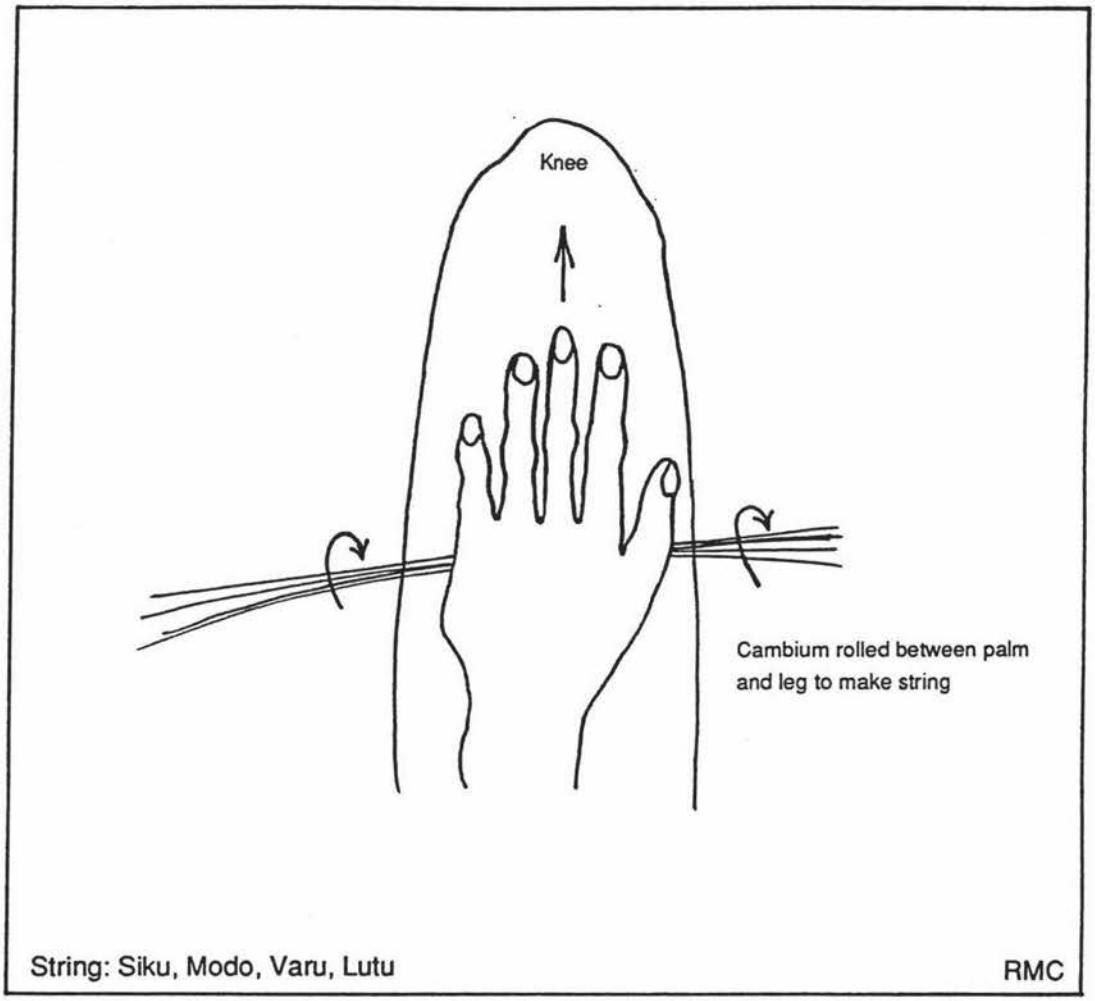


FIGURE 5.10: BROOMS AND BRUSHES

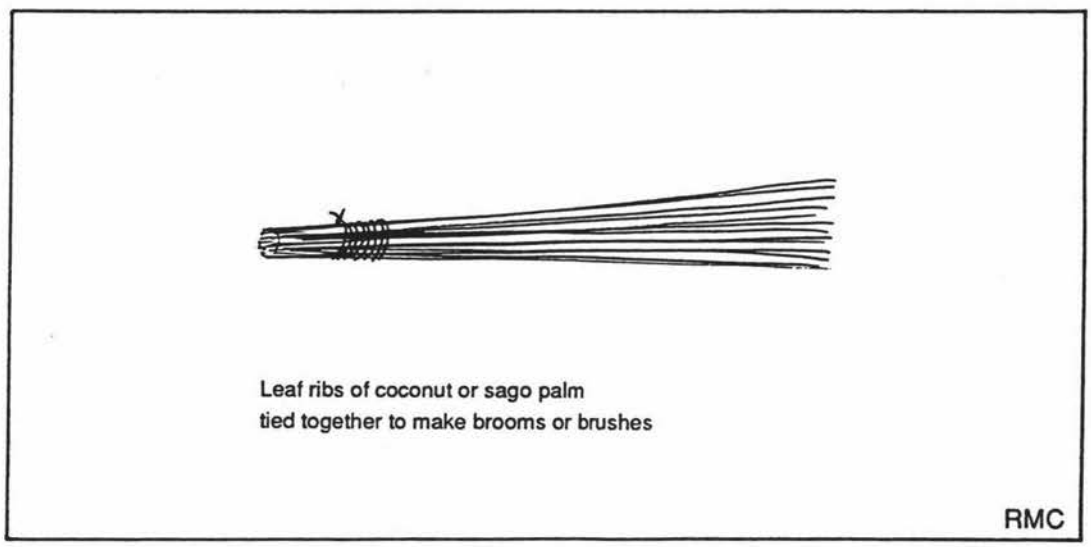
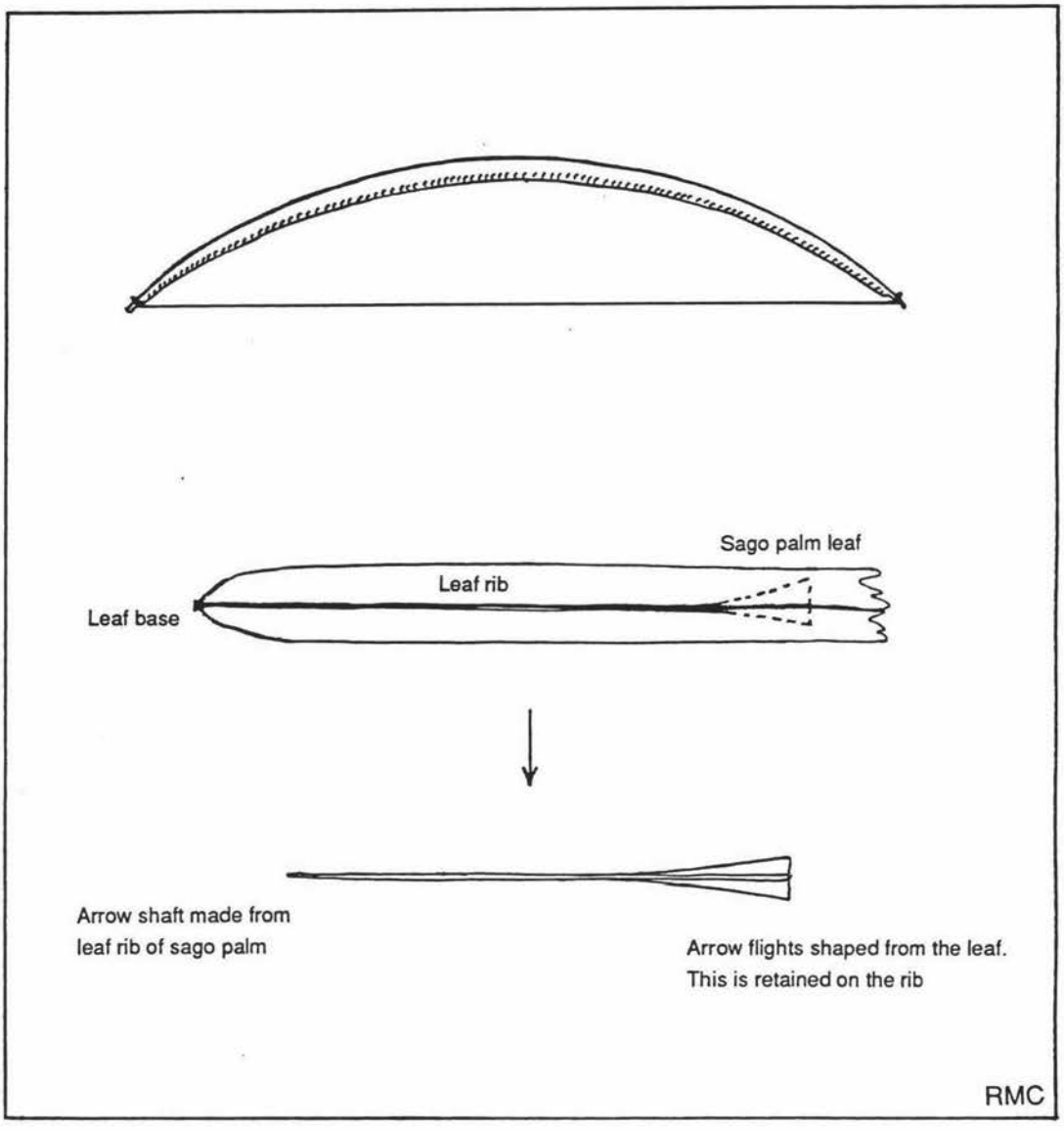


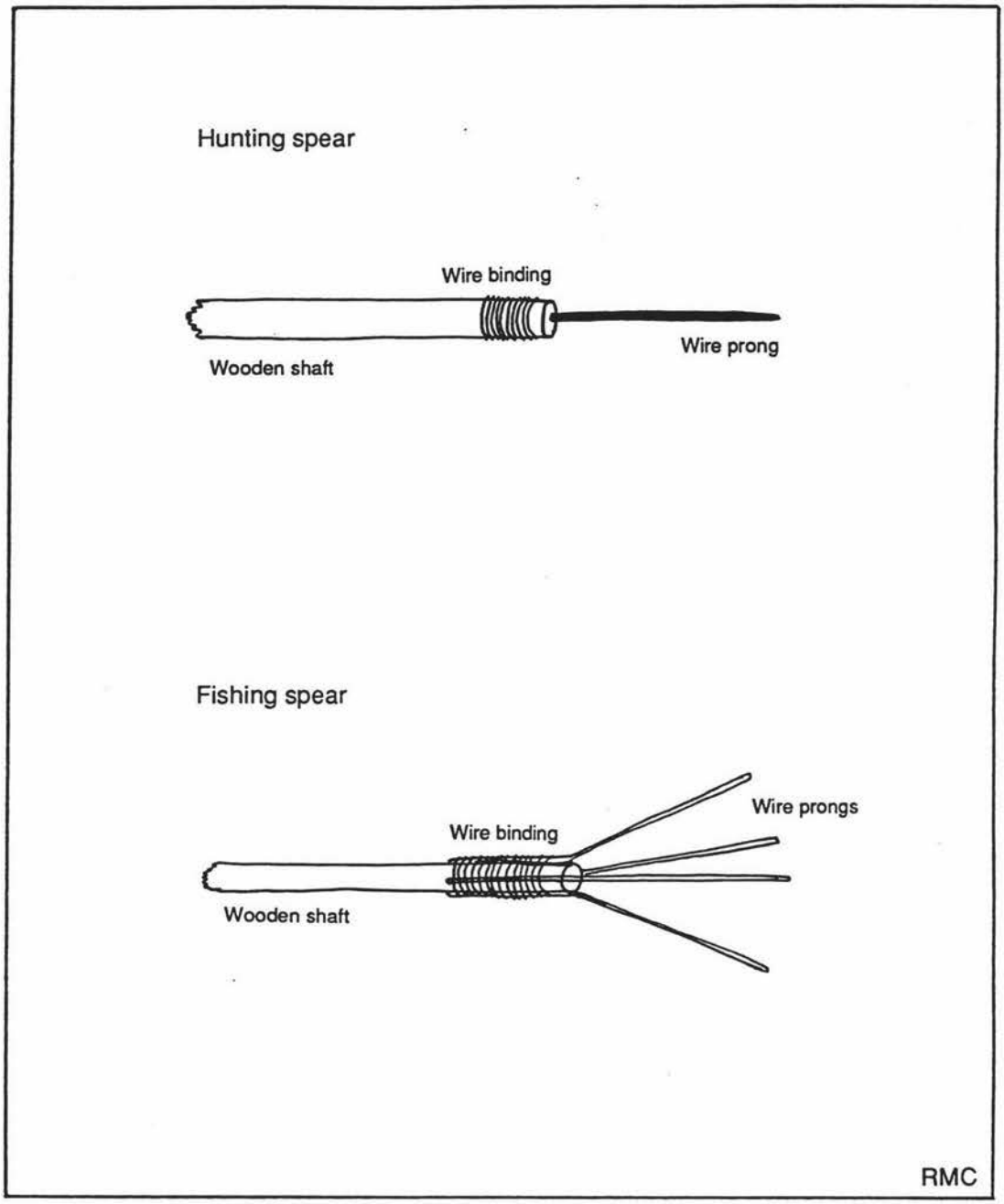
FIGURE 5.11: BOW AND ARROWS

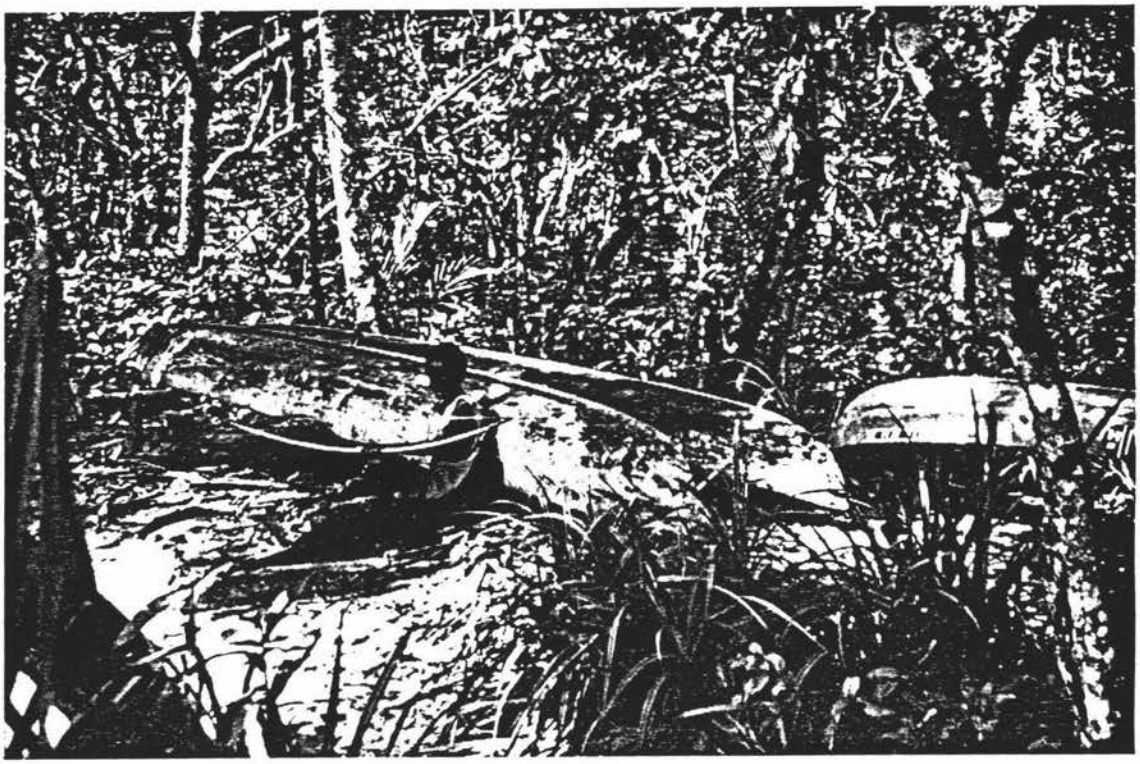


Bow: Kaqe

Bow string: Lutu

FIGURE 5.12: SPEARS





PHOTOGRAPH 13: Villagers often carried a bow and arrows with them when they went *wokabaot*. Canoes on the banks of the Talaevondo Stream.

Fish poison

The leaf of the vaku vine was used to make fish poison. The leaf was crushed and poured into both fresh and sea water to kill fish. Apparently the fish could be eaten after they had been killed in this way but if the poison was taken directly by a person it would be lethal.

Glue

The fruit of the sita tree was used to make glue which in turn was used in the manufacture and repair of canoes. The flesh of this fruit was tar-like and made a very effective glue. The fruit of the barego tree was also used for glue.

Digging sticks

Tunima, kekeso, pusaka and pasika had been used in former times to make taro digging sticks (see Appendix 2 for custom stories concerning taro).

Pig pens

As well as having been used to make digging sticks pusaka was also used to make pig pens.

Toys

The wood of the sogo tree was very much like balsa. This was used by village boys to make model boats which they often towed with a stick and a piece of nylon fishing line. Some of these boats were very well made and were in fact quite realistic.

Trees and Plants used for Medicine

Although there was a medical clinic in Choiseul Bay traditional, or 'custom medicine' as it was called locally, was used quite extensively. Custom medicine was in fact the application of herbal remedies and often this was used alongside western medicine. Where western medicine was not available, or where it was ineffective, local remedies were applied. The villagers quite rationally sought the best treatment they could find regardless of its ethnic origins.

Within Nukiki one or two villagers were known as healers because they had acquired a wide knowledge of the medicinal properties of the local trees and plants. One such person was Solomon Zarabule and it is his knowledge of the medicinal properties of the trees and plants that I have recorded. Because he was a devout Christian, Solomon usually prayed for the sick person as well as applying local custom

medicine. From what I could ascertain the former pre-Christian spiritual practices associated with traditional medicine appeared to have been discarded in Nukiki and replaced, if Solomon's case was typical, with a Christian spiritual supplication.

Although some people like Solomon were known locally as healers because of their specialised knowledge, most householders had a basic working knowledge of local herbal remedies. Different people would have their own favoured prescriptions and I was interested to note some of the similarities between custom treatment of certain medical conditions and the western medical approach to the same problem. The treatment of high blood pressure and heart arrest was a case in point.

Table 5.8 lists tree and plant species used for their medicinal properties. A description of these uses is included in the table. Although outside the scope of this study it would be a most interesting exercise to analyse these plants scientifically for their medicinal properties, particularly as it is now acknowledged that tropical rainforest could be a particularly valuable source of as yet 'undiscovered' medicine.

Tambu Sites

The word *tambu* means sacred and can refer to certain social customs as well as specific geographical locations of spiritual or customary significance. *Tambu* sites, or in other words sacred geographical sites, are known as *sope* in the Vasiqasiqa language. These were burial places for chiefs and were places, where in pre-Christian times, the people or tribe would pray to their ancestors. Other *tambu* sites also existed, although less spiritual significance was attached to them. These sites appeared to serve as land markers or totems for the tribe. My impression was that they acted as a sort of tribal stamp upon the land; a reference point which the tribe could point to and say, "This land belongs to us for this is our mark upon it." I was shown one such site on land belonging to the Qeqetovoru people of Kuku village (see Photograph 19). This site, a hollow tree stump that had grown around a shell necklass or breast plate that had been placed within it, had almost been destroyed by logging, a matter that was very upsetting for the villagers.

Other sites were noted for the historical events that had occurred there. These also served as land marks for the tribe because they further reinforced the tribes association or identity with the land. One example of such a site was the blow hole at Sisirimana Point (see Figure 5.1). In former times the bodies of slain enemies, and sometimes deceased members of their own tribe, were disposed of down this hole. Connected to a naturally occurring underwater tunnel or cave, the bodies were carried out to sea by the outgoing tide.

Another historical site was the high point at the mouth of the nearby Zalepima Stream. Being on the boundary of the Siropodoko land this was fortified during times of war and the dead from the battles disposed of down the blowhole at Sisirimana Point.

Although there had been a universal acceptance of Christianity by the villagers of Nukiki there were still varying degrees of respect for the *tambu* sites of former times. Consequently there was sometimes an understandable reluctance on the part of some villagers to discuss *tambu* sites with me. There was also some vagueness on their part as to the exact location of many old sites because when the Siropodoko people moved onto the Solomo land at Nukiki the knowledge of the Solomo sites disappeared with the emigrating Solomo. Likewise the Siropodoko people gradually forgot about their own *tambu* sites which were located inland in the middle bush area which they had formerly inhabited. The subsequent Christianisation of the population would also have discouraged the continuance, or even remembrance, of these sites. Nevertheless some knowledge did remain and various villagers were kind enough to share with me the custom stories associated with these sites. The stories of the *tambu* sites and other customs of the Nukiki people are recorded in Appendix 2. Figure 5.1 shows the location of *tambu* sites within the Siropodoko land at Nukiki.

Sources of Income

Although most of their livelihood was obtained by subsistence methods, many of the villagers of Nukiki were not at all isolationist in their thinking. As such they were very aware of events occurring elsewhere in the Solomon Islands. Village organisation was, by western standards, quite orthodox. For example, a village committee, school committee and church committee were the social institutions by which Nukiki was

governed, institutions that were as common in my own society as theirs. The few that could afford it used western technology which was readily available. Outboard motors, transistor radios, cassette players and chainsaws were relatively common examples and were often hired out or loaned by those who owned them. The factor, however, that held the villagers to their subsistence lifestyle and limited the widespread adoption of western technology was money, or rather the lack of it. Copra production was virtually the only means by which cash could be generated locally, although the selling of trochus shell and a little intermittent employment in Choiseul Bay were sometimes used by a few to supplement this.

The coconut plantations at Nukiki were established many years ago and even though copra production is an introduced industry, and as such not part of the subsistence economy per se, it has been incorporated very much into the local way of life. Every family made copra and had access to, or owned, a copra drying shed. Copra prices were, however, very low which meant that their ability to earn revenue was very limited. Because of this their reliance on trade goods and services was kept to a minimum.

Not long after I arrived in Nukiki I was taken for a walk along the beach towards the village of Sivusivu. While we were walking a small coastal trading vessel came into view and slowly made its way up the coast towards us. Near the village of Maluku it stopped and stood off the reef while a small aluminium dingy was rowed ashore. The trader had come to make a payment for copra he had collected some time before as well as to pick up another shipment that was awaiting him. Later, after he had completed his business, the boat chugged slowly back up the coast towards Choiseul Bay.

During my time in Nukiki I became accustomed to the villagers involvement in copra production. It was usually a family affair whereby the women, and sometimes the older children, would collect the fallen coconuts, husk them, split them and then carry them to the copra drying shed. It was the men's job to dry the copra and this involved first collecting a good supply of firewood, then stacking the split coconuts in the drying shed on a rack above the fire. Drying would be undertaken initially for two days and during this time a man would often sleep at the drier so he could tend the fire throughout the night. After two days the copra would be sufficiently dry to remove it from the shells so he would then *outem*, as the process was called in pijin. A further two days drying was necessary before the copra was ready for bagging, a process whereby the dried copra

was rammed as tightly as possible into a sack. Once the copra had been bagged it was then transported to the copra shed next to the wharf in Choiseul Bay. More often than not the villagers would load up a canoe with bagged copra and paddle to Choiseul Bay, an effort that required a degree of fitness the few with outboard motor-powered canoes did not have. Where a bigger shipment needed to be taken to Choiseul Bay the villagers would sometimes work together and hire a large canoe and outboard motor from one of their number. This cost $15.00 a day for the canoe, $7.00 for the outboard motor and a further $16.00 for the petrol, quite a high cost when it was considered that a sack of copra only fetched $25.00 and a big canoe could only carry fifteen sacks.

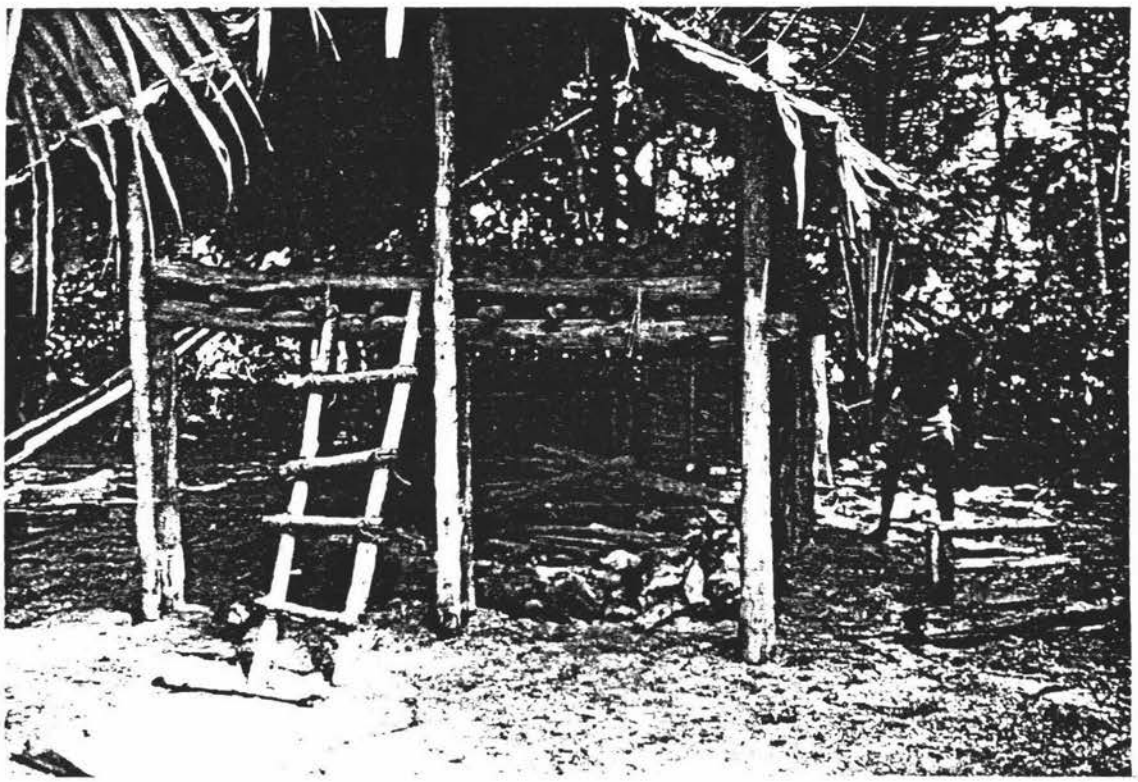
The copra drying sheds were relatively inefficient as well as being smoky. They consisted of a leaf roof, a drying platform made of saplings and an earth floor on which the fire was lit (see Photograph 14). Some sheds had walls to improve heat retention during drying but many did not. Coconut palm fronds were however placed around the wall-less sheds during drying.

Drum driers, used elsewhere in the Solomon Islands, were made from 44 gallon drums. These were much more efficient than the Nukiki driers and would have produced a higher grade of copra because they were less smoky. At the time of my field work no drum driers existed in Nukiki, mainly because the cost of empty 44 gallon drums was prohibitive. The going price was around $100 each I was told! Some drums were, however, shipped to Nukiki just before I left. These were a gift to a villager from a relative but work had not begun on assembling the drier before my departure.

Copra prices were very low. Usually the smokiness of the fires limited the villagers to producing grade 3 copra which, at the time of my stay, fetched approximately $25.00 per sack. Grade 1 copra, on the other hand, fetched approximately $30.00 per sack. At a rate of about 15 sacks of copra per ton, each sack would have weighed approximately 68 kilogrammes. Copra sacks cost $2.50 each.

I was told that 300-400 coconuts were needed to make one sack of copra, although if the coconuts were small as many as 500 were needed. Either way copra production involved a considerable amount of labour for very low returns. A family would normally make about four sacks of copra at a time and as they usually had to share the plantation with other relatives the opportunity to make copra was quite limited for some. Annual production ranged from as low as 3 sacks for one householder I interviewed to

as many as 70 for another. These households contained 6 and 9 people respectively so the resulting annual per capita income was very low indeed, ranging from as little as $13.00 up to $194.00. The money earned from copra production was used to buy, among other things, kerosene, small quantities of rice, hard navy biscuits, soap, salt, sugar, tea, tobacco, *calico* (clothing), and for other items such as the payment of school fees or for travelling.



PHOTOGRAPH 14: Copra drying shed near the mouth of the Talaevondo Stream.

TABLE 5.1: GARDEN PRODUCTION

a) Vegetables

Common name	Botanical name	Seasonal availability	Notes
Sweet potato (Kalaqa)	Ipomoea batatas	All year	Growing time 5-6 months
Small taro (Mana)	Colocasia esculenta	All year	Growing time 12 months. Best crop when hot and dry. Does not grow well in wet season
Big taro (Qatokae)	Colocasia esculenta	All year	Growing time 12 months. Plant productive for 3-4 years
Swamp taro (Qui)	Cytosperma chamissonis	All year	(See Appendix 2 for customs concerning taro)
Yam	Dioscorea spp	All year	Growing time 12 months. Does not grow so well after June. When leaves die it is ready to harvest
Pana	Dioscorea esculenta	All year	As for yam
Tapioca/cassava	Manihot esculenta	All year	Growing time 4-6 months depending on variety. When in flower has strong taste so is only used for making pudding
Tomato	Lycopersicon lycopersicum	April-June	-
Pumpkin	Cucurbita moschata	January-April August-December	Sprouts as well as the fruit are eaten
Cucumber	Cucumis sativus	All year	-
Slippery cabbage	Hibiscus manihot	All year	-
Chinese cabbage	Brassica cernua	All year	-

Common name	Botanical name	Seasonal availability	Notes
Shallot/ spring onion (Silati)	Allium sepa	All year	-
Green bean	Phaseolus lunatus?	All year	-
Sugar cane	Saccharum officinarum	All year	Prefers good soil

TABLE 5.1: GARDEN PRODUCTION

b) Fruit

Common name	Botanical name	Seasonal availability	Notes
Banana	Musa spp	All year	(See Appendix 2 for old customs concerning banana)
Pineapple	Ananas comosus	August-January	-
Melon	Citrullus lanatus	All year	Growing time 3 months. Planted when moon is full
Orange	Citrus sinensis	All year	-
Kubulo	-	All year	Similar to grapefruit but has very thick skin
Piraka	Spondias cyathera	All year	Similar to mango
Mango	Mangifera indica	-	-
Pawpaw	Carica papaya	All year	-
Papagoma	Terminalia solomonensis	June	Bush tree but also planted. Soft flesh of fruit mixed with coconut
Plum	Prunus spp	All year	-
Breadfruit	Artocarpus altilis	All year	-

TABLE 5.1: GARDEN PRODUCTION

c) Nuts

Common name	Botanical name	Seasonal availability	Notes
Nari nut	Canarium indicum	June-August	Bush tree but also planted. (See Appendix 2 for Nari customs)
Betel nut (Kasu)	Areca catechu	All year	Nut is chewed for narcotic effect. Enhanced by chewing with crushed lime
Peanut	Arachis hypogaea	All year	-
Coconut	Cocos nucifera	All year	Grown in plantations rather than gardens. Coconut is a staple

d) Other Produce

Common name	Botanical name	Seasonal availability	Notes
Tobacco	Nicotiana tabacum	All year	-
Pandanus/ screw pine	Pandanus spp	All year	Used for making mats, baskets and hats
Sago palm (Bia)	Metroxylon solomonense	All year	Species planted and leaves used for leaf house construction, arrow making and brush making. Pulpy stem not used as food in Nukiki area

TABLE 5.2: FOOD OBTAINED FROM THE FOREST

a) Food Trees

Vasiqasiqa name	Botanical name	Seasonal availability	Notes
Boe Boe	Pararatocarpus veneosa	June-August	Has a round fruit like a small orange. Collected and eaten after it falls to the ground. Smells good but no longer found close to the village
Sulu	Canarium salomonense	June-August	Edible flat nut. (See Appendix 2 for ways of preparing nut)
Nari *	Canarium indicum	June-August	Edible nut. Longer than Sulu nut. (See Appendix 2 for ways of preparing nut)
Vele *	Barringtonia procera	All year	Edible nut. Sometimes climb tree to collect but otherwise picked from ground. The nut is cut and eaten so in pijin is named cutnut
Barego *	Artocarpus altilis	July	Breadfruit
Kekoso *	Gnetum gnemon	March	A small fruit that needs to be boiled for 10 minutes to get rid of the poison. The leaf can be boiled to make soup
Karukae *	-	June	A small edible fruit
Kanava *	Ficus copiosa	All year	Edible leaf, commonly called cabbage. Also used in soup and for wrapping Nari and Sulu nuts before cooking
Jarivu *	Rhopaloblaste elegans?	All year	Top of stem is soft and edible
Viluaka *	-	All year	Top of stem is soft and edible
Piro *	-	All year	Top of stem is soft and edible
Pirakavaka *	Averrhoa carambola	June-July	Yellow 5 edged star-like fruit that tastes like lemon

Vasiqasiqa name	Botanical name	Seasonal availability	Notes
Natu	Burckella obovata	June-July	Fruit is like an apple but bigger. It tastes cold. Fruit is collected from ground after it has fallen
Papagoma	Terminalia solomonensis	February-March	Edible fruit. Sometimes cooked for variety
Kokosika	Pangium edule	July-August	Fruit needs to be cooked then placed in a stream for 1-2 days to get rid of poison
Talike *	Terminalia spp	January-August December	Small edible fruit like cocoa
Pomolo	-	-	-
Dola *	Inocarpus fagiferus	June-July	Fruit cooked whole then opened to eat contents
Kasu (Betel nut)	Areca catechu	All year	Nut chewed for narcotic effect, usually with leaf of Piper betle plus a little lime. This enhances effect
Sarapa	Piper betle	All year	Small climber. Leaf chewed with betel nut and lime
Tali	-	All year	Grows near the sea. Nut broken open and kernel used
Koraka *	Caryota rumphiana	-	-

* Herbarium specimens of this tree were collected by the author and deposited with the Ministry of Natural Resources Herbarium in Honiara for identification and mounting. Duplicate specimens were then retained by the author.

TABLE 5.2: FOOD OBTAINED FROM THE FOREST

b) Food Plants

Vasaqasiqa name	Botanical name	Seasonal availability	Use
Sulapa	Hornstedtia lycostoma	All year	A local cabbage. Young leaves cooked and eaten
Zuku	Cyathea vittata	All year	A fern frond cabbage. Young fronds cooked and eaten
Mula	Diplazium esculentum	All year	A local cabbage. Young leaves cooked and eaten
Kubisi	-	All year	Outer leaves peeled away and inner stem eaten raw
Vazoro	Saccharum edule	All year	Like sugar cane. Plant shoot eaten raw
Wild yam	Droscorea spp	All year	-

TABLE 5.2: FOOD OBTAINED FROM THE FOREST

c) Forest Dwelling Birds used for Food

Vasiqasiqa name	Common name/ zoological name	Notes
Koqomo	Blyths Hornbill (Aceros plicatus)	-
Kurukuru	Grey Fruit Pigeon (Ducula pistrinaria)	Has plain forehead
Kurao	Red Knobbed Fruit Pigeon (Ducula rubricera)	Has red heart on forehead
Kurukurupeka	Grey Ribbed Ground Dove	Stays on the ground. ie. does not fly up into the trees. Is black in colour.
Qote	Purple Swamp Hen/Pukeko (Porphyriio porphyriio	-
Kamaqa	Osprey/Fish Hawk (Pandion haliaetus)	Inhabits seacoast
Viviri	Cardinal Lory (Chalcopsitta cardinalis)	Red parrot. Abundant in coastal coconut plantations
Qilivara	Rainbow Lorikeet (Trichoglossus haematodus)	-
Maluka	Brahminy Kite (Haliastur indus)	-
Raparapasakanoko	-	This was probably a young Brahminy Kite as the distinction was made on colour as well as eating habits. Maluka ate fish Raparapasakanoko stole chickens

Vasiqasiqa name	Common name/ zoological name	Notes
Kakasa	Solomons Cockatoo (Cacatua ducorpsi)	-
Qaqava	-	Silmilar to New Zealand kokako but was black and had red eyes and wattle. See Appendix 2 for custom story re Qaqava
Vaqara	Duches Lorikeet? (Charmosyna margarethae)	Red cockatoo
Kutukuturu	Fearful Owl? (Nesasio solomonensis)	An owl with big eyes. It was not the boobook as it had a different call (ie. it hooted)
Kio	Scrubfowl (Megapodius frecinet)	-
Vivu	Colonial Starling (Aplonis metallica)	-

TABLE 5.2: FOOD OBTAINED FROM THE FOREST

d) Forest Dwelling Animals Used for Food

Vasiqasiqa name	Common name/ zoological name	Notes
Vekusu	Flying Fox (Pteropus spp)	-
Pakupaku	Small bat (Pteropus spp?)	-
-	Possum (Cuscus spp?)	Eaten as food but skins are not used
-	Pig (Sus spp)	-

e) Forest Dwelling Reptiles and Other Species Used for Food

Vasiqasiqa name	Common name/ zoological name	Notes
-	Giant Green Frog	Two types of giant green frog used as food. Size same as mans hand
-	Big Green Tree Lizard	Like iguana
-	Small freshwater fish	Sometimes caught using poison from Vaku vine
-	Freshwater crayfish	-
-	Freshwater shellfish	-

TABLE 5.3: FOOD OBTAINED FROM THE SEA

a) Seabirds Used for Food

Vasiqasiqa name	Common name/ zoological name	Notes
Belama	Lesser Frigate Bird (Fregata ariel)	-
Palepale	Little Tern (Sterna albifrons)	-
Pulepule	Common Noddy (Anous stolidus)	-
Qiqiqi	Beach Stone Curlew (Burhinus neglectus)	-

b) Other Seafood

Vasiqasiqa name	Common name/ zoological name	Notes
Mokolo	Leatherback Turtle (Dermochelys coriacea)	Eggs and turtle meat eaten
Teqe	Green Turtle (Chelonia mydas)	Eggs and turtle meat eaten
Ako	Crabs	Caught at night on beach by lantern light. November-January best time to catch crabs
-	Fish	Not researched
-	Shellfish	Not research

TABLE 5.4: SOME FIREWOOD TREES

Vasiqasiqa name	Botanical name	Notes
Sisinivu *	-	-
Qema *	Pometia pinnata	-
Qalu *	Calophyllum neo-ebudicum	-
Buni *	Calophyllum inophyllum	Clean burning therefore good for drying copra
Zago	Terminalia brassii	-
Kivili *	-	Clean burning therefore good for drying copra
Pasika (Mangrove)	-	Clean burning therefore good for drying copra

* Herbarium specimens of this tree species were collected by the author and deposited with the Ministry of Natural Resources Herbarium in Honiara for identification and mounting. Duplicate specimens were then retained by the author.

TABLE 5.5: TREES AND PLANTS USED FOR HOUSE BUILDING

Vasiqasiqa name	Botanical name	Use
Gurama *	-	Piles, studs, joists and bearers. A strong timber that does not rot in the ground
Vedeke *	Vitex cofassus	Piles, studs, joists and bearers. Also a strong timber. Does not rot in ground
Vilaki	Kleinhovia hospita	Sappling of this tree used for rafters and battens. Rots with ground contact
Rumese *	Macaranga fimbriata	Sapplings used as rafters and roof battens. Rots with ground contact
Sarende *	Calophyllum paludosum	Sapplings used as rafters and roof battens. Rots with ground contact
Kodama	-	Small tree. Used for rafters and roof battens. Rots with ground contact
Qema *	Pometia pinnata	Rafters, joists, bearers and battens. Rots with ground contact
Qalu *	calophyllum neo-ebudicum	Rafters, joists, bearers and battens. Rots with ground contact
Naqeme *	Timonius timon	A hard timber used for rafters, battens, joists and bearers. Rots with ground contact
Zago *	Terminalia brassii	Rafters
Tunima *	Alangium javanicum	Joists and bearers
Sisinivu *	-	Joists, bearers and rafters
Kivili *	Intsia bijuga	Joists, bearers and rafters
Podovaritora *	Gynotroches axillaris	Studs, joists and bearers. Rots with ground contact
Garagara *	Pterocarpus indicus	Joists, bearers and flooring
Viluaka *	-	Flooring
Piro	-	Flooring

Vasiqasiqa name	Botanical name	Use
Kudaesoro	Gulubia hombronii	Flooring
Modo *	Colona velutina	Flooring
Jarivu *	Rhopaloblaste elegans?	Battens in leaf wall and roof panels. Lower trunk used for flooring
Kaqe	Strongylocaryum latius	Battens in leaf walls and roof panels
Koraka *	Caryota rumphiana	Battens in leaf walls and roof panels. Also used as roof ridge
Siku *	Calamus hollrungii	A vine used as twine for lashing rafters and leaf panels
Sudulu	-	As for Siku
Sasake *	Freycinetia bicolor	As for Siku
Mareqete	-	Not recorded
Ponolo	-	A strong vine used for lashing joists and bearers. Is not used in the roof
Luqa	Dicranopteris linearis or Gleichenia linearis	Used for decorative panelson leaf walls. No longer found near village
Bia (Sago palm)	Metroxylon solomonense	Leaf wall and roof panels
Gugulisi	Evodia solomonensis	Not recorded
Buni	Calophyllum inophyllum	Not recorded
Maraquni	-	Not recorded

* Herbarium specimens of this tree/plant species were collected by the author and deposited with the Ministry of Natural resources Herbarium in Honiara for identification and mounting. Duplicate specimens then were retained by the author.

TABLE 5.6: TREES USED FOR CANOE BUILDING

Vasiqasiqa name	Botanical name	Notes
Zago *	Terminalia brassii	-
Garagara	-	-
Maraquni *	-	-
Qaluveko *	Gmelina moluccana	This species is depleted in the vicinity of Nukiki but is found in other parts of Choiseul
Pepete	-	-
Gurama *	-	-
Bagava *	Alstonia scholaris	-
Buni *	Calophyllum inophyllum	Sometimes used for canoe building - but is not particularly suitable

* Herbarium specimens of this tree species were collected by the author and deposited with the Ministry of Natural Resources Herbarium in Honiara for identification and mounting. Duplicate specimens were then retained by the author.

TABLE 5.7: OTHER USEFUL TREES AND PLANTS

Vasaiqasiqa name	Botanical name	Use
Danisi *	-	Candles
Nari *	Canarium indicum	Candles
Sulu	Canarium solomonense	Candles
Malaenari	-	Candles
Coconut	Cocos nucifera	Torches (frond is burnt) Brushes (made from leaf ribs) Brooms (made from nut bearing branches)
Siku	Calamus hollrungii	String and candle wrapping
Modo *	Colona velutina	String for string bags
Varu *	Hibiscus tiliaceus	String for nets
Lutu *	Ficus variegata	String for bows
Kaqe	Strongylocaryum latius	Bows
Bia (Sago palm)	Metroxylon solomonense	Brushes (made from leaf ribs) Arrows (each made from single leaf rib)
Pipiro	-	Ceremonial spears
Vaku	-	Fish poison
Sita	Parinari glaberrima	Glue
Barego	Artocarpus altilis	Glue
Tunima *	Alangium javanicum	Taro digging sticks
Kekoso *	Gnetum gnemon	Taro digging sticks

Vasalqasiqa name	Botanical name	Use
Pasika	-	Taro digging sticks
Pusaka *	Fagraea racemosa	Taro digging sticks
Sogo	-	Toy boats
Azopane *	-	Bird traps/snares

* Herbarium specimens of this tree/plant series were collected by the author and deposited with the Ministry of Natural Resources Herbarium in Honiara for identification and mounting. Duplicate specimens were then retained by the author.

TABLE 5.8: CUSTOM MEDICINE TREES AND PLANTS

Vasiqasiqa name	Botanical name	Medical use
Kureqa	Dendrocnide spp	Tree poisonous and contact with leaves causes itching. Bark of tree peeled and wet cambium layer rubbed on affected area to alleviate itching
Sisiri *	Ficus tinctoria	The bark of this tree is twisted and peeled to make bracelets. These are placed on the arms of children who are weak, thin and retarded in growth. Acts like a tonic
Pupusu	Barringtonia asiatica	A poisonous tree, but if the stone of the fruit is scratched and the scrapings placed on centipede bites, it alleviates the pain
Sita	Parinari glaberrima	The bark of this tree, when chewed stops internal and external bleeding
Tui *	Pipturus argenteus	The leaves are squeezed and the juice drunk as a cure for sunstroke
Pulanikiu *	-	Leaves are squeezed and the juice used to make cough mixture. If more than one drop of juice is used the mixture is too sour
Talike *	Terminalia catappa	Leaves used to make cough mixture in the same manner as Pulanikiu
Vaora *	-	A young leaf is taken and rubbed on the forehead as a cure for headaches
Kivili *	Intsia bijuga	Bark of the tree chewed to stop internal and external bleeding
Dola *	Inocarpus fagiferus	Bark scratched and scrapings placed in clean rag then soaked in water. This is drunk as a cure for malaria or yellow fever. (Probably yellow fever:- symptoms described as yellow eyes, feet, hands and urine; body weak.)
Barana	-	Leaves of vine crushed and juice drunk as cure for high blood pressure and heart attack. If person is immobile mouth is prized open with a stick and the solution is poured down throat
Piraka	Spondias spp	Crushed leaves held to nose and mouth and smell inhaled as a cure for those overcome with severe sunstroke. Also used to revive those paralysed with grief
Sosolaka	Merremia spp	Runners of vine cut and sap used to stop bleeding from deep wounds. Also used as antisceptic

Vasiqasiqa name	Botanical name	Medical use
Tapa/Rase rase	Epipremnum spp	Leaves heated over fire and rubbed on body to cure arthritus as well as aching joints caused by too much exercise. Acts like linament
Pirimumuqutu	-	Leaves used to heal arthritus in same manner as Tapa/Rase rase
Azopane *	-	Leaves crushed, mixed with water and used as cough mixture
Kidua *	Scaevola taccada	Leaves crushed, mixed with water and drunk to cure sunstroke. Sometimes used to cure heart attacks
Kokoka *	Leucosyke australis	Leaves crushed and juice drunk as cure for sunstroke
Baragao *	Trema orientalis	Leaves crushed and juice drunk as cure for sunstroke
Gagaili	Uncaria appendiculata	Leaves of vine crushed, mixed with water and drunk as a cure for high blood pressure and heart attack
Kulivu) Kukure)	Morinda citrifolia	Bark scratched and rubbed on stomach as laxitive
Bagava	Alstonia scholaris	Bark scratched, mixed with water and drunk as a cure for malaria or yellow fever
Miduku	Cyrtosperma johnstonii	Used to treat headaches that occur during the day (ie. between sunrise and sunset). String is made from the bark, heated over a fire and tied around the head
Kulo	Alpinia purpurata	Cambium layer from inside bark is scraped and rubbed on a wound to stop bleeding. Sometimes drunk for same effect

* Herbarium specimens of this tree/plant species were collected by the author and deposited with the Ministry of Natural Resources Herbarium in Honiara for identification and mounting. Duplicate specimens were then retained by the author.

CHAPTER 6

VALUATION OF VILLAGE SUBSISTENCE USE OF THE RAINFOREST

The Subsumption of the Subsistence Economy

The concept of financially valuing subsistence use of the rainforest was quite foreign to the villagers of Nukiki. Although cash was used by villagers for the purchase of trade goods and external services such as travel, it was not by any standards abundant. Most local transactions were by way of exchange and because an item such as food perished rapidly once it had been harvested any surplus production was given away. An abundant catch of fish, for example, would be distributed amongst neighbouring or related households. Over time these gifts would be reciprocated one way or another so it was in this manner that shortfalls and surpluses in production were overcome. As a consequence of this, perhaps, there was not the same emphasis on accumulating material wealth in Nukiki society as there was, for example, in many western societies.

The emphasis on cash transactions had, however, increased over the years, a fact lamented by one of my principal informants who was a child in the 1960's. Nevertheless, compared with other societies, the cash economy still had only a limited impact on the internal village economy. It was in its transactions with the outside world that the transition had been made although the villagers' capacity to conduct business outside the village was severely restricted by their inability to earn cash. This was limited almost entirely to copra production and what was gleaned by way of remittances from relatives working elsewhere.

Having been brought up in a society where the basis for most transactions was an exchange of cash it took me a little while to get used to the Nukiki way of doing things. My initial attempts at offering cash payment for food given to me were politely refused and as we got to know each other better I was told that people were surprised at how much in the way of stores and provisions I had brought with me. In their culture a visitor does not need to bring their own provisions for they are cared for by his or her host who

takes responsibility for feeding and housing them. As such the villagers of Nukiki took me into their care thus enabling me to experience a generosity and a kindness that was as heart warming as it was humbling. It is an experience that I hope that I never forget.

The dilemma I faced in trying to respond to the generosity of the villagers by offering a cash payment in many respects typifies the difference between the cash economy of a western capitalist society and the subsistence economy of Choiseulese society. The two were quite different in concept and as such the behavioural norms of one society were not applicable in the other. Throughout Melanesia the subsistence economy was in the process of being subsumed by the cash economy and because the social norms associated with each were often quite different, social dislocation was often symptomatic of this transition. For instance the Eagon Resources Development Company logging operation based nearby at Moli was an example of the social disruption brought about when seemingly large amounts of cash were offered to villagers for forest that hitherto had no cash value in their eyes. This monetisation of natural resources led to all sorts of disputes. Some claimed the right to sell the forest, others contested this. Some wanted cash and the consumer goods this could buy whereas others wanted to retain their traditional lifestyle. Faced with values that were often quite different from their own the community was divided in its approach to the problem. Splits and bitterness occurred, the consequences of which will only be evident over time. Perhaps more fundamentally Moli society had changed, irreversibly perhaps. A greater reliance on trade goods had developed yet in many respects the ability to save and reinvest cash gained from the logging had not been learned. The manager of the logging operation, for example, was very concerned that the Moli villagers were dissipating their earnings because he could foresee the day when the forest as well as the cash would be gone.

The sudden transition from a subsistence economy to a cash economy was traumatic indeed and it is little wonder that much of the cash earned by the villagers from their newly monetised forest was dissipated. As the minister of the Nukiki church said to me one night as we were discussing social issues: "We don't know how to handle money." In reality, however, the problem was more than this. With the introduction of the cash economy the rules of society changed, and those that had not been taught the new rules were at a distinct disadvantage. Relatively untouched as they were, the Solomon Islands were becoming a popular destination for off-shore businessmen who came looking for business opportunities. I had the uncomfortable feeling that the Solomon Island villager would gain very little from these 'opportunities.'

The Valuation of Subsistence Production

The problem the Choiseulese villagers face is that the forest, on which they depend for their livelihood, has been assigned a monetary value by those outside their subsistence economy. In economic terms the forest has acquired a capital or monetary value. Usually it is only the timber in the forest that has been assigned this monetary value, the forest's other attributes being ignored, either because they are not understood but more often because they are of no direct value outside the subsistence economy. Motivated by the incentives of their own society the outsider seeks to realise the asset value of the timber, or put plainly, to convert the forest to cash usually with the greatest possible profit to themselves. This does not bode well for the villagers who quite apart from running the risk of being short changed for the monetary value of their timber, also receive no reimbursement for the non-timber values of the forest which, in the case of the Nukiki villagers, comprise the greater part of their subsistence livelihood. As these values are often destroyed when the timber is removed the villagers may well be left destitute at the end of a logging operation.

The question of crucial importance, then, is how best to protect the interests of the villagers in the face of the seemingly unstoppable encroachment on their subsistence way of life by a dominant, yet foreign, economic system. A system where those that do not understand the rules are placed at a disadvantage. One way of highlighting the subsistence benefits of rainforest is to assign a monetary value to these benefits. Decision making in the world of commerce, a predominating force that is one of the main catalysts for logging, is usually on the basis of profit or loss. If a venture is deemed to be profitable there is an incentive to go ahead with it. If not, the disincentive often ensures that the venture collapses.

As outlined in Chapter 1 cost-benefit analysis (CBA) is a method widely used for assessing the costs and benefits of various projects. This technique is widely used in the forestry sector as well as being one of the more commonly used methods for assessing the viability, or otherwise, of development projects. The cost-benefit technique makes it possible to derive values for the non-timber, or subsistence uses, of the Choiseul rainforest. Once derived the subsistence values can then be used to

express more realistically the total value of the forest and, if need be, balanced against its commercial value as a timber resource. The value of the forest to the villager as well as to the off-shore businessman is thus recognised.

The cost-benefit analysis methods used to determine non-timber values of a forest are known as non-market valuation techniques, or sometimes, environmental economics. It was these techniques that I adapted to the situation I found on Choiseul. A wide range of produce was obtained from the forest but in the absence of local market prices for this I had to cast my net wider in order to obtain equivalent market values. Prices in the various markets throughout the Solomon Islands were relatively consistent (personal comment, Abraham Baenaesia, Director of the Solomon Island Development Trust), and my own observations tended to confirm this. The relative consistency in market prices was due to the increasing mobility of Solomon Islanders. With this in mind I was able to travel to markets outside Nukiki and list what was being sold and the prices these items were fetching. My rationale for doing this was that although these markets were not located in Nukiki itself they would, because of the national consistency in market prices, be indicative of prices people would expect to pay had a market been there. As such I was able to value many items of subsistence produce in markets elsewhere in the Solomon Islands.

The closest market was at Moli but this was relatively limited in what it had for sale. A more extensive market was held in Gizo, the administrative centre for Western province, so as well as listing produce and prices at Moli I was able on two occasions to do the same at Gizo. The markets at Moli and Gizo usually sold garden produce and some fish, although from time to time other items such as brushes were put up for sale. Honiara, of course, had a much more extensive market but apart from noting the price of items such as bundles of firewood, which were not sold in Moli or Gizo, I did not record prices there. Market prices of garden produce and other items are recorded in Table 6.1.

Garden produce and other food items were relatively easy to assign a market value to. Not so housebuilding material, some canoes, medicine and other miscellaneous items, all of which were obtained from the forest. For many of these items I was compelled to resort to surrogate (substitute) pricing. My assumption here was that if certain items of forest produce were no longer available, the Nukiki villager would have to do without or obtain a substitute on the open market. For example, if there were no

longer any canoe building trees a timber dugout canoe or a fibreglass canoe would have to be obtained from elsewhere. Both these items had market values and as such reflected the inherent value to the villager of trees suitable for canoe building. It may be argued that in assigning such a value to these trees I have not taken into account the cost of the labour expended in converting the tree to a canoe. This is an avenue I did not explore and as such my surrogate pricing of a canoe building tree, based on the price of a completed canoe, may be lower than it would have been had labour been taken into account. Nevertheless, it is still indicative of what a villager would have to pay if these trees were not available because in the subsistence economy of the village it was, with some exceptions, unusual to assign a monetary value to labour simply because there was not the cash available to pay for it.

Large wooden canoes were available at market prices hence these were a more applicable surrogate, or substitute, than fibreglass canoes. Based on market values a surrogate price of $1500.00 has therefore been assumed for the large canoes. If the cost of labour is ignored a tree suitable for building a large canoe is worth $1500.00 to the villager. Although surrogate prices were not available for the smaller canoes I estimated it would have taken about five times the effort to build a large canoe as it would a small one. Hence it is reasonable to assume a surrogate price of $300.00 for a small canoe.

The exercise in surrogate pricing was extended to housing but this was more difficult because although the villagers could give me the cost of the few village houses made from 'permanent material' (ie. material purchased on the open market), these houses were quite old and hence did not accurately reflect the prices of the day. However, sawn timber had recently been purchased to construct a new house in Nukiki so, as well as obtaining the cost of this material (landed at Nukiki), I was able to obtain the prices of corrugated iron, wall cladding and some other materials that were available in Gizo. House prices were of course known in Gizo but these houses were more sophisticated than the 'permanent' houses constructed in Nukiki. At $30,000.00 the price was undoubtedly much higher as well. Although more approximate than I would have liked it was possible to estimate what it would cost to build a house in Nukiki from the material I priced. Surrogate pricing of such a house, however, assumes all traditional house building material is no longer available. In reality it would have to be a fairly catastrophic event to deny the villagers access to all this material. A more likely scenario would be the construction of a composite house, one in which a mixture of

traditional and purchased materials were used. The surrogate value of such a house could be anywhere on a continuum up to and including the total substitute value. For this study I have therefore amalgamated the various components of a house and listed them either as timber, roofing, wall cladding, fastenings and other material. Surrogate values have been assigned to these as has a total surrogate value for the house. Again, the value of labour has been ignored.

Where market prices were unavailable surrogate prices were also used for miscellaneous forest products. For example a lantern and kerosene could be substituted for local candles. Firewood prices from the Honiara market, as well as the cost of kerosene and a stove, would give an indication of the value of village firewood. Brooms or brushes had an actual market value whereas an item such as a bow and arrow, it could be argued, would have to be replaced by a gun and ammunition. The list of substitutes could of course be extended depending on the village location and degree of subsistence but, as with my other surrogate prices, it is indicative of the value of this kind of forest produce.

Tables 6.2 to 6.9 list surrogate values for the various subsistence products obtained from the forest.

While in Nukiki I spent some time listing plants used for custom medicine (see Chapter 5). Custom medicine was often used instead of western medicine and as such had value as a substitute. I had hoped to be able to determine the cost of providing a medical service at the Taro clinic in Choiseul Bay. Once I had established this, and estimating that perhaps half of all problems requiring medical treatment were treated at the clinic, I was then going to use this as a surrogate value and apply it to the 'service' provided by custom medicine. Unfortunately the Western Province hospital in Gizo, which was responsible for the Taro clinic, was unable to provide me with any operating costs at all. Drug and wages costs, I was told, were handled separately and all done in Honiara. Although I knew that 300-500 people were treated monthly at the Taro clinic I had left it too late to obtain costs from Honiara, if in fact it was possible to get costs at all. Consequently I resorted to using the travel cost method to value custom medicine.

Medical treatment was available free of charge to the Nukiki villagers but in order to get this treatment they had to travel to Choiseul Bay. In doing this the villagers incurred a cost, that of operating a motorised canoe. Applying the travel cost approach, it was

assumed that if the money spent on this travel by all the villagers could be estimated annually, this would represent the use value the village placed on the medical treatment at the Taro clinic. This value could then be used as a surrogate, or substitute, for the custom medical treatment.

In hindsight I should have tried to record how often the villagers sought western medical treatment as opposed to custom treatment. I also should have kept a tally of Nukiki villagers using the Taro clinic as both sets of data would have been relatively easy to obtain. In the absence of this information I have resorted to using estimates of these figures based on my observations while in Nukiki. These, and the surrogate value of custom medicine, are recorded in Table 6.9.

The Assessment of Subsistence Production Levels

Basis for comparison

It is normal forestry practise to assess and value the timber contained within a forest on a per hectare basis. Thus it might be determined that Choiseul rainforest contained a volume of merchantable timber that was equivalent to an average of 49.22 m^3/ha and that this was worth \$9.00 m^3. To calculate this the available forest area would have to be known and the timber assessment undertaken within this area.

Normally it would have been convenient to have assessed the subsistence benefits of the Nukiki rainforest on a per hectare basis as well. However the difficulty I faced was that although I had both 1:50,000 and 1:150,000 scale maps of the Siropodoko tribal area around Nukiki these unfortunately contained insufficient topographical detail for either myself or my informants to be able to transpose tribal boundaries onto them with any accuracy. In view of this, and because I had accurate census information, it thus seemed more realistic to assess subsistence production annually on a household basis. Furthermore, the timber volume production and revenue data that I had calculated for the nearby Eagon logging operation at Kuku village, could readily be converted to an annual return on a per household basis. Thus a valid comparison of both subsistence and timber values of the forest could be made.

Village garden production

Village garden production levels initially appeared to be rather difficult to assess. I did not have the time available to record every item of produce obtained from the gardens nor did this seem to be a particularly efficient way of assessing production considering the variables involved. These included garden size and location, intensity of cultivation, number of people reliant on the garden and times and frequency of harvesting. I had grappled with this question for some time before embarking on my field work but as it transpired the matter was fairly quickly resolved in the field. The gardens provided by far the greater portion of the villagers' staple diet and as each household unit was essentially self-reliant in terms of food production, garden size and level of garden production was determined by household size. Although the size of the household unit varied considerably the level of per capita food consumption amongst the villagers was fairly uniform. This then was to be the constant factor in garden production. By taking this then multiplying it by the number of daily meals consumed by the average sized household it was possible to determine just what the garden was worth to the average household in terms of its equivalent market value.

It was the practice in the village to have only two main meals a day. These were similar in content and comprised boiled or baked sweet potato, supplemented with greens or occasionally tapioca pudding if the villagers felt like a treat. If the fishing had been good then fish was included in the meals as were other relishes from time to time. During the day the villagers would also eat snacks such as sugar cane, bananas, cucumber, coconut, bush fruit, nuts or whatever else was available at the time.

The population of Nukiki was 408 at the time of my field study. Within the villages of Nukiki there were 86 families and the average size of these was five (4.74) people. Although individual families were large (a five children family was considered to be small) actual family size at the time of my research did not reflect this. The reason for this was that many of the older children had left home and only the younger ones remained. There were also a number of older couples whose children had all left Nukiki, as well as some young couples whose families were not yet complete (see Appendix 3 for census information).

The 1986 Census, however, used households rather than families per se as a basis for analysing the population. A household was defined as a group of people who shared a common eating arrangement. If most household members were related, households were defined as private. If not, they were defined as collective. Because I had no specific data on how village people grouped themselves for meals I decided to use the 1986 Census data for household size. This showed the average sized Nukiki household contained seven (6.68) members.

By taking what I considered to be a normal daily meal, costing it from Table 6.1, and multiplying it by the number of meals consumed by the average sized (seven member) household per year, I was able to determine that a garden was worth $8,679.70 per annum to a household (see Table 6.2).

Production of food from the forest

Nuts, fruit, leaves ('cabbage'), birds, mammals such as the flying fox, bat, possum and pig, as well as some reptiles, were all obtained from the forest and eaten as food. The wild cabbage was available all year round so could be gathered any time whereas nuts and fruit were only available seasonally (see Figure 5.5 and Table 5.2). Hunting, as in my own society, could almost be termed a sport. If the hunter was skillful and the game not too elusive, it provided food to supplement the staple garden-based diet.

I was able to question villagers closely on the annual yields of both betel nut and nari nut trees and hence determine a level of production that could be applied to both garden and forest trees of these species. This methodology is outlined in Table 6.3 and Figure 6.1. The value of nut production was in fact quite high, a mature nari nut tree producing as much as $125.00 per annum in nuts. By way of contrast a mature and productive betel nut tree might produce $40.00 per annum in nuts.

It was difficult to establish a precise level of consumption for the other food items because they did not contribute significantly to the diet. Consumption varied between households and depended on whether the family had access to fruit and nut trees or, in the case of edible wildlife, whether there was a hunter in the family. In retrospect I

should have interviewed on this topic a little more extensively but in the absence of precise data I have been able to make what I consider to be a realistic assessment of consumption levels based on my experience in the village. This is listed in Table 6.4.

Firewood production

Firewood was readily available in the Honiara market at $10.00 for a bundle approximately 0.3 m^3 in size ($33.33 m^3). I had intended to use surrogate values such as the cost of kerosene and a burner but this would only have been realistic in the absence of a firewood market price. Firewood consumption would have varied considerably between households so in the absence of precise data I have estimated that a household would use the equivalent of 0.3 m^3 every four days. In annual terms this represents about 27 m^3 of firewood which has a market value of $912.58 (see Table 6.5).

Annual value of housing

Surrogate values for housing were relatively easy to calculate in annual terms. To determine what a leaf house was actually worth to a household each year it was simply a matter of taking the price of the surrogate house components and dividing them by their life expectancy. For example fibrolite wall cladding could be expected to last 20 years. Its surrogate value was $1,500.00 plus $100.00 for fastenings, therefore its annual value to a household was $80.00. Combined, the total annual surrogate value of a leaf house was $305.00 (see Table 6.6).

Annual value of canoes

As with housing, the value of a canoe to a household was relatively easy to determine. Although there were at least a dozen large canoes throughout the villages of Nukiki, most households only had one small canoe. These had a life expectancy of five to ten

years, depending on how well they were looked after. Using the surrogate value of $300.00 per canoe and an average life expectancy of 7.5 years, this equates to an annual value of $40.00 (see Table 6.7).

Annual value of miscellaneous forest produce

Candles, brushes, string bags, nets, spears, bows, arrows, fish poison, glue, digging sticks, bird snares and toy boats were all items that were made from bush material. As implements they would be used then discarded once they wore out or had been expended. By taking the market price of the surrogate for these items and dividing it by the life of the product, it was thus possible to calculate the value of these to a village household on an annual basis. Examples are listed in Table 6.8.

Coconut Plantations

Because they were an introduced industry and a source of cash income, coconut plantations have not been valued as subsistence produce.

Combined Annual Household Value of Subsistence Production

To calculate the total annual value of household subsistence production it was simply a matter of combining the annual values of the various subsistence products used by a household (refer to Tables 6.1 to 6.9). The value thus derived, $10,512.15 per household, is quite substantial (see Table 6.10).

It is interesting to note that subsistence production in Nukiki has, to date, been sustained for many generations. There were, however, signs that it was under pressure from the existing population. For example, some garden fallow periods had been reduced to three or four years which was insufficient to allow the forest to regenerate. As a result, forest litter did not have time to accumulate so rejuvenation of soil fertility

could not occur. The gardens were, however, located on fertile limestone karst country so consequential losses in garden production may not have been as serious as they would have been on less fertile land.

The distance villagers had to travel to new garden sites was also increasing as suitable land closer to the village was progressively taken up. Nevertheless plenty of forest land was still available for gardens and other subsistence production, albeit at increasing distances from the villages. Given, however, that the current population of Nukiki is well fed and housed it may not be unreasonable to assume that if present population levels could be maintained subsistence production could still continue to support the villages of Nukiki indefinitely. However, as the population is likely to increase, it is probable that subsistence production will, at some unknown point, cease to be sustainable.

TABLE 6.1: VALUATION OF PRODUCE SOLD IN MARKETS

a) Garden Produce - Available Market Prices

	Market Price $				Ave Price $
	Honiara	Gizo	Moli	Gizo	
	(21.5.91)	(14.6.91)	(25.6.91)	(19.7.91)	
Cabbage - salad *				1.00	
Cabbage - slippery *		1.00	1.00	1.00	
Cabbage - chinese *		1.00			1.00 *
Bachui *		1.00			1.00 *
Egg plant (ea)				0.20-0.40	0.30 ea
Pineapple (lge)				2.50	
Pineapple (small)				2.00	2.25 ea
Cucumber (v.lge)				2.00	
Cucumber (lge+)				1.50	
Cucumber (lge-)				1.00	
Cucumber (med)				0.80	
Cucumber (small)				0.60	1.20 ea
Beans - snake (lge)				1.00	
Beans - snake (small)				0.70	0.85 ea
Beans - green (lge) *		1.00		0.80	
Beans - green (small) *				1.00	1.00 *
Betel nut (lge)		0.10-0.20		0.20	
Betel nut (small)		0.10-0.20		0.10	
Betel nut (2-3)			0.10		0.10 ea
Piper betle leaf (6)			0.10	0.10	0.10 *

	Market Price $				Ave Price $
	Honiara	Gizo	Moli	Gizo	
	(21.5.91)	(14.6.91)	(25.6.91)	(19.7.91)	
Banana (v.lge)			0.40		
Banana (lge)			0.20		
Banana (12 small)			1.00		
Banana (4 small)			0.20		
Banana (ea)		0.10			0.17 ea
Capsicum			0.10		0.10 ea
Coconut (lge)		0.60	0.30	0.40	
Coconut (med)		0.40			
Coconut (small)		0.20	0.20		0.35 ea
Tomato (lge)				0.30	
Tomato (med)				0.20	
Tomato (small)				0.10	0.20 ea
Sugar cane (60cm)				0.60	0.60 ea
Spring onion *		1.00		1.00	1.00 *
Pawpaw (lge)		1.00			
Pawpaw (med)		0.60			
Pawpaw (small)		0.40			0.67 ea
Sweet potato (30+ lge)			7.00		
Sweet potato (20+ small)			3.00		0.19 ea
Tapioca (5)		1.00			0.20 ea

* Per bundle

TABLE 6.1: VALUATION OF PRODUCE SOLD IN MARKETS

b) Non-Garden Produce - Available Market Prices

	Market Price $				Ave Price $
	Honiara	Gizo	Moli	Gizo	
	(21.5.91)	(14.6.91)	(25.6.91)	(19.7.91)	
Gate fruit				0.20	0.20 ea
Nari nuts (lge bag)			5.00 (3.00 Kuku)		
Nari nuts (10 shelled)				0.10	
Nari nuts (NIS #1)				0.70 kg	
Nari nuts (NIS #2)				0.50 kg	5.00 lge bag
Tuna (Bonito 45cm)				3.00	3.00 ea
Chicken (rooster)				8.00	8.00 ea
Brushes		1.00			1.00 ea
Firewood ($0.3m^3$)	10.00				33.33 m^3

NB. Nari nuts were called Ngali nuts elsewhere in the Solomon Islands. Nuts in shells (NIS) were purchased by grade (#1 and #2) at buying centres in the provinces and in Honiara.

TABLE 6.2: GARDEN PRODUCTION LEVELS

a) Household Size

Average family/household:	7 (6.68) people
Comprises:	49% adults 51% children

(See Appendix 3 for further details on household numbers)

b) Daily Food Consumption

		Daily household consumption	Annual household consumption	Annual $ value to household
Main Meals (typical example)				
Potatoes:	3 per adult/meal * 2 per child/meal *	21) 14) (35)	12,775	2,427.25
Greens:	Ave household consumption (bunches/day)	6	2,190	2,190.00
Coconuts:	Greens/potatoes cooked in coconut milk	6	2,190	766.50
Snacks (typical example)				
Sugar cane:	1 per person/day	7	2,555	1,533.00
Bananas:	2 per person/day	14	5,110	868.70
Coconut:	1 per person/day	7	2,555	894.25
TOTAL ANNUAL VALUE OF GARDEN TO HOUSEHOLD:				8,679.70 p.a.

TABLE 6.3: VALUATION OF FOREST AND GARDEN NUT AND FRUIT TREE PRODUCTION

Nari Nuts

a) Selection of Price

Market Prices	Selected Market Price
Moli - $5.00/10 litre string bag	
Kuku - $3.00/10 litre string bag	
$0.70/kg NIS * grade #1	
$0.50/kg NIS * grade #2	$5.00/10 litre bag **

b) Estimate of Annual Nut Production per Tree

Year	Annual production (litres)	Annual market value per tree $
0-19	Nil ***	0.00
20	10	5.00
25	25	12.50
30	50	25.00
35	75	37.50
40	100	50.00
50	150	75.00
60	200	100.00
70	250+	125.00

Betel Nuts

By comparison with the Nari nut, a mature Betel nut tree can produce as many as 400 Betel nuts per annum. At an average market value of $0.10 per nut a mature and productive tree could earn its owner up to $40.00 per annum.

ESTIMATED TOTAL ANNUAL VALUE OF
FRUIT AND NUT TREES TO HOUSEHOLD: 250.00 ****

* Nuts in shells
** Best market price
*** I was informed that a tree first produces nuts at approximately age 20
**** Estimated that each household owns at least two Nari nut trees

FIGURE 6.1: ANNUAL PER TREE MARKET VALUE OF NUT PRODUCTION

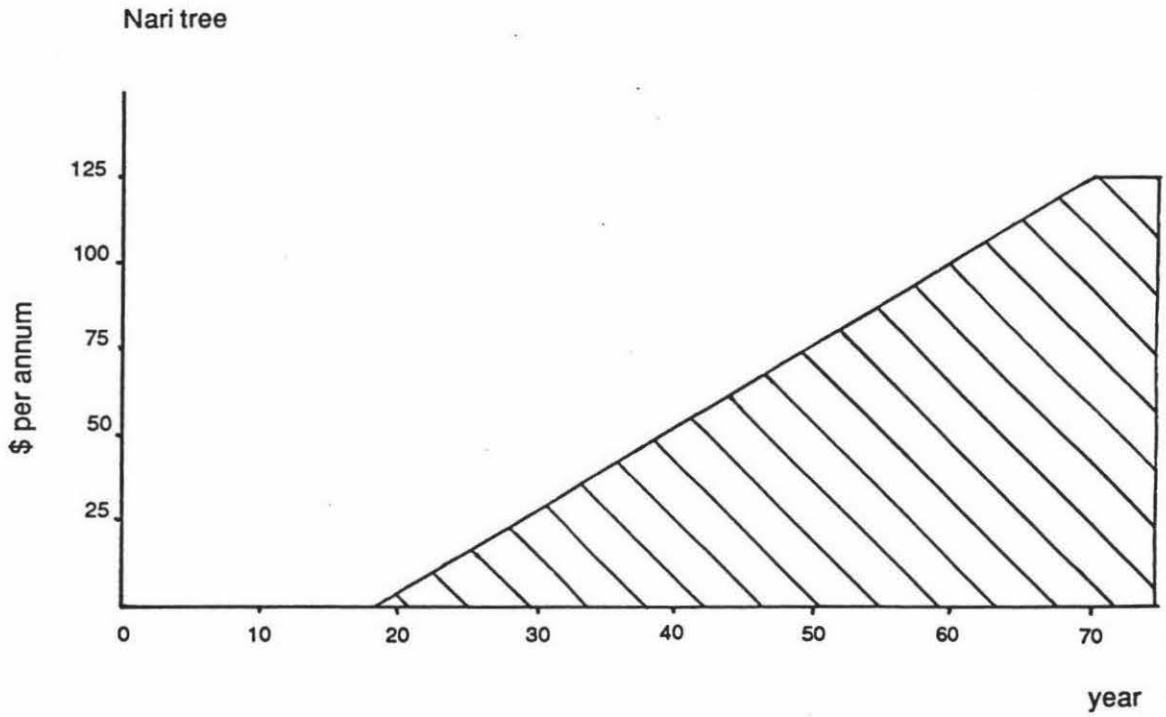


TABLE 6.4: VALUATION OF OTHER FOREST FOOD

a) Examples of Surrogate Pricing of Other Forest Food

Forest food item	Market place surrogate	Market price of surrogate $	Derived surrogate price for forest food $
Food birds	Canned poultry (roasted goose)	3.31 ea *	3.31 ea
Forest mammals (bats, possums)	Canned meat (corned beef)	5.04 ea *	5.04 ea
Pigs	Domestic pigs	250.00 ea (actual Nukiki market value)	250.00 ea

b) Estimated Annual Consumption of Other Forest Foods

Forest food item	Household consumption	Annual value to household $
Food birds	1 per month	39.72
Forest mammals	1 per month	60.48
Pigs	Nil	-
TOTAL ANNUAL VALUE OF OTHER FOREST FOOD TO HOUSEHOLD:		100.20

* August 1990 prices - Honiara retail price index.

TABLE 6.5: VALUATION OF FIREWOOD PRODUCTION

a) Firewood Market Price

Honiara market firewood price: $10.00 per bundle (0.3 m^3)
ie. $33.33 per m^3

b) Derived Value of Firewood Trees

Firewood tree size varied enormously. However an average tree volume of 5 m^3 would not have been unrealistic (ie. log size: 10m x 80cm). Using this volume per tree firewood values could be listed as follows:

Vasiqasiqa name	Botanical name	Value of 5 m^3 tree $
Sisinivu	-	166.65
Qema	Pometia pinnata	166.65
Qalu	Calophyllum neo-ebudicum	166.65
Buni	Calophyllum inophyllum	166.65
Zago	Terminalia brassii	166.65
Kivili	-	166.65
Pasika	-	166.65

c) Annual Value to Household

Household consumption: 0.3 m^3 every 4 days
27.38 m^3 per annum

Firewood value: $33.33 m^3

ANNUAL VALUE OF FIREWOOD TO HOUSEHOLD: 912.58

TABLE 6.6: VALUATION OF LEAF HOUSES

a) Surrogate Building Material and its Prices

Building component		Market place surrogate	Market price of surrogate $	Derived surrogate price for subsistence product $
Wooden framing and flooring	1)	Sawn timber (House lot ex Honiara landed at Nukiki)	3,000.00	3,000.00
Sago leaf roofing	2)	Corrugated iron (73.15 m required for village 45 m^2 permanent house. Cost $16.24 m *)	1,188.00	1,200.00
Sago leaf wall cladding	3)	Fibrolite cladding (Cost $60.00 per sheet *, 24 sheets per 45 m^2 house)	1,440.00	1,500.00
Fastenings (Vine lashing)	4)	Nails (Cost $100.00 per carton *, 4 cartons per 45 m^2 house)	400.00	400.00
-	5)	Cement (Cost $32.95 per bag *, 12 bags per house)	395.00	400.00
-	6)	Miscellaneous (hardware, netting, lining, internal wall panels, glazing)	2,000.00 approx.	2,000.00
Approximate total cost of leaf house surrogate:				8,500.00

* Price of material landed at Gizo. Assumed to be the same for Nukiki because shipping distance from Honiara to Gizo is similar to Honiara to Choiseul.

TABLE 6.6: VALUATION OF LEAF HOUSES

b) Derived Value of House Building Trees and Plants

1) Timber: flooring, framing, piles

Vasiqasiqa name	Botanical name	Use	Value $
Gurama	-	Piles, studs, joists and bearers	Cummulative value $3,000.00 per house
Vedeke	Vitex cofassus	Piles, studs, joists and bearers	
Vilaki	Kleinhovia hospita	Rafters and battens	
Rumese	Macaranga fimbriata	Rafters and battens	
Sarende	Calophyllum paludosum	Rafters and battens	
Kodama	-	Rafters and battens	
Qema	Pometia pinnata	Rafters, joists, bearers and battens	
Qalu	Calophyllum neo-ebudicum	Rafters, joists, bearers and battens	
Naqeme	Timonius timon	Rafters, joists, bearers and battens	
Zago	Terminalia brassii	Rafters	
Tunima	Alangium javanicum	Joists and bearers	
Sisinivu	-	Joists, bearers and rafters	
Kivili	Intsia bijuga	Joists, bearers and rafters	
Podovaritora	Gynotroches axillaris	Studs, joists and bearers	
Garagara	Pterocarpus indicus	Joists, bearers and flooring	
Viluaka	-	Flooring	
Piro	-	Flooring	
Baluve	Gulubia spp	Flooring	
Kudaesoro	Gulubia hombronii	Flooring	
Modo	Colona velutina	Flooring	
Jarivu	Rhopaloblaste elegans?	Flooring	

TABLE 6.6: VALUATION OF LEAF HOUSES

b) Derived Value of house Building Trees and Plants

2) Roofing

Vasiqasiqa name	Botanical name	Use	Value $
Bia (Sago palm)	Metroxylon solomonense	Roof panels	Cummulative value $1,200.00 per house
Jarivu	Rhopaloblaste elegans?	Roof panel battens	
Kaqe	Strongylocaryum latius	Roof panel battens	
Koraka	Caryota rumphiana	Roof panel battens	

3) Wall Cladding

Vasiqasiqa name	Botanical name	Use	Value $
Bia (Sago palm)	Metroxylon solomonense	Wall panels	Cummulative value $1,500.00 per house
Jarivu	Rhopaloblaste elegans?	Wall panel battens	
Kaqe	Strongylocaryum latius	Wall panel battens	
Koraka	Caryota rumphiana	Wall panel battens	

TABLE 6.6: VALUATION OF LEAF HOUSES

b) Derived Value of House Building Trees and Plants

4) Fastenings (Vine lashing)

Vasiqasiqa name	Botanical name	Use	Value $
Siku	Calamus hollrungii	Tying rafters and leaf panels	Cummulative value $400.00 per house
Sudulu	-	Tying rafters and leaf panels	
Sasake	Freycinetia bicolor	Tying rafters and leaf panels	
Ponolo	-	Tying joists and bearers	

TABLE 6.6: VALUATION OF LEAF HOUSES

c) Annual Value of a Leaf House to a Household

House component	Life of surrogate	Surrogate value $	Surrogate value per annum $
Framing, floor and piles (+fastenings)	Sawn timber - 20 yrs	3,000.00 (+200.00*)	160.00
Leaf roof (+fastenings)	Corrugated iron - 20 yrs	1,200.00 (+100.00*)	65.00
Leaf walls (+fastenings)	Fibrolite - 20 yrs	1,500.00 (+100.00*)	80.00
TOTAL ANNUAL VALUE OF LEAF HOUSE TO HOUSEHOLD:			305.00

* Fastenings

TABLE 6.7: VALUATION OF CANOES

a) Surrogate Products and their Prices

Subsistence product	Market Place surrogate	Market price of surrogate $	Derived surrogate price for subsistence product $
Small canoe (3-4 metres)	Nil		300.00
Large canoe (6-8 metres)	8m wooden (dugout) canoe ex Vella Lavella	1,500.00	1,500.00
	6.4m narrow fibreglass canoe	3,500.00 Honiara 3,690.00 Gizo	N/A

b) Derived Value of Canoe Building Trees

Vasiqasiqa name	Botanical name	Value of mature tree (large canoe) $	Value of immature tree (small canoe) $
Zago	Terminalia brassii	1,500.00	300.00
Garagara	-	1,500.00	300.00
Maraquni	-	1,500.00	300.00
Qaluveko	Gmelina moluccana	1,500.00	300.00
Pepete	-	1,500.00	300.00
Gurama	-	1,500.00	300.00
Bagava	Alstonia scholaris	1,500.00	300.00

TABLE 6.7: VALUATION OF CANOES

c) Annual Value of Canoe to Household

Life of canoe:	5-10 years (average 7.5 years)
Surrogate value of canoe:	$300.00
ANNUAL SURROGATE VALUE OF CANOE TO HOUSEHOLD:8	$40.00

TABLE 6.8: VALUATION OF MISCELLANEOUS FOREST PRODUCE

Item	Market place surrogate	Market price of surrogate $	Life of surrogate	Surrogate or market value $	Annual value to household $
Candles	Kerosene lantern Kerosene (20 litres)	10.00 43.50	3 yrs 20 litres p.a.	3.33 p.a. 43.50 p.a.	46.83 **
Brush	Has market price	1.00	3 months (use 8 p.a.)	1.00 ea	8.00
String	Nylon string	3.00	6 months (use 2 p.a.)	3.00 ea	6.00
Bow and arrows, spears and snares	Rifle (.22 calibre) Ammunition (1 box)	900.00 *** 15.00	60 years 1 box p.a.	15.00 p.a. 15.00 p.a.	30.00 **
Fish poison	Fish hooks	2.00 (pkt 5)	5 pkts p.a.	10.00 p.a.	10.00
Digging sticks	Spade	30.00 *	20 yrs	1.50 p.a.	1.50 **
COMBINED ANNUAL VALUE					102.33

* Estimate only
** Market price of surrogate divided by life of surrogate
*** A high price, obtained from one source only

TABLE 6.9: VALUATION OF CUSTOM MEDICINE

a) Travel Cost Pricing of Western Medicine

Nukiki villagers using Taro Clinic	6 per day
Clinic open approx. 250 days per year (Mon-Fri)	
No. people using clinic per year	1,500
Cost of travel to clinic (1 canoe per day):	
Canoe hire (no charge = mercy mission)	
Motor hire at $7.00 per day	$1,750.00 pa
Petrol at $16.00 per day	$4,000.00 pa
Annual cost of travel	$5,750.00 pa

b) Surrogate Value of Custom Medicine

50% of Nukiki village medical problems treated at Taro Clinic
Assumed that clinic cost = surrogate cost of custom medicine

Surrogate value of custom medicine	$5,750.00 pa
Number of Nukiki households	47
ANNUAL SURROGATE VALUE OF CUSTOM MEDICINE TO HOUSEHOLD:	$122.34

TABLE 6.10: TOTAL ANNUAL VALUE OF FOREST PRODUCE TO A HOUSEHOLD

Product	Value per year $
Garden	8,679.70
Nut and fruit trees	250.00
Other forest food	100.20
Firewood	912.58
Housing	305.00
Canoe	40.00
Miscellaneous forest produce	102.33
Custom medicine	122.34
TOTAL ANNUAL VALUE OF FOREST SUBSISTENCE PRODUCTION PER HOUSEHOLD:	10,512.15

CHAPTER 7

THE IMPACT OF LOGGING ON KUKU VILLAGE

Located at Moli, some 11 kilometres away and clearly visible from the beach at Nukiki, was the Eagon Resources Development Co. Ltd. sawmill and base camp for their logging operation. My first introduction to Moli and the logging operation was on the boat trip from Honiara to Choiseul Bay. Later I was to make three trips into the areas affected by logging and on two of these locations was able to undertake some work on assessing the impact of logging on village land. As far as my research was concerned this was quite significant because, having defined the subsistence value of the forest to a particular village, I could determine what a nearby village in similar forest lost through logging. These losses could then be compared with the royalties or compensation the village received from the logging.

Pavora River

Not long after I arrived in Nukiki I was taken by boat to Pavora Bay. This was a beautiful bay almost halfway between Nukiki and Moli (see Figures 4.1 and 5.1). It was unusual for the area in that it was not protected by a reef so consequently the beach was exposed to the surf. Before logging had caused siltation in the bay it had been a favourite nesting site for turtles.

The owners of the land surrounding Pavora Bay were strongly opposed to logging so had not allowed it on their land. Unfortunately, however, this had not prevented them from suffering some of the consequences of logging because the headwaters of the Pavora River were located well within the logging area. Although I did not visit these particular workings in the bush, the level of soil disturbance must have been quite severe because the siltation or aggradation in the Pavora River was bad. At the time of my visit the river had a heavy deposit of silt along its banks and on the river bed where it entered the bay. I was told that before the logging the river used to run clear but this was no longer the case since logging. Even in fine weather, such as on the day of my

visit, there was some discolouration caused by flocculence. I was also told that before logging the river had contained a bountiful supply of small fish, shellfish and freshwater crayfish. Aggradation in the riverbed since logging had, however, virtually wiped out a supplementary source of food for the one family that lived in the bay. Although I did see a few small fish in the river it bore no comparison to the other streams I had seen in Nukiki. These ran beautifully clear upstream of the mangroves and were abundant in acquatic life. The riverbeds were stable and even though flooding must have occurred during prolonged tropical downpours there was not the evidence of the severe flash flooding and the erosion that went with it. By contrast the Pavora River appeared lifeless and discoloured. Shingle rifts, eroded river banks and silt deposits on the river flats all bore testimony to flash flooding, a symptom of deforestation and severe soil disturbance in its headwaters. Put simply, the Pavora catchment had lost its ability to absorb the high rainfall that is so typical of that tropical climate.

PHOTOGRAPH 15: Siltation in the Pavora River. Logging in the headwaters of the catchment had a drastic effect on the river.

The affect of deforestation on the resident family in Pavora Bay was quite drastic. In the past the river had provided them with some food and all of their drinking water. The despoilation of their river meant that they now had to rely on collecting rainwater for drinking. Two metal water tanks had been provided for this purpose by the logging company. A garden site by the river had also been eroded during the flooding and as it supplied the main source of food this was a major problem for the household. They would have to establish, I was told, a new garden elsewhere. Birds, caught for food, were also less abundant since areas of bush had been cleared. The hornbill and pigeon were two species mentioned.

The bay itself had been a good fishery. During heavy rainfalls, prior to logging, floods had swept small fish from the river into the bay and these had attracted other fish which fed on them. The villagers in turn made the most of this increase in fish numbers but since logging heavy deposits of silt are swept into the bay during floods, turning it muddy and spoiling it as a fishery. Turtles, prized by the villagers for their eggs, had also nested less frequently in the bay since siltation had occurred. In the past two species had nested in the bay, the most frequent having been mokolo. This was described to me as a big black turtle with a soft shell. This description most likely refers to the rare Leatherback Turtle (*Dermochelys coriacea schlegelii*). The largest of the turtles this species is listed as critically endangered by the International Union for the Conservation of Nature and Natural Resources (Groombridge, 1982). The other turtle that nested in the bay was called teqe in the Vasiqasiqa language. This was a hard shelled variety, probably the more common Green Turtle (*Chelonia mydas agassizi, Chelonia mydas carrinegra or Chelonia japonica*).

Moli

A month after I had been in Nukiki I made a canoe trip to Moli to price produce in the market and make contact with the logging company. When I arrived at Moli the market had not begun so, accompanied by my escort, I walked around to the sawmill to make a courtesy call. At the workshop I was introduced to the manager of the Eagon Resources Development Company operation at Moli. He obligingly arranged for me to look at the Eagon maps and aerial photographs of the logging area. I was particularly interested in establishing the location of the Siropodoko tribal boundaries, but like me Eagon were

awaiting the outcome of discussions between adjoining land owners on their mutual boundaries. These had still not been formalised at the time of my departure from Choiseul.

If I had thought the logging of tropical rainforest was a controversial issue before I came to the Solomon Islands, I was to find it even more so in the islands themselves. Throughout the Solomon Islands people were divided as to whether or not logging should take place. In Nukiki the majority of the villagers were opposed to logging so it was useful for my research to examine contrasting views. As one would expect, Eagon provided this and a discussion I had with the manager provided an insight into their philosophy on logging. As he saw it the revenue from logging provided the villagers of Moli with a one-off opportunity for development. He was, however, frustrated and dismayed at the villagers attitude to this money, for instead of using it 'wisely' he believed they were wasting it. The manager, who could foresee the day when both the timber and the cash flow from royalties would be gone, was concerned that the villagers would end up with nothing at the end of the logging operation. Consequently, he told me, Eagon were trying to educate the people to use their royalties wisely and were establishing demonstration agricultural projects such as a cocoa plantation. This was done through the Eagon Choiseul Foundation which, in addition to creating demonstration projects, was also establishing a hospital in Moli, had created a number of scholarships for students and in fact was prepared to look at anything that would encourage development (Solomon Star, 1991 460:5. See Appendix 4). Eagon apparently were even prepared to guarantee a market for the cocoa projects for as long as they were logging on Choiseul for, as the manager put it, if agriculture in the Moli area failed, Eagon would be blamed for it. They estimated they would be logging on Choiseul for 20 years, or in other words for the duration of their licence. The logging licence, I was told, stipulated that a permanent all-weather road be established in the area. According to the manager, Eagon had endeavoured to do this in very difficult conditions by laying a one metre base-course and putting in good culverts.

Moli itself was no longer a typical Solomon Island village. Rather, it was a logging camp with unpainted sawn timber buildings, mud roads and a predominantly male population that was not local to the village. In short it was typical of logging camps throughout the southern hemisphere. The original villagers of Moli, the land owners, were divided over the logging. While initially some wanted it, others now opposed it (Ombudsman's Report, 1990:12-19 and Link, 1991 20:8-9. See Appendices 1 and 5).

Logging, I observed, was the cause of social disruption. Communities that were formerly united, in the way I found Nukiki was, were split by land disputes. Dalmian Mijikana of Vudutara village near Moli observed:

> Some land owners want to extend their traditional boundaries and this especially applies to those with small portion of customary land areas and I think they are doing this to get bigger royalty. This is against our traditional way of oneness and that of communal sharing. Since the arrival of churches, we Choiseulese live in harmony, but in my area this is not the story today (Link, 1991 20:8-9).

More than anything, it appeared that the villagers were caught between two cultures. The logging company, Korean in its ownership and capitalist in its philosophy, had certain business expectations from their venture. At the same time they would normally expect the islanders, the other party to the business transaction, to be equally astute in their business practises. Such was not the case because the islanders, well versed as they were in the economy of a subsistence culture, were ill equipped to manage their affairs well in the somewhat predatory world of international business. As a consequence, their so-called development opportunities, as perceived by the Koreans, were slipping away by the log load, a debt perhaps against future generations of Choiseulese who will no doubt be better equipped to survive in a capitalist world.

Kuku Village

Although the cost or impact of logging was more tangible in Pavora Bay than it was in Moli, I had no way of quantifying it in terms that were comparable with my study of the subsistence use of rainforest in Nukiki. I needed a site in which I could make a more appropriate comparison, so when the opportunity arose to do this in the village of Kuku, I jumped at it.

Kuku village was situated on the coast some 16 kilometres to the southeast of Nukiki. In January 1991 Eagon established roads onto land belonging to the Qeqetovoru people of Kuku village and, according to the villagers, had illegally removed a substantial number of trees. The villagers were understandably very angry about his

and it was only through the appeasement of one senior villager that the men of Kuku were prevented from attacking company workers and burning the machines (Link Vol.20:8-9,1991).

Nukiki and Kuku villagers were linked by strong blood ties. Because of my friendship with Nukiki villagers I was given free access to Kuku so, accompanied by a number of Nukiki villagers and one Kuku villager, we set off down to Kuku by canoe to look at the logging trespass. Due to increasingly rough weather the canoe journey proved to be the most exciting I undertook in the Solomon Islands!

Kuku village and the area immediately surrounding it was home to 21 families, or households, at the time I undertook my research. As such the village was a lot smaller than Nukiki. Shortly after our arrival we were taken into the bush behind the village to look at logging damage to garden sites and to areas that had previously been covered in forest that had belonged to the village as a whole. After a short walk through coastal coconut plantations we made our way up onto a steep ridge. About two thirds of the way up the spur leading to this ridge we came across a logging snig track that had been bulldozed down the spur and through some garden sites (see Photograph 16). The timber trees had been removed in April 1991 and the gardens ruined in the process. Walking up this bulldozed track I was able to observe the severe erosion that was occurring as a result of water running unimpeded down the track (see Photograph 17). No provision had been made to prevent this so if this disregard for soil and water values was typical of this logging operation elsewhere it was hardly surprising that the Pavora River had aggraded badly. Later in the day I noted that the small Narinari Stream, directly below this spur, was showing signs of quite heavy siltation.

Along the top of the main ridge was the Eagon Company main road. This was of a high standard. I was told by the Kuku villagers that this was to be the main logging access road to Babatana, the area surrounding Sasamungga to the southeast of Kuku and Moli. Since the villagers had objected to the logging of their land construction on the road had stopped. When the villagers first objected to the company about the logging the road had reached a point on the ridge called Narikekele. This was directly above the gardens that had been destroyed by the snig track. Roading and logging, however, did not stop until a place named Sulupusaka had been reached, a distance of some 400 or 500 metres from Narikekele. This deafness to the villagers complaint, or *earpass* as it is

PHOTOGRAPH 16: Logging snig track bulldozed through a garden site near Kuku village.

PHOTOGRAPH 17: Erosion on a logging snig track near Kuku village.

called in the Pijin language, was put down to the fact that there were numerous merchantable trees between the two points, Sulupusaka being the end of the ridge and the limit of the merchantable trees (see Photograph 18).

There were no garden sites on the ridge between Narikekele and Sulupusaka. However, the trees that were taken by the loggers had also been of high value to the villagers as a source of building material, food and medicine. Some of these trees were owned by individual families and others by the tribe as a whole.

PHOTOGRAPH 18: The end of the logging road at Sulupusaka, near Kuku village. Logging was continuing on the ridge in the background.

Extent of the Damage

For the villagers of Kuku the extent of this damage was quite substantial. While only four of the 21 resident households (19 percent) lost their gardens this was a very serious problem indeed for these particular families. The gardens were the major source of food for the villagers so to destroy a household's garden was to deny them subsistence. In order to survive, these households must have relied on their neighbours to feed them until they established new gardens.

In total ten families, including those who lost gardens, had sago palms and other useful trees destroyed by the logging. If a household lost its sago palms it no longer had the means to reclad its leaf houses. Coupled with the loss of other house building material such as was obtained from trees on the tribal common land, this was the equivalent of a westerner losing all the savings they had set aside to purchase a new house.

Without counting the tree stumps it was difficult to determine exactly what number of trees had been taken by Eagon from the ridge between Narikekele and Sulupusaka. I did not attempt to gain access to log tally figures for this logging area from Eagon so can only quote the villages estimate that over 1000 trees had been taken. These included trees in family and tribal ownership and comprised of house building trees, canoe building trees, food trees, medicine trees as well as planted species such as sago palm and nari nut. The villagers of Kuku estimated that 25 percent of their useful trees had been removed from this area, a very significant figure in terms of lost livelihood.

In hindsight it would have been helpful to have verified the number of trees lost from the village common land by counting stumps. Stump diameter could then have been measured to get a (very) rough estimate of the tree volume removed. I did not have time to do this but I did, however, manage to get accurate data on the number of family owned, and hence planted, trees that were destroyed. Table 7.1 lists the number of gardens as well as the tree species lost to logging.

Tambu Site

The Eagon Company road stopped only 12 metres short of a *tambu* site at Sulupusaka but it was obvious that a bulldozer had ventured within three or four metres of the site. It would have been a major catastrophe for the Qeqetovoru people if this *tambu* site had been destroyed because it represented one of the tribe's landmarks, a kind of signature or focus for their identity with this area of land. The *tambu* site itself was a hollow tree stump that had grown around a shell necklass or breastplate called a *barake* which had been placed within it (see Photograph 19).

PHOTOGRAPH 19: The *tambu* site at Sulupusaka was a hollow tree stump in which had been placed a *barake* (shell breastplate, or necklass). Still living, the stump had grown over and sealed in the *barake*. This *tambu* site was almost destroyed by the logging.

Valuation of Village Losses

Using data obtained from Nukiki I valued Kuku village losses in terms of the subsistence production they had to forfeit as a result of the logging. Calculating this was not particularly straight forward and a number of assumptions had to be made. An explanation has therefore been given for each component of this exercise.

Garden losses

The 1986 Census showed that the average sized household in Kuku was comprised of seven (6.79) people. As this was almost the same as the average sized Nukiki household I was able to use household garden production values from Nukiki and apply them directly to Kuku. It would have taken the villagers almost one year to re-establish a fully productive garden after it had been destroyed by logging so the combined loss of the four village gardens was calculated as $34,718.80 for one year. Discounted, this was $31,278.16 in present value terms (see Table 7.2).

Garden nut and fruit tree losses

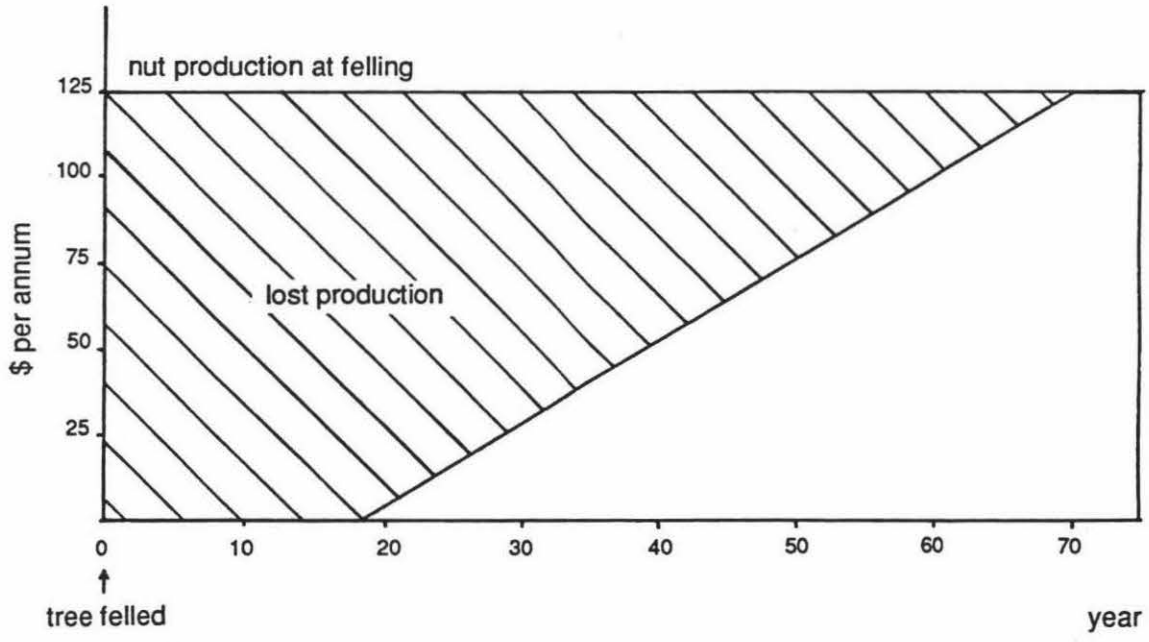
Nari nut trees

In Table 6.3 an attempt was made to estimate the annual nut production from a *nari* nut tree and place a value on this. If a tree such as this was felled the owner would quite obviously lose his or her ability to harvest nuts from this tree, not only in the year the tree was destroyed but for as long as it would take for a replacement tree to reach the same level of production. This loss in production, illustrated in financial terms, is shown in Figure 7.1.

If, at the time of felling, the tree was fully productive (ie. producing 250 litres or $125.00 nuts p.a.), it would take 20 years for a replacement tree to even start producing nuts plus another 50 years for it to reach the same level of production. In other words it would be 70 years before the owner, or more probably subsequent owner, could expect to harvest the same quantity of nuts annually. When considering the owner's loss it is therefore very necessary to take into account the long period of time over which this

loss is sustained. Using a discounted cash flow the net present value of the loss of such a tree has thus been calculated as $1,231.41 (see Table 7.3). The calculated loss of $1,231.41 is much higher than the $13.00 per nari tree compensation paid to the villagers by Eagon Resources Development Co. Ltd. In fairness to Eagon, however, their payment was higher than the Solomon Island Government official crop compensation rates which, by my calculations, were extremely low. For example a non-bearing ngali nut tree (ie. nari nut tree in the Vasiqasiqa language), had a value of $3.30 and a bearing tree a value of $10.60 (Appendix 6 lists all Government compensation rates).

FIGURE 7.1: LOST NARI NUT PRODUCTION



Sulu nut trees

Because nari nuts and sulu nuts were similar, and because I had no information on sulu nut, I have assumed that sulu and nari nut production are of the same value. This assumption was also made by Eagon who paid the same compensation rates for both tree species.

Betel nut trees

I was told a betel nut tree would start producing nuts at a rate of around 50 nuts ($5.00) per year at age two and then gradually increase production to a maximum of 400 nuts ($40.00) per year. Unfortunately, however, I did not know the age at which it would reach optimum nut production. In the absence of this information I have assumed it is age ten and therefore have based my discounted cash flows on this assumption. The estimated loss thus derived is calculated as $178.49 (see Table 7.4). Compensation paid by Eagon, on the other hand, was only $0.50 per tree. This did not even compare very well with Government crop compensation rates which were $1.66 for a non-bearing tree and $6.60 for a bearing tree. By my calculations it was, however, evident that the Government compensation rates still considerably undervalued the tree.

Miscellaneous losses

Seven cocoa trees and one orange tree were the only other tree losses I recorded at Kuku. As cocoa was not grown widely in Nukiki I had not valued it although I do recall seeing one young tree in the Vughala gardens. Although I have recorded oranges as growing in Nukiki I had no market value for these as they were not present in the markets at the time prices were recorded. In the absence, therefore, of any data on the value of these species, and because their losses at Kuku were relatively light, I have ignored them.

Sago palm losses

When discussing how many sago palms (bia) were needed to provide roofing and wall panels for a house I was told that the leaves from three palms were required for the roof of a house three fathoms long. The fathom, incidentally, was the standard measurement

used by the villagers and equated to 1.83 metres. By the same measure a house four fathoms in length needed the leaves from four sago palms to roof it. It seemed, however, that the leaves from two palms provided enough material to clad the walls of most houses.

It was relatively easy to calculate an approximate per tree value for a single sago palm based on the information contained in Table 6.6. From this table a leaf house roof had a value equivalent to $65.00 p.a. and the walls a value equivalent to $80.00 p.a. Assuming that the leaves from five trees were required to clad one house, each tree was calculated to be worth $29.00 p.a. if it was used for leaf house cladding. The difficulty I faced, however, was that I did not know the age at which the sago palm was considered sufficiently mature to provide leaf for houses. As with nut tree production, leaf production would increase gradually but in the absence of any data on this I have assumed full leaf production is attained by age ten. Any leaf production before this period has been ignored (see Table 7.5). The value of lost production per tree has therefore been calculated as $189.57. By comparison Eagon paid the land owners $6.00 per tree which was, by Government crop compensation rates, quite reasonable. The Government rates stood at $5.00 for a mature tree and $1.00 for an immature tree. These rates were, again, extremely low by my calculations.

Other tree losses

Because I had no precise data on the number and species of trees lost from the tribal common land I had to accept the villagers estimate that they had lost 25 percent of their useful trees. To place a value on this I took the annual household values I had obtained from Nukiki for the household forest uses not already valued as specific Kuku village losses. These included other forest food obtained from the forest, firewood trees, house building trees (apart from sago palm), canoe building trees, trees used for miscellaneous forest produce and trees and plants used for custom medicine. Because the villagers estimated they had lost 25 percent of their useful trees the combined annual household value of these items was multiplied by a factor of 0.25 to give a household value of $359.37. The combined village value (21 households) of this loss was $7,546.77 but as village subsistence use of the forest was assumed to be sustainable at existing population levels this had to be taken into account. Using discounted cash flow calculations the net present value of this loss has been calculated as $68,607.00 (see Table 7.6).

Tambu sites

Although the villagers of Nukiki and Kuku place a high value on *tambu* sites I was unable to place a monetary value on these. As it transpired the *tambu* site at Sulupusaka was not destroyed so it did not need to be recorded as something the villagers had lost.

Village losses

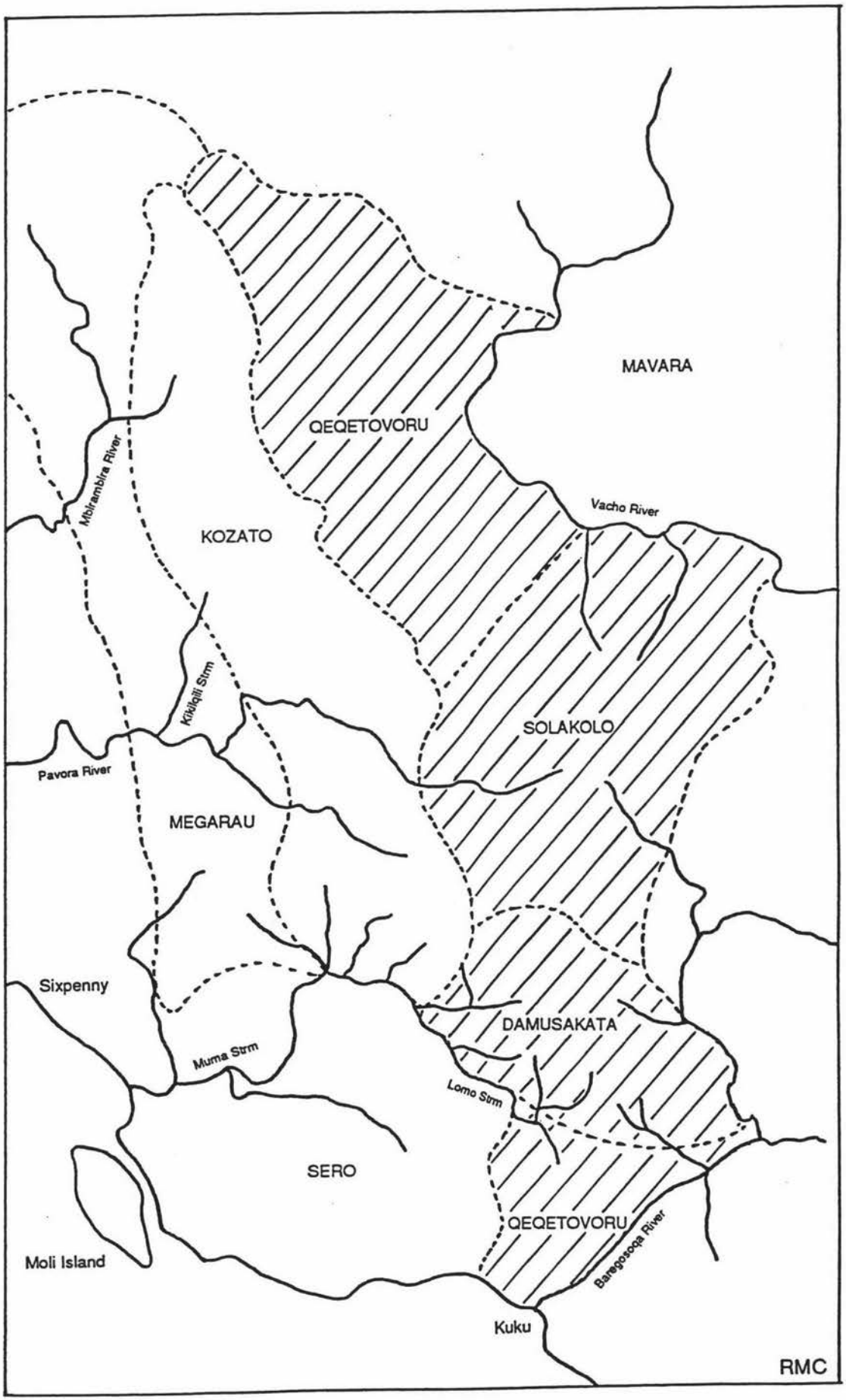
To find the total value of the subsistence production losses sustained by Kuku villagers during the logging operation, the garden losses, garden nut and fruit tree losses, sago palm losses and the loss of other trees on the village common land were combined. Individual household losses and the combined village loss of $176,613.13 are listed in Table 7.7.

Estimated Village Income from Logging

Dispute over the logging licence

The villagers of Kuku had told me that one member of their tribe had given Eagon Development Company written permission to log land belonging to the Qeqetovoru people. In addition to this the man's son had also given Eagon written permission to log land he considered belonged to the Solakolo people (see Figure 7.2 for map of tribal land claimed by Kuku villagers). The villagers of Kuku, the Qeqetovoru, strongly maintained that these two men had no right to do this because they were not chiefs and as such had no jurisdiction over the land rights of the local people. The right of these two men to their own land was also questioned by the tribe because this land had been inherited matrilineally rather than patrilineally, which was the custom of these people. Furthermore the villagers maintained a meeting of the tribe had not been called to consider the logging proposal, this being a legal requirement under Section 5.c (1) of the Forest Resources and Timber Utilisation (Amendment) Act, 1990.

FIGURE 7.2: MAP OF TRIBAL LAND CLAIMED BY KUKU VILLAGERS



The land title map that Eagon were using was also disputed by the villagers of Kuku who maintained that in addition to Qeqetovoru land already shown on the map, the Solakolo land and Damusakata land also belonged to them (see Figure 7.2). As their claim to Damusakata land was not in dispute the issue really revolved around who had title to the Solakolo land plus a small portion of land that had been logged on the Sero boundary. At the time I undertook my research this dispute was before the Custom Land Enquiry Committee who, in due course, were to make a ruling on land ownership.

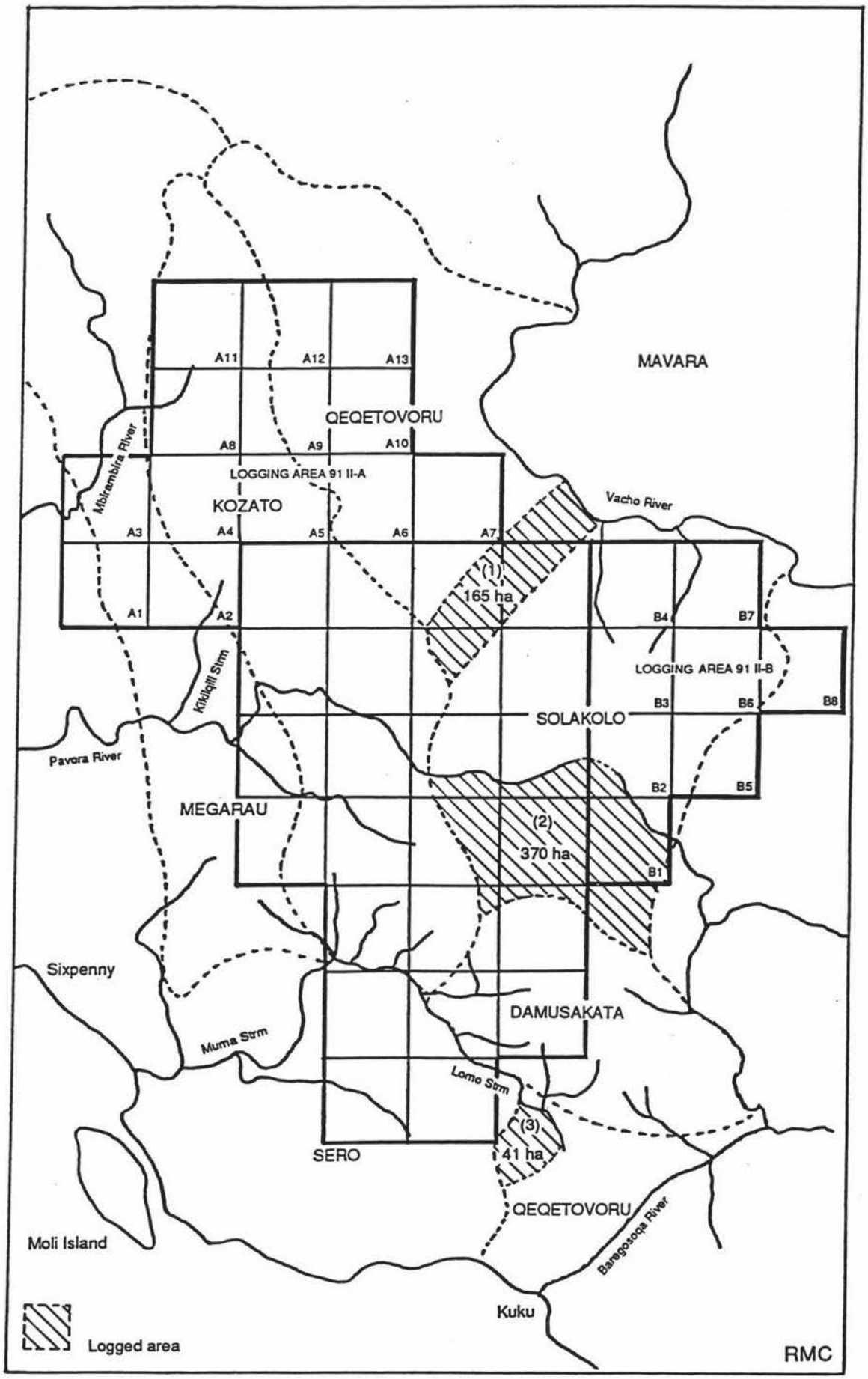
Estimated royalty payments

The logging on land claimed by the Qeqetovoru people had been undertaken in three localities (see Figure 7.3) but because the Logging Licence was in dispute the royalty payments had been placed in trust. Although the Qeqetovoru people had been able to supply me with details of royalty payments for one of the three logged areas (see Table 7.8), neither I nor the villagers, it seemed, had any idea of the log volume this referred to. Consequently I decided to calculate royalty payments from logging data contained in Eagon's logging reports to the Ministry of Natural Resources Forestry Division.

Eagon's 1991 Logging Plan divided the 1991 logging areas into 100 hectare felling coups (see Figure 7.3 and Appendix 8). These logging areas, 91 II-A and 91 II-B, partially overlapped land claimed by the Qeqetovoru people. By transposing these felling coups onto a map showing Qeqetovoru land that had been logged, it was possible to calculate the size of the three Qeqetovoru logging sites as being 576 ha. Using an average total standing per hectare (tree) volume of 57.9 m^3/ha, obtained from Eagon's 1991 Logging Plan, and then multiplying this by a standard factor of 0.85 to allow for logging waste, logging production from land claimed by the Qeqetovoru people was calculated to be approximately 28,350.72 m^3.

Although 576 ha of Qeqetovoru land had been logged, it was only from the land directly behind Kuku village that the subsistence losses had been recorded. The area of this logging site was calculated to be 41 ha (see Figure 7.3, Area 3). Using the average merchantable volume derived from the logging plan, log volume production from this site was calculated to be 2,018.02 m^3 (see Table 7.9).

FIGURE 7.3: 1991 LOGGING AREAS



Source: 1991 Logging Plan. Eagon Resources Development Co Ltd

From the commencement of logging in 1989 through to 1990, Eagon paid village land owners a royalty of \$5.00 m^3 for their timber. This was increased to \$9.00 m^3 in 1991.[1] In making an assessment of royalty payments that were due to the villagers of Kuku, it was simply a matter of multiplying the log volume calculated to have been removed from Qeqetovoru land by \$9.00 m^3. The value of royalty payments thus derived for the area in which subsistence losses were recorded was \$18,162.18 (see Table 7.9).

The above estimates of log production and royalty payments from Qeqetovoru land are obviously no substitute for hard data in the form of log tallies and records of royalty payments by log volume. However, as this was not available it was necessary to use what I considered to be very good secondary data sourced, as it was, entirely from Eagon's records for the area.[2] It should, however, be emphasised that the log production figures and the royalty payments listed are only indicative of what the villagers might have expected from their logged land.

Logging Royalties Compared with Loss in Subsistence Production

One advantage of valuing subsistence use of the rainforest in financial terms was that the loss in subsistence livelihood brought about through logging could be compared directly with logging royalties. This allowed a calculation to be made to determine whether the villagers' gained or lost when logging occurred on their land. In the case of Kuku village, it was very clear that timber royalties from a given area were no substitute for the subsistence values lost when this land was logged (see Table 7.7). There were, however, a number of ways in which comparisons between subsistence losses and logging royalties could be made. Each placed a different emphasis on the values involved.

Direct comparison

The direct comparison was the most obvious way of comparing logging royalties with the loss in subsistence livelihood, and probably the most accurate. Using the values from Tables 7.7 and 7.9 respectively, the combined loss of \$176,613.13 suffered by the villagers of Kuku during logging was far in excess of the \$18,162.18 they were

estimated to be due in royalty payments (see Table 7.10). To compound the problem the losses suffered by individual households were unevenly distributed throughout the village. While all 21 households shared in the loss of the trees from the common land, only ten households suffered direct losses to their garden or household trees. At least six households suffered losses in excess of $10,000.00, so when compared with the estimated per household logging royalty of $864.87 (see Table 7.9), these losses were catastrophic. The imbalance in losses also had the potential to cause conflict within the village when the time came to allocate the inadequate royalty payment between various households. These imbalances could, however, have been offset by using the estimated $236,994.30 royalty from the remaining 535 ha (see Figure 7.3, Areas 1 and 2), which combined with the $18,162.18 from the land used for the villagers' subsistence livelihood, adequately covered the combined village subsistence losses. Cross-subsidising the villagers' loss in this manner would, however, have been to completely ignore the subsistence value of the 535 ha (see next section).

The estimated royalty payment occurred only once. On the other hand the loss in subsistence production resulting from logging, occurred over many years. By using simple discounted cash flows this continuing loss in subsistence production is taken into account and is reflected in the high values attributed to it (refer to Tables 7.2 and 7.7).

Sustainable subsistence production compared with estimated royalties on a household basis

Another way of comparing subsistence production with logging was to contrast the benefits of sustainable household subsistence production with the benefits a household might gain from the logging. To do this the total annual value of forest subsistence production to the average sized Nukiki household was taken and compared with the combined royalties the average sized Kuku village household could expect from the logging that was undertaken on their land. Using discounting procedures this comparison showed that the present value of $95,565.00 per household for forest subsistence production was far in excess of the $12,150.31 per household the villagers could expect from the logging (see Table 7.11). This comparison, however, implies that logging had totally destroyed the villagers' ability to practise any form of subsistence production. This was only partially the case because, although the villagers had lost

much in the way of forest food, firewood, house and canoe building material, miscellaneous forest produce and medicinal trees and plants, they could still plant gardens and other useful trees in logged areas. As such this comparison was somewhat biased against logging. It did, however, serve to illustrate the value of sustainable subsistence production when compared with the once-only timber royalty payment.

Sustainable subsistence production compared with estimated royalties for logging all Qeqetovoru land

It was interesting to contemplate how the villagers might have faired had they allowed all their land to be logged. From Figure 7.2 the total land area claimed by the Qeqetovoru people was calculated to be 3,524.7 ha. Using the average merchantable volume of 49.22 m^3/ha from Table 7.9 and multiplying this by the \$9.00 m^3 stumpage rate paid by Eagon, the royalty payment the Qeqetovoru people could have expected from their total land area was estimated to be \$1,569,345.25. In household terms this was \$74,730.73 which was still lower than the \$95,565.00 per household that had been calculated for sustainable subsistence production (see Table 7.12). As with the previous calculation, this also incorrectly assumes that the villagers would no longer be able to practise any form of subsistence production after logging.

Applying the Methodology to other Villages

The methodology used in this study could readily be applied to other villages but ideally separate base data on subsistence uses and their respective values should be collected for each locality. As was done with Kuku and Nukiki, similar studies could be used to determine whether or not other villages are likely to be disadvantaged by logging.

Notes

1 Total royalty payments to land owners were based on log out-turn as measured by the company so were not independently verified. Compared with the \$9.00 m^3 paid to the villagers, Ministry of Natural Resources Forestry Division log export returns showed that in 1990 the f.o.b. value of Eagon's log exports amounted to \$153.78 m^3 (see Appendix 9). In the first quarter of 1991 Eagon's log exports had an f.o.b. value of \$163.25 m^3 and in the second quarter, \$181.80 m^3. Export duty paid to the Solomon Islands Government by Eagon amounted to 22.13 percent f.o.b. values in 1990, 26.30 percent in the first quarter of 1991 and 23.97 percent in the second quarter. Export duty, plus logging, loading and administrative costs had to be deducted from the f.o.b. value of the timber to give some idea of the profitability of the logging operation but as I had no information on Eagon's operating costs I could not assess this. During 1990 87.5 percent of Eagon's log exports were to Korea but in the first half of 1991 this had dropped to 49.9 percent. I was told Eagon Industrial Co. Ltd., the parent company of Eagon Resources Development Co. Ltd., were substantial buyers of the logs exported from Choiseul.

2 A number of factors can influence the accuracy of timber volume predictions. These include the timber assessment method used, the intensity of sampling and the accuracy of the tree volume tables used to calculate volume. As a study of the timber assessment methods Eagon used was outside the scope of my research I have accepted the volume predictions in Eagon's 1991 Logging Plan at face value. In New Zealand, merchantable volume is usually assessed at 85 percent of total tree volume. This allows undersized, or otherwise non-merchantable timber, to be left behind in the bush plus takes into account some logging waste. The 15 percent wastage may not be appropriate for the generally larger trees of the tropical rainforest of Choiseul but in the absence of any local data I opted for a default waste factor of 0.15.

If a logging operation is inefficient wastage can be much higher than 15 percent. As such a wise forest owner will assess log wastage in the bush and ensure the logger pays for it if the situation warrants it. This usually has the effect of decreasing wasteful logging practises. A wise forest owner will also always measure log volume production from the bush him or herself because if a logger is left to provide an estimate of log production the temptation to under assess volume, and hence pay less for the volume of logs removed, is usually very great.

During the time I undertook my research none of these checks were undertaken, namely because the villagers did not have the expertise available to do so. Because the villagers of Moli were suspicious of the Government and thought that they may try to take over their land, they had discouraged Ministry of Natural Resources Forestry Division officers from becoming involved with the logging operation. This was a mistake, because quite apart from having absolutely no desire or even jurisdiction to control village land, Forestry Division officers may have been able to provide some measure of protection for the villagers in terms of ensuring logging practices in the bush were less detrimental to soil and water values. As well they could have checked that log volume measurements were being accurately recorded.

As with the Solomon Islands Government in general, the Forestry Division was under resourced so could not monitor logging operations as well as they wished. I did, however, note from Forestry Division sources that at least two field inspections had been undertaken on the Eagon logging opertaion in the first six months of 1991 and that an improvement in bush practises had been noted on the second inspection. At the time of my departure from the Solomon Islands the Australian International Development Assistance Bureau (AIDAB) was beginning to provide assistance with the 'policing' of logging operations.

TABLE 7.1: GARDEN SITES AND GARDEN TREES LOST THROUGH LOGGING

a) Summary of Households Affected

No. households in Kuku area	21
No. households affected by logging (includes four who lost gardens)	10
Average size of household (from 1986 census)	7

b) Losses by Household

Householder	Number of members	Loss through logging
Abel Matagolomo *	10	5 Nari nut trees 20 betel nut trees 30+ sago palms Yam garden
Max Lumiri	9	17 sago palms
John Pegavai	1	50 sago palms
William Kodokoboe	7	150 sago palms
Simon Birubatu *	20	50 sago palms 7 cocoa trees 1 Sulu nut tree 1 betel nut tree 1 orange tree
Luke Ripukana *	2	Whole garden (owner absent so could not itemise losses)
Samuel Taqibule	1	15 sago palms
Daniel Vudukana	10	20 sago palms
James Lupabose	10	14 sago palms
Julian Kolebe *	10	Whole garden (owner absent so could not itemise losses)

* Lost all or part of garden

TABLE 7.1: GARDEN SITES AND GARDEN TREES LOST THROUGH LOGGING

c) Tree Species Lost from Tribal Common Land

Vasiqasiqa name	Botanical name
Jarivu	Rhopaloblaste elegans?
Nari	Canarium indicum
Vedeke	Vitex cofassus
Qema	Pometia pinnata
Buni	Calophyllum inophyllum
Qalu	Calophyllum neo-ebudicum
Pepete	-
Kuvata	-
Sukutu	-
Natu	Burckella obovata
Suputu	-
Bagava	Alstonia scholaris
Padakubo	-
Danisi	-
Poroporo	-
Qiqiu	-
Gagadora	-

Approximately 1000 trees, or 25 percent of the total number of trees on village common land, were reported to be lost through logging.

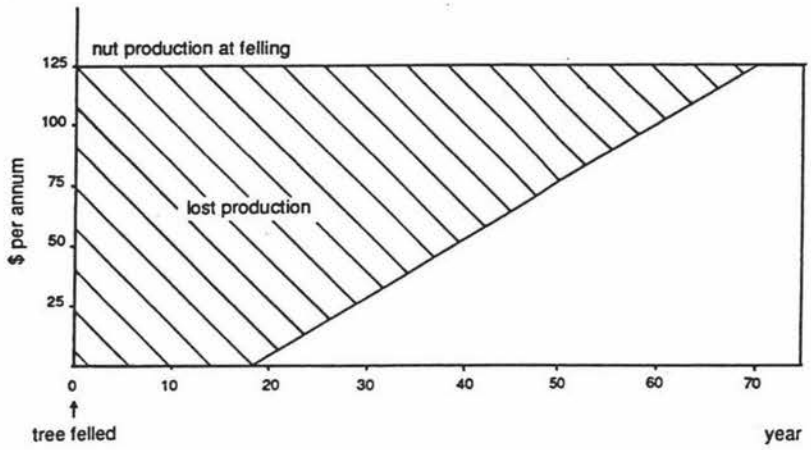
TABLE 7.2: VALUE OF LOST GARDEN PRODUCTION

No. gardens lost in Kuku	4
Annual value of gardens to each household (ex Nukiki)	$8,679.70
No. years gardens out of production	1
Total loss sustained by Kuku village over one year	$34,718.80
PRESENT VALUE OF LOSS IN GARDEN PRODUCTION SUSTAINED BY KUKU VILLAGE:	$31,278.16 *

* PV = total loss discounted at 11 percent for one year

TABLE 7.3: VALUE OF LOST NARI AND SULU NUT PRODUCTION

a) Lost Nut Production per Tree



Present value of lost Nari and Sulu nut production (see Appendix 7)	$1,231.41

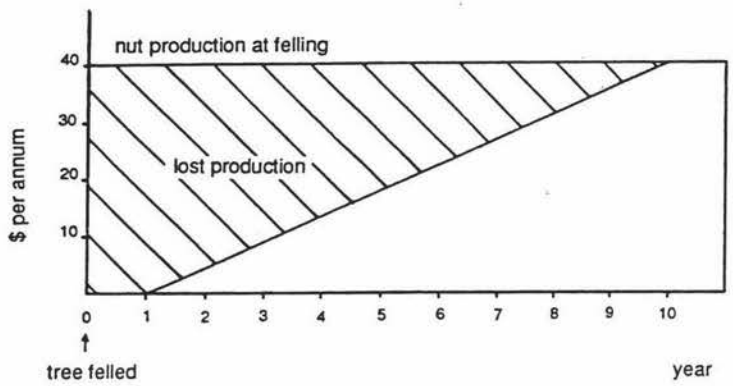
b) Total Value of Lost Nari and Sulu Nut Production

No. trees lost	Value $
5 Nari nut trees * ($1231.41 per tree)	6,157.05
1 Sulu nut tree * ($1231.41 per tree)	1,231.41
TOTAL LOSS IN NARI AND SULU NUT TREES SUSTAINED BY KUKU VILLAGE:	7,388.46

* Have assumed all trees are mature and are producing nuts at optimum rate.

TABLE 7.4: VALUE OF LOST BETEL NUT PRODUCTION

a) Lost Nut Production per Tree



Present value of lost betel nut production (see Appendix 7)	$178.49

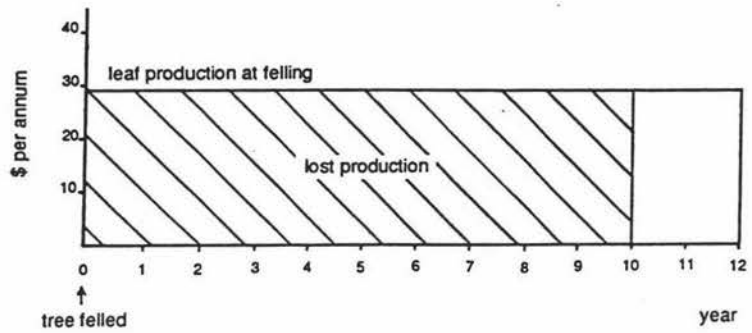
b) Total Value of Lost Betel Nut Production

No. trees lost	Value $
21 betel nut trees * ($178.49 per tree)	3,748.29
TOTAL LOSS IN BETEL NUT TREES SUSTAINED BY KUKU VILLAGE:	3,748.29

* Have assumed all trees are mature and are producing nuts at optimum rate.

TABLE 7.5: VALUE OF LOST SAGO PALM PRODUCTION

a) Lost Leaf Production per Tree



Present value of lost sago palm leaf production (see Appendix 7)	$189.57

b) Total Value of Lost Sago Palm Production

No. trees lost	Value $
346 sago palms lost * ($189.57 per tree)	65,591.22
TOTAL LOSS IN SAGO PALMS SUSTAINED BY KUKU VILLAGE:	65,591.22

* Have assumed all trees are mature and are producing leaves at optimum rate.

TABLE 7.6: TOTAL VALUE OF TREE LOSSES ON COMMON LAND

a) Annual Loss of Forest Products

	Annual value $	25 percent annual value $
Other forest food	100.20	25.05
Firewood	912.58	228.15
Housing (framing, flooring and piles only)	160.00	40.00
Canoe	40.00	10.00
Miscellaneous produce	102.33	25.58
Custom medicine	122.34	30.59
Total value to household		359.37
Total loss sustained by village (21 households)		7,546.77

b) Village Loss Sustained in Perpetuity

Present value of loss = Annual loss / interest rate (11%)

PV = $7,556.77 / 0.11

PRESENT VALUE OF COMMON LAND TREE LOSS SUSTAINED BY KUKU VILLAGE: $68,607.00

TABLE 7.7: KUKU VILLAGE LOSSES SUSTAINED THROUGH LOGGING

a) Household Losses

Householder	Loss $ *
Abel Matagolomo	26,500.49
Max Lumiri	6,489.69
John Pegavai	12,745.50
William Kodokoboe	31,702.50
Simon Birubatu	21,974.94
Luke Ripukana **	11,086.54+
Samuel Taqibule	6,110.55
Daniel Vudukana	7,058.40
James Lupabose	5,920.98
Julian Kolebe **	11,086.54+
Other 11 households	3,267.00 ea
Combined household losses:	176,613.13

* Each household's loss includes 4.76 percent of total value of tree losses on common land. ie. $3,267.00 per household

** Incomplete assessment of household's loss

b) Summary of Village Losses

	Value $
Garden losses	31,278.16
Nari/Sulu nut tree losses (6 trees)	7,388.46
Betel nut tree losses (21 trees)	3,748.29
Sago palm losses (346 trees)	65,591.22
Tree losses on common land	68,607.00
COMBINED KUKU VILLAGE LOSSES:	176,613.13

TABLE 7.8: QEQETOVORU RECORDS OF ROYALTY PAYMENTS FOR LOGGING ON THEIR LAND (AREA #1 ONLY)

1. Logs

Ship	Value $
11th ship (Coral Queen)	9,737.58
12th ship (New Leading)	1,725.46
13th ship (Marine Heart)	3,378.67
14th ship (Narinder)	11,224.98
Total logs	26,066.69

2. Sawmill

Month	Value $
January	321.47
February	1,090.42
March	617.06
Total logs	2,028.95
COMBINED TOTAL LOGS	28,095.64

The Qeqetovoru people had no information on the timber volumes to which these timber royalties applied. They understood these payments applied to timber removed from Area #1 of their land (see Figure 7.1).

TABLE 7.9: ESTIMATED ROYALTY PAYMENT FOR LOGGING ON QEQETOVORU LAND (AREA #3 ONLY)

a) Estimated Log Production

Estimated area of Qeqetovoru land logged directly behind Kuku village	41 ha
Average standing timber volume (Eagon 1991 Logging Plan)	57.90 m^3/ha
Average merchantable volume (85 percent of standing volume)	49.22 m^3/ha
Log volume calculated to have been removed	2,018.02 m^3

b) Estimated Royalty Payments

1991 stumpage payments to land owners	\$9.00 m^3
Calculated log volume production	2,018.02 m^3
ESTIMATED ROYALTY PAYMENT TO KUKU VILLAGERS:	\$18,162.18 *

* \$864.87 per household

TABLE 7.10: A DIRECT COMPARISON BETWEEN LOGGING ROYALTIES AND LOSS OF SUBSISTENCE PRODUCTION (AREA #3 ONLY)

	Value $
Combined village loss in subsistence production (from Table 7.7)	176,613.13
Estimated royalty payment for logging on Qeqetovoru land (from Table 7.9)	18,162.18
RESULTING UNCOMPENSATED LOSS IN SUBSISTENCE PRODUCTION:	158,450.95 *

* $2,164.50 was, however, paid to the villagers by Eagon to compensate for the loss of Nari and Sulu nut trees, betel nut trees and sago palms.

TABLE 7.11: SUSTAINABLE HOUSEHOLD SUBSISTENCE PRODUCTION COMPARED WITH ESTIMATED TOTAL HOUSEHOLD ROYALTIES

Household Values

Sustainable household subsistence production (from Table 6.10)	$10,512.15 pa
Period over which subsistence production sustained	Year 0 onwards
Log volume calculated to have been removed from Qeqetovoru land (576 ha)	28,350.72 m^3
Estimated total royalty payments	$255,156.48
No. households	21
Estimated royalty per household	$12,150.31
Period over which royalty sustained	Year 0 only

Cost-Benefit Analysis

Present value of subsistence production (11 percent discount rate)

PV = $10,512.15 / 0.11

PV = $95,565.00

Present value of royalty (11 percent discount rate)

PV = $12.150.31 x 1.0 (year 0)

PV = $12,150.31

TABLE 7.12: SUSTAINABLE HOUSEHOLD SUBSISTENCE PRODUCTION COMPARED WITH ESTIMATED HOUSEHOLD ROYALTIES FOR LOGGING ALL QEQETOVORU LAND

Household Values

Sustainable household subsistence production (from Table 6.10)	$10,512.15 pa
Period over which subsistence production sustained	Year 0 onwards
Estimate of total land area claimed by the Qeqetovoru people	3,542.7 ha
Estimated royalty payment from total land area (ave.merch.vol. 49.22 m3/ha, stumpage $9.00 m3)	$1,569,345.25
No. households	21
Estimated royalty per household	$74,730.73
Period over which royalty sustained	Year 0 only *

* In actual fact it would probably take two years to log this area but for the purpose of this calculation revenue is considered to occur in year 0 only.

Cost-Benefit Analysis

Present value of subsistence production (11 percent discount rate)

PV = $10,512.15 / 0.11

PV = $95,565.00

Present value of royalty (11 percent discount rate)

PV = $74,730.73 x 1.0 (Year 0)

PV = $74,730.73

CHAPTER 8

CONCLUSION: LOGGING IS NO COMPENSATION FOR LOST SUBSISTENCE PRODUCTION

The villages of Nukiki and Kuku, on the island of Choiseul, were heavily reliant on the subsistence use of tropical rainforest for their livelihood. Values derived for these uses by the villagers of Nukiki were therefore quite substantial at $10,512.15 per annum for the average sized household. Using the information derived from Nukiki and applying it to the village of Kuku, it was very clear that the Kuku villagers were severely disadvantaged when forested land belonging to them was logged. Logging royalties were no compensation for losses in subsistence production. Insofar as they were disadvantaged by it, logging did not lead to development for the villagers of Kuku, rather it led to further underdevelopment.

Land Use: The Pressure of Population

With the majority of the population living in rural villages and dependent almost entirely on a subsistence economy for their livelihood, the Solomon Islands still represented the 'old Melanesia.' This was especially so on the island of Choiseul, remote and underdeveloped as it was even when compared with other parts of the Solomon Islands. Changes were, however, taking place and this was perceptible in villages such as Nukiki and Kuku. Quite apart from the sudden and often traumatic changes brought about in Kuku by the advent of logging, other more subtle changes were taking place as well.

The situation that most concerned the villagers of Nukiki was their increasing population. They were worried that, in time, their land resources would be insufficient to support their enlarged population. With the national annual population growth rate in the order of 3.5 percent there was some cause for this concern. Signs that Nukiki village land was starting to come under pressure were perceptible. For example, garden fallow periods had, in some instances, been reduced to three or four years. This was

insufficient to allow forest regeneration to occur and because forest litter no longer had time to accumulate, rejuvenation of soil fertility was unlikely. The gardens of Nukiki were, however, located on fertile limestone karst country so losses in garden production may not have been as serious as on less fertile land. The distances villagers had to walk to new garden sites were also increasing because land close to the villages had already been taken up. Similarly, large trees such as qaluveko (*Gmelina moluccana*), which was suitable for building large canoes, were also depleted in the vicinity of the villages. In spite of all this the population of Nukiki was, at the time I undertook my research, still well fed and housed. If the population could be kept at the same level then subsistence production, as currently practised, could continue to support the villagers of Nukiki indefinitely. Population is, however, likely to keep on increasing so it is probable that subsistence production will, at some point, cease to be sustainable. If this catastrophe is to be avoided, population control is necessary.

Social Disruption: The Subsumption of the Subsistence Economy

The subsistence economy of Choiseul appeared to be in the process of being subsumed by the cash economy. Because the social norms associated with the two economies were often quite different, social dislocation was often symptomatic of this transition. More than anything it appeared that villagers were increasingly caught between two cultures. This was thrown sharply into focus by logging where, in many respects, the two cultures met head on. Well versed as they were in the economy of a subsistence culture, the villagers of Moli and Kuku, were ill-equipped to manage their affairs well in the face of the somewhat predatory world of international business. Social disruption occurred with the monetisation of natural resources when seemingly large amounts of cash were offered to villagers for forest that hitherto had no cash value in their eyes. Divided in their approach on how to address the issues raised by this, splits and bitterness occurred within these communities. This will have long term consequences, the full impact of which will only be evident over time.

Other Values of the Rainforest

Because it has attempted to highlight the more immediate benefits of the rainforest to Solomon Island villagers, this study has been confined to identifying, valuing and then comparing with logging, the subsistence uses of the rainforest. These were the uses, after all, upon which the Choiseulese villagers depended for much of their livelihood.

There are, of course, many other benefits provided by tropical rainforest and even though recognition of these benefits has been outside the scope of this study, it in no way lessens their value. While this study can only place values on the subsistence benefits of the rainforest the fact that other values exist, albeit unrecorded, means that as significant as the subsistence values might be, this research still understates the total value of the forest. Both environmental and social, these other values include the provision of habitat for flora and fauna that would otherwise be endangered. Fresh-water and marine habitats, by virtue of their location, are also particularly vulnerable to erosion caused by deforestation. The value of fisheries associated with an unpolluted acquatic environment would need to be considered as would other issues such as the forest's role in maintaining the relatively cool climate for which Choiseul was noted. Wider ecological issues, such as the contribution Choiseulese rainforest made towards maintaining the global biosphere could also be considered. Cultural preservation was also significant. For example, *tambu* sites in the forest were important to the villagers and although I was not equipped to place a value on these, it did not mean that it could not be done. The social disruption caused by logging must also have been a cost that could be debited against timber royalties but as with *tambu* sites, I was not equipped to do this.

The Methodology

Because village field research was undertaken over a limited period of time (three months in Nukiki itself), it was not possible to examine at first hand subsistence use of the rainforest throughout the year. While receiving excellent information from the villagers on seasonal variations in subsistence production, I may have been able to record additional forest uses had I been resident in the village longer. Similarly the valuation of subsistence production was also conducted over a short period of time.

This meant that seasonal variations in market prices, for example, could not be taken into account when valuing garden production. It also meant that, in some instance, assumptions had to be made when deriving surrogate prices. While the resulting prices are not unrealistic, a greater degree of precision may have been possible had I been able average data collected over a longer period of time and from a number of different sources. However, as expenditure by the villagers in some of these areas was very infrequent a considerable period of time would have been required to do this. Logging royalties also had to be estimated. While this could be no substitute for actual royalty payments had they been available, the estimates were nevertheless derived from a very good source, the company logging plan for the area.

While improvements in the precision of the valuation could be made, the study does serve to illustrate that subsistence production from tropical rainforest on Choiseul has a significant value. The methodology used to derive these values could also be readily applied elsewhere. Using similar procedures it would be possible to derive forest subsistence values for other villages using data local to that particular area. If need be this could then be compared with local logging royalties. Different values would, of course, be obtained for different villages. For the villages of Nukiki and Kuku the conclusions were, however, clear enough; the subsistence value of the tropical rainforest was very high and logging royalties were no compensation for its destruction.

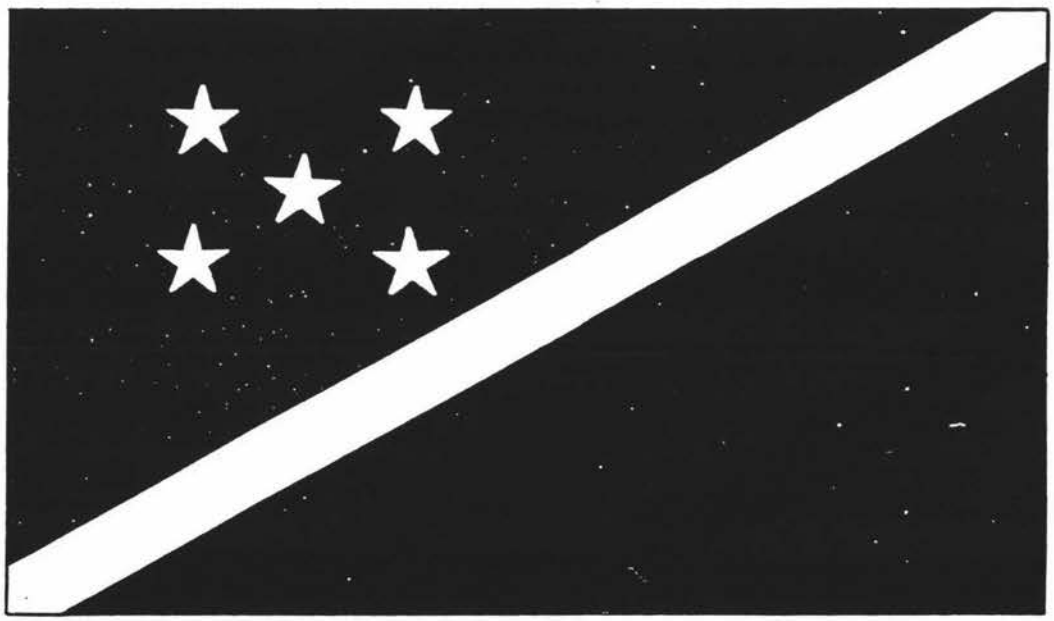
APPENDIX 1

REPORT OF THE

OMBUDSMAN

FOR THE YEAR ENDED

30TH JUNE 1990



Presented to

THE NATIONAL PARLIAMENT OF SOLOMON ISLANDS

Pursuant to Section 98(3) of The Constitution

Forestry Division - A mere "spectator"

Introduction

In 1983, a major Industrial Company from Asia proposed to enter the logging business on Choiseul, the largest Island in Western Province and asked the Solomon Islands Government to "grant the timber right". In Solomon Islands however, the Government cannot grant timber rights except on government land. For "Customary" or Tribal land it is the people themselves who grant timber rights if they wish, and the Government should only grant a "Logging Licence" when certain procedures under the Forest and Timber Act, administered by Forestry Division of the Ministry of Natural Resources have been followed. These procedures were introduced in 1977 (before Independence) but remain essentially the same except for the controversial amendment in 1984 providing for Provincial and Local Government participation and the "Standard Logging Agreement" Regulation. The idea was to enable exploitation of Forests but with some legal protection for landowners to allow them to say 'no' if they or their local Government Representatives so wished and to have a reasonably fair agreement with the Company. Only when these legal procedures were completed should be the Commissioner of Forests issue a Certificate enabling the Minister of Natural Resources to issue a government "Logging Licence"

Asian Logging Proposal 1983 - Accepted by Foreign Investment Division, despite objections.

Officers from Forestry Division and Western Province vetted the Asian Industrial Company's proposal and saw it as:

> "Not a forest development ... but purely and simply a logging project with details of a sawmill and veneer mill attached ...."

No replanting was planned and the proposed annual cut of hardwood timber which the Company wanted (over 200,000 cubic metres) was based, at this stage entirely on the Company's calculations, and was seen as:

> "unsustainable and unmanageable both socially and environmentally".

The Provincial Government considered cutting 50,000 cubic metres of timber per year as reasonable and planning officials regarded it as:

> "unwise and unfair to allocate the entire timber resources of the Choiseulese people to one foreign monopoly for over 30 years ...."

Since the Company proposed to buy much of the timber out-put itself, for use in its Veneer factory in Asia, the Central Bank (CBSI) and Foreign Investment Division (FID) of the Prime Minister's Office were immediately concerned that:

> "...it will be necessary for Customs, Income Tax and CBSI to co-operate in setting up and operating export price checks to guard transfer pricing ..." (and loss of Customs Duties and Income Tax to Solomon Islands).

Although in April 1983 some landowners were in favour of the Company, The Area Council objected to the proposal and to the way things were "done by political agreements". It regarded the proposed Royalty Rate of $3.50 (SI) as "low"; the annual cut as too high; and it saw the proposals for localisation and training of Solomon Islanders for senior posts and the plans for post logging development as "inadequate", and so on.

Forestry Division then, found it "surprising" that, despite these many objections from all authorities concerned, Foreign Investment Division (FID) of the Prime Minister's Office accepted the Company's proposal and granted it Foreign Investment Approval on 27 March 1983.

There were, however, a number of conditions attached to this Foreign Investment Approval which included:

- the Company to plant new trees at its own expense;
- the requested annual timber cut, must be reviewed along with other matters, in consultation with Forestry Division;
- that Sawmilling "must be started from Year 1 and more sawmilling to be done than log exports in the year to come" (that is more than 50% of its annual production to be sawn timber); and
- "Royalty paid to landowners to be reviewed upwards in relation to world market prices" (presumably this means a sliding scale of Royalties like that offered by the former Levers Pacific Timbers); and various financial matters outside the scope of this investigation, including:
- "No tax holidays"

However, when Forestry Division and the Province tried to negotiate the necessary changes in the Company's proposal they encountered great difficulties and no agreement was reached. As one Officer from Western Province wrote about the frustrating negotiations with Company Officials:

> "These people refuse to listen, discuss, compromise ..."

Assessment of the Timber Resource - a chance for "sweet sugar"

Under pressure from Western Province, Forestry Division decided that an inventory and assessment of the timber resources on Choiseul must be made to determine the appropriate annual cut. A Government Forestry Officer went with three most senior Company officials and three of its junior foresters to make aerial and ground surveys of the Island. The Government Forestry Officer agreed that the resource was "very rich" but doubted if it could be exploited on the scale proposed by the Company especially on the steep ridges of Choiseul without "severe erosion" and disadvantages to future agricultural activities. He attempted to explain the Company's proposal to village people and urged Senior Officers from Forestry Division to come and hold more meetings with the landowners to explain the effects of the project.

The Government Forestry Officer reported that:

> ".... Choiseul people are in desperate need of project development, means of communication and other services" and that "rural people rightly suspected that welcoming the Company to operate on their land might help to provide them with these services ..."

He noted also the Asians' "sweet sugar" when the Compnay in its efforts to befriend people, provided sports equipment, soft drinks, towels, food and cigarettes and said that without his

> "... presence to explain such situations, such dealings could be just a simple bribery ..."

More important people in the Provincial Government were subject to repeated uncompromising meetings and eventually "emotional pleading" by a Company Director who offered expensive wrist watches if they "would do something to favour the Company's application". (The watches were returned and the matter was reported to Government Law Officers).

After the forest inventory was complete, arguments continued about the appropriate amount of timber which the Company should fell each year (the Annual "Quota" or "Cut"), until a political decision was made in September 1987. The Company insisted on cutting at least 200,000 cubic metres a year; Caucus recommended an annual cut of 120,000 cubic metres per year; and the Minister decided to increase this to 150,000 cubic metres (which is the figure he gave in the Logging Licence). The only technical recommendation seen on file before the licence was issued, was for 50,000 cubic metres. Forestry Division last year tried to reduce this quota to 75,000 cubic metres, but met with resistance from the Company and criticism from the highest political level.

Consent to negotiate for the whole of Choiseul

Forestry Division then began the Legal procedures under the Forestry Timber Act and gave the Company "Form 1" Consent to Negotiate with Customary Landowners in Electoral Wards 16, 17, 18 and 19 in October 1983 and in late January 1984 it gave a further "Form 1" Consent for the remainder of Choiseul, "Wards 13, 14, 15 and the rest of 19". These Form 1s were passed to the Choiseul Area Council in accordance with the Act.

The description of the Company's proposed business in these Form 1s was "Manufacturing and Marketing of raw, processed plywood; special plywood for container floor; Lumbering processing and Marketing 4 Log Import and Sales" - apparently for its 2 mills in its Asian mother country -

Conflict between Landowners and people of Choiseul

This description, significantly different from that in its proposal to Foreign Investment Division and Forestry Division confused Landowners and the Area Council and the conflict between those in favour of the Company and those against it, began in earnest and has continued ever since.

It appears from official files that the National Members of Parliament were on the side of the Company, as were successive Prime Ministers and most Ministers of Natural Resources. Against the Company, were Western Province which had devolved certain limited powers under the Forestry Act as from July 1984 (and had gained additional powers since the 1984 Amendment to the Forestry and Timber Act); and the Area Council with its apparent power to stop proceedings at Form 1 stage. The position of technical officers in Forestry Division is unclear.

The exact proportion of rural Choiseul people for and against the Company is not clear from official files (and probably is not known). However, Forestry Division Files contain representations from politicians, senior public officers, some traditional leaders and an unregistered "Peoples' Association" in favour of the company and a petition of landowners. (it is never clear if rural people know exactly what they are doing when they sign such petitions, they may be merely "expressing interest" or "wanting to know more about the proposed development").

Decision by the Area Council

These representations began with demands for changing or disregarding a controversial decision by the Choiseul Area Council in May 1984, that the Company must resubmit its Form 1 and specify exactly which tribal or customary lands it wished to log and which representatives it had contacted rather than simply listing the Electoral Wards for the whole island and the names of the Commissioner of Forests and two prominent political leaders.

It should be remembered that Electoral Wards were determined by the protectorate Government in the 1960s along convenient straight lines without much regard to traditional land ownership. In Custom, land is held by family lines or groups, not individuals. Landowing groups and the boundaries of customary lands - are remembered by oral tradition and are only occasionally recorded in Court Judgements which in themselves are not conclusive.

This controversial decision by the Choiseul Area Council was aimed at protecting those people and landowners who did not wish this Asian Industrial Company to enter their and area did not see why the Government should issue a Logging Licence for their lands, which would prohibit alternative Companies from coming in, which might offer better terms, or people commercially exploiting their own timber.

The Area Council's decision caused particular consternation in Honiara and the Prime Minister convened meetings with the Company, Forestry Division and eventually involved Western Province.

An officer from the Attorney General's Chambers advised that the Area Council's decision was incorrect and ultra vires, because the Council contained members of the Provincial Assembly who voted on the decision and so was improperly constituted. Western Province strongly disputed this legal opinion and supported the Area Council, despite some threat of legal action.

Area Council determines land ownership of 27 Custom Lands

The Company complied with the Area Council's requirement and did supply a list (based on a petition) of 46 Customary lands, and representatives for most of them. This was incorporated in a new "Form 1" and copies were advertised throughout the areas affected. In November 1984 the Area Council convened to hear representations from people in order to make determinations of ownership for these traditional lands. According to the Government Officer who acted as Secretary to the Area Council:

> "We only received applications from very small areas, but a total of 46 tribal lands were surrendered. They were mainly from landowners interested in logging. Out of these, the Council only managed to hear 30 applications and only 27 determined ..." (the remaining 3 determinations were disputed and referred on Appeal to the Customary Land Appeal Court but were eventually "withdrawn" unheard).
>
> "(Form II) Notices and sketches of these lands were done .... proceedings of the hearing I have taken down word by word ... as the Customary Land Appeal Court may want a copy .... (but) The Area the Company has applied to log is a very big area* ... at least 200 (more) areas of tribal land will have to be submitted to the Council .... it will take at least 8 months to complete it if we do the job thoroughly ..... I am only highlighting the grounds upon which I tendered my refusal to continue as Secretary for the Council in timber right hearing, as it will interfere with my normal duties ..."

In fact the timber right hearing for the remainder of these 46 Customary lands was never completed, although a meeting was arranged in early 1985 and draft Form II Notices were prepared. It was cancelled on grounds of expense, lack of time for legally advertising these Notices and lack of legal advice for the people.

Uptil this point this Office has found no evidence of Maladministration of the Forest and Timber Act Procedures by Forestry Division, Western Province or Area Council. Indeed it stands out from the several other timber rights acquisitions invested as being fair, following the principles of natural justice as far as practicable and with the rural people comparatively well informed, even if they received no legal advice.

**Footnote: Choiseul is approximately 3,200 Hectares and this was the largest Logging concession or Licenced Area granted, at least since Independence.*

Determination of Land ownership never completed

Far from commending the Officers and Councillors involved on thorough and judicious work, Forestry Division shared "concern" with others at the length of time and expense involved and wrote in August 1985:

> "if what is being done is necessarily in accordance with the procedures under the Act then the provision needs overhauling. However, it seems to me that what is being done is superfluous ..."

However, 8 months later, when the Customary Land Appeal Court Appeals had been withdrawn the opinion was different:

> "whilst agreements (between the Company and Landowners) are being negotiated, we feel that it is in your (the Company's) best interest that the actual boundaries are clearly defined to avoid later disputes ..."

Official Records produced to the Ombudsman's staff do not disclose what happened between August 1985 and April 1986, to make Forestry Division change its attitude.

No records too, have been produced to show that ownership of any of the remaining Customary Lands was ever determined. Indeed a letter in August 1987 a letter from one of the Company's main political supporters indicates clearly that no further determinations were made:

> "... I write this letter to confirm to you the wish of the 27 tribes who are willing to allow their land to be used by the Company concerned ... Thank you for your oral acceptance of the Company I believe that your decision will help the 9% (nine per cent of the three hundred of tribes in Choiseul who accept the Company Application."

The letter "urged" the Premier of Western Province to sign Form III which would indicate the Provincial Assembly's approval of the project, so that the Logging Licence could finally be issued:

In fact the Premier signed Form III approvals for only 25 lands, two of the 27 land holding groups presumably having said "no" to logging.

No Local Participation - The 1984 Amendment Act

There is no evidence from files at Western Province to show that this Industrial company (100% Asian owned) made any offer to comply with the Forest and Timber (Amendment) Act of 1984, which since August of that year, had provided that Logging Companies must hold meetings to negotiate with Provincial Government and Area Councils for them to participate in managements and profit shares. It does not appear that the Province or Area Council declined such a chance for local participation, especially given Western Province's policy at that time, (though it is hard to see how it would work in practice) but simply that the matter was never considered. The Area Council may not even have been aware that the law had been changed and the Province and others could be forgiven for not noticing that the Act had been brought into effect, since the Legal Notice of Commencement was published in the wrong section of the Gazette which had become hopelessly muddled at that time. (The Standard Logging Agreement was also first produced in 1984, but it took three years of delays and set backs before being fully Gazetted).

Non-Standard Logging Agreement

The next stage in a timber rights acquisition on customary and land is for the landowners themselves to negotiate and sign a logging agreement with the company in prescribed form, which must be submitted to Forestry Division for approval by the Minister.

The "prescribed Form" is the "Standard Logging Agreement", part of the Forestry and Timber Regulations, which imposes a set of minimum requirements for Logging agreements made between Companies and Customary Landowners. It was intended to give the Landowners and the Government some control over the Company's operations, and includes provisions for reafforestation; preventing damage to land, rivers, crops, tabu places and remaining forest; minimum standards for roads; a sliding scale and minimum royalty and attempts to prevent wasteful practices and so on, and even "transfer pricing". Broadly the Standard Logging agreement incorporates the conditions on which the Company's original Foreign Investment Approval was granted and which the company, by persisting with its application might be assumed to have accepted.

The 25 lands which accepted the Company had formed an unregistered "Peoples' Association"* and "Lands Associations" to negotiate with the Company through their educated local leaders, extra terms and conditions for good logging practices and development of schools and clinics. These are permitted additions to the Standard and Logging Agreement, but it is not clear from this investigation whether in practice such benefits were indeed to be in addition to Logging royalties or instead of Royalties - For instance, in other areas operated by other Asian Companies, villagers may receive sawn timber for building or a ship for "community use" instead of the equivalent value of Royalty payments for their logs.

A logging agreement with the Peoples' Association was in fact signed in early July 1987. A government officer on behalf of the Area Council reported that:

"During that time of signing, no explanation nor time for reading of the agreement was made or given to the landowners. However, I have learned that various meetings with those Landowners were made in the villages regarding the Agreement ... and the agreement was sent to (the Provincial Secretary) through the Ministry of Natural Resources ..."

Unfortunately, according to the spokesman for the "Peoples' Association"

"The concern is the way the Company is rushing into signing the agreement, so much so that I am not included ... (he was temporarily away form Choiseul). Secondly, the additional conditions of agreement assigned to me by landowners to prepare is NOT signed in conjunction with the Solomon Islands Standard Logging Agreement. My fear is that Landowners were rushed and talked out of the importance of the "Additional Conditions" I would like the company to sign the Additional Conditions also".

In fact what the Peoples' Association and another "Land Association" had signed was not at all a "Standard" Logging Agreement, but a re-typed version, with significant amendments and deletions - not least the omission of the provision for a sliding scale of Royalties. Royalties - the payment which Customary landowners receive for their trees - were in this Agreement fixed for five years at a $5 per cubic metre of timber regardless of species. (In real terms this was worth 57% of the orginal offer made in 1983 and now regrettably is worth a great deal less, owing to the decline in value of the Solomon Island Dollar).

Forestry Division objected to the omission of three complete Clauses of the Standard Logging Agreement: which were aimed to prevent damage to soil, rivers and remaining forest by prohibiting logging on steep slopes; an attempt to prevent transfer pricing, and a requirement for reafforestation by the Company. Almost identical letters of complaint were sent to Forestry Division from the Peoples' Association various supporters of the Company and the Company itself, and it is to the Credit of the Commissioner of Forests that he stood up to this rain of letters and finally succeeded in making these clauses incorporated or attached to the signed agreement. The agreement, however, as approved by the Minister did not incorporate the additional terms wanted by the people and still contained many significant amendments and omissions. It was not exactly the prescribed "Standard Logging Agreement".

**Footnote: The Peoples' Association" recently applied for registration as a Charity, but was rejected. It was still unregistered at the time of writing this report.*

Lobbying support for the Company

This kind of correspondence, lobbying for the Company with its repeated, strangely awkward phrases continued throughout official files, particularly those at Forestry Division. The similarity in content and style indicate a close relationship between the writers and the Company for which they argue. They are not concerned with matters that would benefit landowners, such as the royalty rate or post logging development or the standard of roads, but argue against a reduction in the felling quota; against reafforestation; against sawmilling quotas, against a moratorium on new timber rights acquisitions and so on. They are, to this Office, unconvincing as true representations of what the rural people want.

Ministerial intervention

None the less, they managed to convince the Minister of the day as evidence of what the Choiseul People wanted and there is evidence that Ministerial intervention was a strong element throughout proceedings to ensure the issue of a Logging Licence. There are many Ministerial comments on purely technical and administrative matters:

Intending "to amend these provisions (of the Act and Regulations) if there is real difficulty that would scare genuine investors.." (hoping not to disappoint our people by being difficult over the quota issue.." issue .."

Strongly urging "that negotiation with the Company be expedited (without breaking the law of course) .. Please ensure (personally) that we are not being obstructive."

Even the Permanent Secretary, with no relevant technical background became involved:

> "I would personally endorse 150,000 m^3 (quota -) 120,000 m^3 was a general Caucus view and Caucus views are not Cabinet Decision. Since advised that 150,000 m^3 would appear to be reasonable by Minister of Natural Resources..." (the only technical advice seen was for an annual quota of timber to be cut of 50,000 m^3.)

Finally the Minister advised, or directed that:

> "Unless the Law is amended, Forestry Division will be effect continue to be a Spectator in these areas of important concerns".

Logging Licence Issued-despite incomplete procedures for 91% of Land

The Logging Licence was issued on 10 September 1987 by the Minister of Natural Resources (no certificate of Recommendation by Forestry Division (Form IV) has been produced). It was in the outdated, inappropriate, standard from described in Ombudsman's Annual Report 1987-88 Item III 3 (b); it allowed an annual quota of 150,000 cubic metres of timber; and the timber rights were to last until the year 2007 and covered the WHOLE of Choiseul.

Procedures under the Forest and Timber Act had been carried out for approximately 9% of Land and Landowners.

A previous Investigation (Reported as Items III 1(b) and (c) in the Ombudsman's Annual Report for 1988-89 revealed Forestry Division's curious but convenient interpretation of the Forest and Timber Act:

> "Areas for which Licences have been granted by the (Forestry) Division can be regarded as having completed the formalities under the Act - otherwise there would not have been any Licence issued -"

In other words, once a licence is issued, even though only a small fraction of landownership has been determined and only one or two agreements made: there are no more Form 1s; no more advertisements and determinations of Landownership; no more Form IIs or appeals to the Court; and no more Standard Logging Agreements. At best, informal agreements are made and the Company carries on unsupervised.

Thus for 91% of Land and Landowners in Choiseul, none of the procedures required by the Forest and Timber Act - have been carried out. For them there are no legal procedures to give them the chance of a fair determination of landownership and an informed decision of logging and reasonably fair logging agreements.

Western Province was well aware of this and noted that only parts of Wards 16 & 17 Landowners had signed agreements and asked the Minister of Natural Resources and the Company:

> "to withdraw the application from the unagreed areas of Wards 16 and 17 and Wards 18, 19, and 20 and concentrate on the agreed areas."

This resolution and request by the Western Provincial Assembly if it was ever passed on to the Minister, was evidently ignored. So much for devolution of powers to the Provinces.

Since 1985 - Conditions attached to Foreign Investment Approval removed

As one of the final notes on this report, Forestry Division, when recently trying to enforce forest policy of milling at least 20% of cut timber on a very unwilling Company, supported by political leaders, discovered, to its embarrassment, that in 1985, when negotiations with Landowners and legal procedures were well under way, had succeeded in changing the original 1983 Conditions of its Foreign Investment Approval from those mentioned earlier in this report to "Nil Conditions" (no reafforestation, no processing etc) and even obtained a tax concession to import equipment duty free! This approval was used as a strong reason not to comply with current forest policy. Little wonder that Foresty Division ended up as a mere "Spectator", what chance do the people and the Landowners have?

In fact, with the passing of the 1990 Forest Resources and Timber Utilisation (Amendment) Act, such power as the Provincial Governments has was weakened and a curious provision was inserted, "deeming" logging agreements and logging licences "to be approved, validly properly and lawfully granted notwithstanding that the provisions of that part (IIA) in force at the time of such grant may not have been complied with in every particular or requirement."

In this an attempt to prevent them objecting to maladministration and to retroactively validate or unfair and probably unlawful procedures such as described in this report?

Note: *The scope of this investigation was being enlarged in September 1990 to include the issue of a Government Temporary Occupation Licence for the unregistered, disputed "freehold" land at Moli Mainland which enabled the Company to use Moli Primary School as its Choiseul Headquarters.*

APPENDIX 2

CUSTOM STORIES FROM NUKIKI

(Transcripts from field notes)

The origin of the tribes of Nukiki

Narrated by Ezekiel Rilifia on 7.6.91

The land at Nukiki belonged to a tribe called Solomo. Long ago (eight generations) the Solomo fought a war against another tribe and invited a tribe called the Siropodoko to help them. The Siropodoko came from the middle bush country inland from Nukiki. In return for this assistance the Solomo promised to give the Siropodoko *kesa* (custom money) to pay for any of their men that were killed. In the ensuing battle many were killed and the Solomo did not have enough *kesa* to pay for all the deaths. In order to meet their debt to the Siropodoko the Solomo agreed to give them some of their land instead.

Dokakalo, chosen as chief of the Siropodoko tribe, had four children - three sons and a girl. He divided his land amongst these four children and it is their names that have been given to the tribes that originated from them. The names of these children were Moqerego (first born son), Sarekana (second born son), Nanavua (third born daughter) and Ugumatakana (fourth born son).

Traditional ways land is acquired

Narrated by Ezekiel Rilifia on 7.6.91

Panaka is when land is given for blood payment. This is how the Siropodoko acquired land from the Solomo. From that time onwards the Solomo had to move away and allow the Siropodoko to settle at Nukiki. If many people die in battle the whole tribal area is taken in payment.

Baramokoisi is when a tribe wanted to sacrifice a person and that person pleaded with someone from another tribe to save them. In payment for his life he would then give the other tribe member his land. Thus a tribe would own a small parcel of land in another tribal area and over a period of time a mosaic pattern of land ownership could develop. However it differed from *panaka* in that only land owned personally by the "sacrificee" changed ownership, not the whole tribal area.

Sake was when someone from a different tribe entered a *tambu* site and swore against those buried there. To compensate for this insult half of this person's land was taken.

Vovota could occur when a man gave his daughter to the son of another tribe. The father of the bridegroom had to make a *kesa* payment but if, for instance, the value of the daughter was set at five *kesa* but the man only had a ten *kesa* piece (*kabo*), he may have paid that and received his change in the form of a parcel of land. This would be vested in the daughter and the son in law. Ownership of this land then went with the daughter to the other tribe and was inherited by her descendants who would belong to her husband's tribe.

Sope was the burial site of chiefs and, prior to the introduction of Christianity, places where people would pray to their ancestors. Commoners from the tribe were buried elsewhere.

Customs concerning taro gardens

Narrated by Solomon Zarabule on 11.6.91 after he had verified this information with Naaman Malaveke and his wife Helen Zaduku. Naaman and Helen were two elderly villagers who were familiar with custom ways. Solomon himself was taught these customs by his mother, Karoline Mabevavini (born in 1916). Solomon wanted the old custom practices concerning taro to be recorded before they are lost. Taro has largely been eclipsed by sweet potato as the main food crop due to the spread of the taro beetle after World War II.

When establishing a taro garden you go into the bush and look for some good ground. The undergrowth is then cut (called brushing) and placed in a pile. If this is not done and it is just left lying around as it was cut, the custom belief was that a man would have difficulty finding a wife. Any single girl looking at the garden would say to herself: "this man is lazy and would not make a good husband." The custom name for brushing is called *riva*.

Once the garden has been brushed the big trees are cut down. This is called *qeto* in custom language. When the trees were felled it was important to cut the branches off as not to do so was a sign of laziness too. Like failing to brush the gardens this could be a sign that the man could have difficulty marrying.

Nowadays young men do not take too much notice of these custom beliefs. Nevertheless brushing and cutting branches is still considered sound practice although it is not always done.

In custom practice the garden is left for a few days to allow the sun and the wind to dry out the site. This is called *tuku*. Following this the husband and the wife take all the previously cleared small material, cut it up and heap it by a tree at the bottom of the garden. The pile of rubbish is then burnt. It also kills the tree which saves cutting it down. This is called *poki*. The ground is then allowed to dry again and then it is swept clean. This is called *vulana*. After waiting two or three days after digging the taro roots out (to allow them to dry) planting then takes place. This is called *lelemba*.

Once the taro has been planted and left for a while it is then inspected. The plants that are growing well are left alone, but the ones that are growing poorly are transplanted to a new site. This is called *rabasa.* Taro is then harvested after one year.

In former times these events occurred in the sequence in which they are listed. Nowadays, however, people just harvest taro in the most convenient way.

Different names of taro

There are 23 custom names, or types of taro. These and the sub species characteristics are listed as follows:

Taro that live a long time in the ground (keeps a long time, does not rot)

Kokoku

Sibu

Titike

Karato

Kabolasi

Dorotina

Taro that belongs to children (suitable for infants because they are soft and smell good when they are cooking)

Puroqema	When the Choiseulese only had stone axes they used to burn the trees to kill them. Eventually the tree would fall over and in the hole left by the Qema tree this taro would self seed. As it was only found in the hole left by the Qema tree this taro was called Puroqema, or taro of the Qema.
Sava	The white-grey leaves of this taro resemble the Sava flower. This taro is also eaten by men with no teeth.
Vakikinaka	Vakikinaka means "kaikai long midday", or food for lunch.
Samapapa	
Riropani	
Seqa	

Other taro

Zare	
Pazasari	
Buriqalo	Buriqalo means can transport this taro long distances and still successfully propagate it.
Taovuji	
Biloso	Biloso means to take him back. If you give taro to a visitor you will probably change your mind about this one and take it back because it is too good to give away.

Vavakako	Vavakako means very long one. This is the same name given to the stick used for carrying baskets over one's shoulder.
Mamaleseqe	
Vitovito	
Purovedeke	Same as Puroqema except that this one grows in the hole left by the Vedeke tree.
Komuqara	
Rikokale	This is the biggest type of taro, both in leaves and root.

Seven new types of taro

Marata	Means comes from Malaita.
Saikoloni	This taro self seeded on Choiseul after the 1972 cyclone so is called the cyclone taro.
Kaduqolo	Means comes from across the sea.
Mana rogava	Means big taro that grows in swamps.
Mana puro	Taro that came up by itself.
Puro gumata	Taro belonging to Gumata - the man who discovered it.
Puro karoline	Taro belonging to Karoline - Solomon's mother who apparently discovered it on Choiseul.

Custom taro digging sticks

The custom belief was that you could only use four kinds of tree for digging sticks otherwise the taro died. The names of the trees that could be used for taro digging sticks were:

Tunima

Kekoso

Pusaka

Pasika (strong mangrove)

Nowadays people do not worry about this too much.

Custom way of knowing when taro is ready to harvest

Nadu	When taro is strong and stand firm. The taro was inspected and shaken. If it was not strong and stiff it was not ready for harvest.
Vavaqu	Taro is in flower therefore is ready for harvest.
Nalu rabasana	Taro was weeded at six monthly intervals. After weeding six times (one year) the taro was ready for harvest.
Podo suka	Growth slows down and when this happens the taro is ready for harvest.

These methods are still used to gauge whether taro is ready for harvesting.

Different parts of the taro

These custom descriptions are still used nowadays:

Viro	Stem of the plant. This piece is used only when the root and leaves are sick.
Vavaqu	Flowers
Kapitu	Old leaves. The new leaves are too soft when they are cooked.
Kikidamavora	Leaf tip. This is taken for food and the rest is left to allow continued root growth.

Taro sickness

Luvisi	Leaves do not spread but collapse. When this happens the taro is no good for eating.
Zui	The stem goes red and is no good for eating.
Romese	Small insects like grasshoppers are found on the leaves which means the taro is sick and is no good for eating.
Bula	Leaves die like they have been burnt and the root goes soft (root rot). In this condition it is no good for eating.
Ninimaka	Has a small snake (worm) in the root and is no good for eating.
Qome	Dry leaves because a beetle lays its eggs in the root. Is no good for eating.
Siakale	Name of an epiphyte found in trees. When this is nearby the taro will not grow so the epiphyte is removed.

Tui	Name of the tree that taro will not grow near. The tree is removed.
Megamega	Also the name of another tree that taro will not grow near. The tree is removed.

Custom tool used for taro

In custom only one tool is used for harvesting taro. This is called the *kuvete*.
In custom if a girl used a knife instead of a *kuvete* she would be considered lazy and her chances of getting married were diminished. Nowadays the *kuvete* is no longer used exclusively to harvest taro.

Custom calendar concerning death

Narrated by Solomon Zarabule on 27.7.91.

For counting the months or years since the death of a partner, string was tied around one's wrist or leg after the fashion of a bangle. If a woman's husband died she left the house and could not marry for four years. During this time she did not wash, cut or brush her hair. Obviously she became very dirty. The months of the years of mourning were counted using string calendars. A special room was made and attached to someone's house and the woman would stay in there the whole time. Other people would bring her food. The purpose of this was to dispel rumours that the wife had killed the husband. Some women lost their minds during this time. Men also spent time in mourning but the duration of this period was unknown.

The people of Nukiki do not practise this custom any longer although they may not wash for a limited period. Relatives of the deceased person will go them and tell them they should finish the mourning period by washing and cleaning themselves up. The mourning period may last from three days to a month although the older people still remember the old customs and find it harder to have a short mourning period. They are frightened not to but are discouraged by people like Solomon.

Before the mourning period was broken the custom was to break shells before the washing took place. The string calendars are called *pupuke*. Although the people of Nukiki no longer use *pupuke* some people in the bush still do. People in the Roman Catholic mission at Moli are still said to undertake these practices as well. Women can still be seen wearing *pupuke* in these places signifying that the woman is a widow.

Custom story of the Tuaqa Stream

The boundary between Bakele land and Siropodoko land crosses Mount Talaevondo, the Tuaqa Stream and Viluji Hill. In former times people lived on Viluji Hill and were presided over by a chief. The hill gave the people protection from their enemies as it gave them a good view of the surrounding land. An old widow lived amongst these

people on the hill and she adopted a small boy. One day the widow and the small boy went down to the stream in the valley to catch some crayfish. The stream was *tambu* for children to go to the toilet in but the widow forgot to warn the boy and as well as swimming he also urinated in the stream. In the evening they climbed back up Viluji Hill to the village. The old widow was unaware of what the small boy had done.
They cooked the crayfish for dinner then went to sleep for the night. Everyone in the village slept except for the chief who was up chewing betel nut. When he went outside his house to throw the nut shells into the valley he heard splashes where they landed. He went out to investigate and found that Tuaqa Stream had risen in the night and surrounded Viluji Hill completely because it was cross. The chief woke everyone up to warn them as the water was still rising. The people all asked what was wrong and what had caused this. They asked who had gone down to the stream that day and they discovered that the only people who had were the widow and the small boy. They then realised that the small boy had gone to the toilet in the stream so they threw a live pig into the water to try and appease it for the wrong done. The water did not go down so they threw in some custom money. This did not work either so next they threw in some custom arm bands. Again this failed so they then threw in some custom pudding, again with no success. Finally they threw in the small boy. The water then went down quickly and the boy was swept down the stream. The widow was grief stricken and ran after the child. The river snaked and turned to get away from the widow and even dived into holes in the ground taking the boy with it. The widow knew where the holes came to the surface again so took short cuts across the land to meet the river when it came out with the small boy. The river looped back on itself to escaped the widow and finally disappeared into a hole where the widow could not follow and where she did not know where it came out. The grief ridden widow turned to stone and to this day a big rock stands to guard the hole which swallows up the Tuaqa Stream. Her walking stick sprouted and is now a clump of bamboo growing out of the rock.

This story explains why the Tuaqa Stream winds back on itself so much and disappears into holes.

Custom story about Masipusu Point

Narrated by Solomon Zarabule on 27.7.91.

There is a big rock at Masipusu Point which is on the coast between the Mbirambira and Pavora rivers. It is said that once a god had a garden there. A devil called *basana* came along and said to the god that the land did not belong to him. An argument and then a fight developed which the devil lost. He then ran away and hanged himself in a cave. As he was hanging there he turned to stone and to this day there is still a rock that hangs down from the roof of the cave. It is called *basana*. This is the explanation for the unusual rock formation in the cave.

This cave is *tambu* as it is also a former burial site. Children from Pavora Bay used to canoe around this point so they would not have to walk along the track past the *tambu* site on the way to school at Nukiki village.

Another custom story about Masipusu Point

Narrated by Solomon Zarabule on 5.8.91.

On 30.5.91 Billy Savevai took me by boat to Pavora Bay. En route we passed Masipusu Point. Billy showed me the blow hole in the rocks and indicated that it was a site of customary significance.

Masipusu Point is a jumble of rocks that overhang in places. In one area is a blow hole. The custom associated with this area tells the story of some people a long time ago who were preparing a feast but were turned into stone while doing so. The blow hole is the bowl they were using to make nari nut and taro pudding at the time they were turned into stone. Another stone is like a pudding leaf parcel that had been prepared for the feast. It looks like wrapped leaves.

The custom story says that when people were about to be turned into stone there was a sound like rain. If they were close enough to stream and managed to run across it they would be spared. In the case of Masipusu Point, the Mbirambira and Pavora rivers were too far away for them to do this so they were turned into stone. This story explains why there is such an interesting jumble of rocks at Masipusu Point.

Custom story about Sisirimana Point

Narrated by Solomon Zarabule on 5.8.91.

Sisirimana Point is the point between the Sivusivu village beach front and the bay into which the Zalepima Stream and Mbirambira River flow. On the Zalepima Stream side of this point is a blow hole. In times past the dead used to be put down this hole. The blow hole is more like a small tunnel in that the water surges up and down it rather than spraying out as with the blow hole at Masipusu Point.

Sisirimana means place for putting dead bodies. The hole was used to dispose of the bodies of both enemy and members of the local tribe alike. Once put down the hole they were swept out to sea through an underwater entrance. Chiefs were buried separately at one of the *tambu* sites.

Zalepima Stream

Narrated by Solomon Zarabule on 5.8.91.

Near the mouth of Zalepima Stream was a high point that in times past was fortified. During times of war logs were lashed at the top of the slope. When the enemy tried to scale the heights the ropes were cut and the logs would roll down the slope onto them. They would then be disposed of down the blow hole at Sisirimana Point.

A custom story about two boys

Narrated by Solomon Zarabule on 5.8.91.

Two young brothers lived in a village. They were poor and when they were still young both their parents died. Because they were poor the other villagers did not like them and did not help them much. It was hard work fending for themselves and the boys agreed it would be a big help if they could find wives. Because they were poor none of the village girls liked them so they could not get married.

One day one of the boys was out in his canoe fishing. He had paddled a long way when he saw an island. Because he was tired and hungry he decided to go ashore to get some coconut to eat. There he met an old man who invited him to stay the night. He accepted this offer but to his alarm he found that instead of being made from sticks the old man's house was made of snakes. The bed was also made of snakes. Although he did not like it the boy stayed anyway. The next day the old man told him to climb a coconut palm and get two green coconuts but to be careful not to scratch them against the trunk when coming down. The boy was careful to obey these instructions. The old man gave one coconut to the boy and kept one for himself. He then bid the boy farewell. Because the old man was a magician he called up all the fish and told the boy he could take his pick of fish to take home in his canoe as food. The boy duly did this. The old man also told him to throw his coconut into the sea when he reached the middle sea. When he got there he did this and to his surprise the coconut turned into a beautiful girl whom he pulled aboard his canoe and took for his wife.

When he got back to his village everyone was very surprised. His brother wanted a wife too so he also went to the old man. However, unlike his brother, he did not obey the old man's instructions closely. He did not sleep in the house because he did not like snakes and instead of climbing down the tree carefully with the two coconuts he threw them for the old man to catch. When he threw his coconut into the sea all he got was an ugly girl with a deformed nose and a funny voice.

This story is used to illustrate the importance of following the instructions of the old people.

Customs concerning food and birds

Banana

If you planted banana when the sun was coming up the fruit was good but if you planted it when the sun was going down the fruit was poor. It seemed that this custom was still adhered to.

Nari nuts

It was a special time in the villages when the nari nuts were prepared for ceremonies to be held later in the year. To store the nuts they were broken open and the kernel taken out and wrapped on leaves. These were tied tightly and placed above the fire to dry. They kept like this for many months. The name given to nuts prepared in this way was *voko*. When nuts are dried whole, that is without breaking open the nut to remove the kernel, it is called *duki*. The taste of these nuts is different from *voko*. Nowadays tins are often used to store the nuts instead of leaves.

Sulu nuts

The sulu nut is flat whereas the nari nut is long. Nari nuts and sulu nuts are prepared in the same way.

Qaqava and Koqomo

The qaqava is black like the Hornbill (koqomo) but has a smaller beak. An old custom story has it that both birds went for a swim but first removed their beaks so they would not get wet. Qaqava came out first and preferred koqomo's smaller beak so stole it and ran away. That is why the Hornbill's beak looks too big for him.

APPENDIX 3

SUMMARY OF 1986 CENSUS INFORMATION

Ward, EA, Locality	HHs	Number of M	F	0-14	15+	total
005 Bisivugala	2	9	8	11	6	17
006 Vakatipu	8	40	33	43	30	73
007 Nukiki	11	34	27	31	30	61
008 Tarapasike	9	29	28	21	36	57
009 Kele Kele	1	5	7	8	4	12
010 Maluku	4	11	14	11	14	25
011 Kalakalanga	3	10	7	8	9	17
012 Tuana	6	12	18	17	13	30
013 Lonely Point	2	6	9	7	8	15
014 Seuseu	1	5	2	3	4	7

Source: Statistics Office, 1986:63

APPENDIX 4

Solomon Star, 13 June, 1991, Page 5

Social economic benefit to people of Choiseul

The people of Choiseul in the Western Province start to get benefits from Eagon, an overseas company logging the island.

Eagon a logging company from South Korea, has provided scholarships to seven students attending the Solomon • Islands College of Higher Education, King George VI School, Betikama and St Joseph's National Secondary Schools.

The students are Joseph Dokena in the College, Roger Maraka to KGVI, Titus Rusu to St Joseph's, James Pandokale to St Joseph's, Shane Tutua to Betikama, and Olga Tutua to Betikama.

The company is paying their fees and tuition until they complete their education or course.

The manager of Eagon office in Honiara, S.H. Lee, said "the scholarship program is one of the main programs offered by the Eagon Choiseul Foundation."

He said the other programs are in health and agriculture development.

The scholarship is open only to Choiseul pupils from form four and upwards.

Under the health programme a mini hospital under an expatriate doctor, is to open August,

In the agriculture program, a cocoa model farm is to be set up along the main road from Moli (south, where Eagon is based) to Sirovanga in the north.

The foundation established recently is a charitable organization devised by the president of the Eagon Industrial Company, Y.J. Park, in South Korea.

Park said "the foundation's aim is to assist social and economic development in Choiseul for the landowners and people of Choiseul".

He said this would encourage the islanders to be self-reliant and encourage young people to become farmers.

The company is injecting into the foundation $20,000 monthly.

APPENDIX 5

CHOISEUL

SIDT now has 10 centres around the country. The newest was opened recently on Choiseul, and is the second in the West. Read on for news about this and logging activities around Choiseul.

Villagers against logging

PEOPLE OF villages around Moli area of South Choiseul are angry about logging operations on their land says the chief of Kuku village, Mr Simon Sotavae.

Mr Sotavae says the Eagon Logging Company has entered his people's customary land, east of Moli, without permission.

He says: "We didn't sign any logging agreement with the company but despite this, their operation went through our area. We stopped them three times but they would not listen."

People in Moli signed a logging agreement with Eagon but the problem has occurred because the Moli claim Kuku village land. "We know well that the area had been used by our forefathers from one generation to another," says Sotavae.

"The company started unlawful entry on our customary land in January. When we went to stop them, they told us they obtained permission from Moli people."

Mr Sotavae says they approached Eagon to try and stop it from operating on their land while landowners sorted out their differences but their appeal received a negative answer.

He says the steering commitee will look thoroughly at who the real owners are.

A landowner about two kilometres east of Moli, **Mr Daniel Vudakana**, says Eagon Logging company is also effecting the people of Pavoraa village with land erosion and river pollution.

He angrily said the river from which they draw their drinking water and wash their clothes is now polluted.

Mr Vudakana says: "Another problem facing us now is land erosion. We make gardens along the river's bank and when rain comes our gardens are washed away as there are no trees standing to control the flow of water prior to its entry into the river."

He says before the logging this never happened. As a result they went to the company to ask for compensation for their lost crops. A few received a total of $300.

'Our boys went up to attack workers and machines'

There are no agricultural staff to help them price their damaged root crops and other vegetables.

Mr Vudakana says in this particular area, all the trees are gone including their nut trees, other edible fruit trees, bush materials for building houses and plants for traditional medicines.

He goes on: "As a result, land disputes are now common and our custom court inquiry is now busy trying to settle all land disputes but each case has to wait for a month."

"The land court inquiry legally can only sit once a month, but huge destruction can be caused in less than one month.

"Recently, our boys went up to attack the company's workers and machines which caused their operation to stop for a time. We gave them a final warning not to enter our areas again and their failure would only make us take the law into our own hands."

Asked whether he knew that it is illegal to do this, he replies: We are prepared to risk our own lives in safeguarding what is left of our natural resources and other properties. We did not sign any logging agreement with the Eagon Logging Company but despite this fact, the company trespasses."

According to Mr Vudakana, the company has not paid any royalty to them although it informed them it will pay their logs at $5 per cubic metre per landowner.

However, Mr Vudakana states that they have no one to represent them in the company when each log is measured out for their cubic metres and that they are not sure whether they are getting the right amounts for royalty payments.

He says after various discussions on these problems, they are now thinking to press the company to have their representative to check

this. Mr Vudakana sadly admits that they do not even know the number of logs that have gone out from their forest or the number of logs taken on each shipment. "Only when these are checked will landowners know what is going on," he says.

When the company first arrived, it said it would help the people of Choiseul with money, says **Damian Mijikana** of Vudutaru village near Moli.

He said the company said it would build good roads, clinics, dwelling houses for people and schools. Because of these promises we allowed our land to be used but all that is happening is the fast disappearance of our way of harmonious living.

"Land dispute is now common, solely caused by the arrival of the company. All its promises have failed - although it has built a clinic at their camp for their workers, we don't know whether the public will be allowed to get treatments there. This clinic has yet to be staffed."

Mr Mijikana emotionally said it was a sad thing that those who attended schooling signed the logging agreement.

He continues: "Some landowners want to extend their traditional boundaries and this especially applies to those with small portion of customary land areas and I think they are doing this in order to get bigger royalty.

"This is against our traditional way of oneness and that of communal sharing.

"Since the arrival of churches, we Choiseulese live in harmony, but in my area, this is not the story today."

A spokesman for the Eagon Logging Company says it is not prepared to discuss the issue with the media.

APPENDIX 6

SCHEDULE E

GOVERNMENT CROP COMPENSATION RATES

1. ROOT CROPS

Sweet potato	10 cents	per	hill
Taro	24 "	"	clump
Pana	24 "	"	hill
Yam	24 "	"	"
Tapioca (Cassava)	9 "	"	plant

2. VEGETABLE

Bush cabbage	33 cents	per	bush
English cabbage	20 "	"	plant
Green pepper	10 "	"	"
Aubergine (Egg plant)	14 "	"	"
Tomatoes	20 "	"	"
Beans (all types)	23 "	"	"
Cucumbers	28 "	"	"
Water Melon	28 "	"	"
Pumkin	20 "	"	"
Sweet Corn	8 "	"	"
Peanuts	8 "	"	"
Shallots	45 "	"	metre row
Radish	42 "	"	" "
Lettuce	63 "	"	" "
Chinese cabbage	50 "	"	" "

3. EDIBLE FRUITS AND NUTS

	Seedling $SI	Non-bearing $SI	Bearing $SI
Ngali nut	-	3.30	10.60
Mango	-	2.80	9.80
Betel nut (chewing)	-	1.66	6.60
Custard apple	-	0.35	2.10
Soursop	-	0.35	2.10
Rambutan	-	0.35	2.10
Guava	-	0.35	2.10
Carambola (5 corner fruit)	-	0.35	2.10
Cut nut	-	0.35	2.10
Bush apple (F. malaccense)	-	0.35	2.10

Citrus	- Seedling category	(a)	50 cents per tree
		(b)	- cents per tree
	- non bearing "	(a)	5.00 per tree
		(b)	80 cents per tree
	- bearing "	(a)	8.30
	"	(b)	83 cents per tree
Breadfruit	- Seedling "	(c)	50 cents per tree
		(d)	-
	- non bearing "	(c)	2.80 per tree
		(d)	1-40 per tree
	- non bearing "	(e)	9-80 per tree
		(d)	7-00 per tree

Banana	-	27 cents per newly planted sucker
		80 cents per bearing stem
Papaw	-	per non bearing tree
		$1.30 per bearing tree
Pineapple	-	3 cents per newly planted sucker
	-	35 cents per bearing plant
Sugar cane	-	3 cents per newly planted set
	-	8 cents per mature stalk
Sago palm	-	$5 per mature palm
" "	-	$1 per Immature palm

4. COMMERCIAL TREE CROPS

Cocoa, well maintained and bearing $3.00 per tree
" " " " non bearing $1.00 per tree
(subject to a maximum in both cases of $990 per hectare)
Cocoa, poorly maintained and bearing $1.00 per tree
" " " " bearing $1.00 per tree
(subject to a maximum in both cases of $247 per hectare)

COCONUTS

		Non bearing	SSI 6-40 yrs	Over 40 years
Hybrid - well maintained	(e)	5.00	14.00	8.70
Rennell- well maintained		4.00	11.20	6.80
Local tall well maintained		3.60	10.30	6.20
FMS well maintained		3.20	9.20	5.60
All varieties - poorly maintained	(f)	2.10	6.10	3.70
Poorly maintained subject to a maximum per hectare		330.00	965.00	586.00

5. COMMERCIAL FIELD CROPS

Chillie (Tabasco) 9 cents per plant
Chillie (Long red) 5 cents per plant
(Subject to a maximum of $494 per hectare for Tabasco and $247 per hectare for long red).
Turmeric 2 cents per plant
(Subject to a maximum of $173 per hectare)
Pasture improved $125 per hectare
Pasture an improve $40 per hectare.

6. NOTES:

(a) Plants purchased i.e. budded, improved variety
(b) Plants locally grown from seed
(c) Plants properly spaced and maintained
(d) Random planting
(e) 'Well maintained' means coconut palms planted at a recommended density and well brushed or grazed.
(f) 'Poorly maintained' means overgrown palms in very poorly condition or randomly planted, self-sown palms at densities other than those recommended.

Source: Supplement to the Solomon Islands Gazette. SI No.16. 26 June 1987

APPENDIX 7

Present Value of Lost Nari and Sulu Nut Production (from Table 7.3)

Year	Annual Production From Mature Tree $	Annual Production Lost When Tree Felled $	Discount Rate (11%)	Present Value $
0	0	125	1	125
1	0	125	0.9009	112.6125
2	0	125	0.8116	101.45
3	0	125	0.7312	91.4
4	0	125	0.6587	82.3375
5	0	125	0.5934	74.175
6	0	125	0.5346	66.825
7	0	125	0.4817	60.2125
8	0	125	0.4339	54.2375
9	0	125	0.3909	48.8625
10	0	125	0.3522	44.025
11	0	125	0.3173	39.6625
12	0	125	0.2858	35.725
13	0	125	0.2575	32.1875
14	0	125	0.232	29
15	0	125	0.209	26.125
16	0	125	0.1883	23.5375
17	0	125	0.1696	21.2
18	0	125	0.1528	19.1
19	0	125	0.1377	17.2125
20	5	120	0.124	14.88
21	6.5	118.5	0.1117	13.23645
22	8	117	0.1007	11.7819
23	9.5	115.5	0.0907	10.47585
24	11	114	0.0817	9.3138
25	12.5	112.5	0.0736	8.28
26	15	110	0.0663	7.293
27	17.5	107.5	0.0597	6.41775
28	20	105	0.0538	5.649
29	22.5	102.5	0.0485	4.97125
30	25	100	0.0437	4.37
31	27.5	97.5	0.0394	3.8415
32	30	95	0.0355	3.3725
33	32.5	92.5	0.0319	2.95075
34	35	90	0.0288	2.592
35	37.5	87.5	0.0259	2.26625
36	40	85	0.0234	1.989
37	42.5	82.5	0.021	1.7325
38	45	80	0.019	1.52
39	47.5	77.5	0.0171	1.32525
40	50	75	0.0154	1.155
41	52.5	72.5	0.0139	1.00775
42	55	70	0.0125	0.875
43	57.5	67.5	0.0112	0.756
44	60	65	0.0101	0.6565
45	62.5	62.5	0.0091	0.56875
46	65	60	0.0082	0.492
47	67.5	57.5	0.0074	0.4255
48	70	55	0.0067	0.3685
49	72.5	52.5	0.006	0.315
50	75	50	0.0054	0.27
51	77.5	47.5	0.0049	0.23275
52	80	45	0.0044	0.198
53	82.5	42.5	0.004	0.17
54	85	40	0.0036	0.144
55	87.5	37.5	0.0032	0.12
56	90	35	0.0029	0.1015
57	92.5	32.5	0.0026	0.0845
58	95	30	0.0024	0.072
59	97.5	27.5	0.0021	0.05775
60	100	25	0.0019	0.0475
61	102.5	22.5	0.0017	0.03825
62	105	20	0.0015	0.03
63	107.5	17.5	0.0014	0.0245
64	110	15	0.0013	0.0195
65	112.5	12.5	0.0011	0.01375
66	115	10	0.001	0.01
67	117.5	7.5	0.0009	0.00675
68	120	5	0.0008	0.004
69	122.5	2.5	0.0007	0.00175
70	125	0	0.0007	0
				1231.413

Present Value of Lost Betel Nut Production (from Table 7.4)

Year	Annual Production From Mature Tree $	Annual Production Lost When Tree Felled $	Discount Rate (11%)	Present Value $
0	0	40	1	40
1	0	40	0.9009	36.036
2	5	35	0.8116	28.406
3	9	31	0.7312	22.6672
4	13.5	26.5	0.6587	17.45555
5	18	22	0.5935	13.057
6	22.5	17.5	0.5346	9.3555
7	27	13	0.4817	6.2621
8	31.5	8.5	0.4339	3.68815
9	36	4	0.3909	1.5636
10	40	0	0.3522	0
				178.4911

Present Value of Lost Sago Palm Production (from Table 7.5)

Year	Annual Production From Mature Tree $	Annual Production Lost When Tree Felled $	Discount Rate (11%)	Present Value $
0	0	29	1	29
1	0	29	0.9009	26.1261
2	0	29	0.8116	23.5364
3	0	29	0.7312	21.2048
4	0	29	0.6587	19.1023
5	0	29	0.5935	17.2115
6	0	29	0.5346	15.5034
7	0	29	0.4817	13.9693
8	0	29	0.4339	12.5831
9	0	29	0.3909	11.3361
10	29	0	0.3522	0
				189.57

A discount rate of 11 percent was used in all present value calculations as this was the interest rate offered by the National Bank of the Solomon Islands for their standard 6-12 month term deposit at the time I undertook my research.

APPENDIX 8

1991 FELLING AREAS

7. DETAILS OF FELLING AREAS

FELLING COUPS	AREA (Ha)	TOTAL VOL(M3)	VOL/Ha (M3/Ha)	POMETIA	TERMI -NALIA	CALOPHY -LLUM	PALAQ -UIUM	OTHERS
A 1	100	5,151	51.5.	54	12	8	5	21
A 2	100	5,537	55.4	62	16	7	2	13
A 3	100	5,670.	56.7	58	9	15	4	14
A 4	100	5,950	59.5	45	11	9	5	30
A 5	100	5,057	50.6	62	13	7	4	14
A 6	100	5,340	53.4	48	13	9	8	22
A 7	100	5,387	53.9	54	15	12	3	16
A 8	100	5,843	58.4	49	20	7	3	21
A 9	100	4,492	44.9	57	9	11	6	17
A10	100	4,853	48.5	63	5	15	1	16
A11	100	5,328	53.3	49	2	31	2	16
A12	100	5,557	55.6	65	8	14	-	13
A13	100	6,256	62.6	47	16	17	4	16
B 1	100	6,308	63.1	43	11	19	6	21
B 2	100	6,753	67.5	51	4	17	3	25
B 3	100	5,735	57.4	56	10	9	6	19
B 4	100	8,253	82.5	47	26	9	3	15
B 5	100	6,756	67.6	51	11	6	5	12
B 6	100	5,153	51.5	61	11	8	5	15
B 7	100	5,746	57.5	47	9	12	3	29
B	100	6,421	64.2	51	7	14	5	23
TOTAL	2100	121,546	57.9	53	11	12	4	20

Source: 1991 Logging Plan. Eagon Resources Development Co. (SI) Ltd.

APPENDIX 9

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Run date: 17/07/91 Form FD 01

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 1 Year: 1992

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co,		15996	1546722	96.69	319622		
Allardyce Lumber Co,		11429	1642972	144.01	348282		
Integrated Forest Industry		7315	1213730	138.58	158705		
Dalsol		4002	504415	126.04	125992		
Hyundai Timber Co,		7105	1179757	166.05	241379		
Eagon Resources Dev,		14444	2261185	156.55	481685		
Talsol Investment		1898	223809	118.12	46638		
Kayuken Pacific		5499	824872	146.22	178639		
North New Georgia Timber Cor		32281	4269382	132.26	920885		
Total for month/quarter		99939	13445247	134.53	2772993		
Year to date		99939	13445247	134.53	2772993		

Run date: 17/07/91 Form FD 01

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 2 Year: 1992

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co,		14824	1755325	118.41	804996		
Allardyce Lumber Co,		12661	2376029	187.67	518872		
Integrated Forest Industry		10144	1383537	136.39	314869		
Dalsol		4605	638939	138.74	134713		
Hyundai Timber Co,		8751	1287344	147.11	273247		
Eagon Resources Dev,		22794	3429720	149.59	724452		
Talsol Investment		2299	293395	127.62	61704		
Kayuken Pacific		5217	804913	154.29	171323		
North New Georgia Timber Cor		27199	3735519	137.34	789726		
Total for month/quarter		108494	15684670	144.57	3785904		
Year to date		208433	29129917	139.76	6558897		

Run date: 17/07/91 Form FD 81

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 3 Year: 1990

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co.		18046	2557621	141.73	587716		
Allardyce Lumber Co.		4873	664223	163.83	156421		
Integrated Forest Industry.		9522	1369141	143.79	324439		
Hyundai Timber co.		8589	1571228	182.93	376785		
Eagon Resources Dev,		7888	1312183	185.04	314253		
Taisol Investment		4854	752747	156.81	175958		
Kayuken Pacific		3199	534133	166.97	127535		
North New Georgia Timber Cor		42286	5290739	125.36	1172439		
Total for month/quarter		97579	14059935	144.09	3237458		
Year to date		326812	43189952	141.14	9796355		

Run date: 17/07/91 Form FD 81

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 4 Year: 1990

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co,		12866	1731673	134.59	405799		
Allardyce Lumber Co.		10954	2324594	210.28	555591		
Integrated Forest Industry		4312	620814	144.04	147124		
Dalsol		6969	960316	137.82	227892		
Hyundai Timber Co,		5257	807521	153.61	192844		
Eagon Resources Dev,		11634	1623038	139.51	383939		
Kayuken Pacific		3499	535682	153.10	127368		
North New Georgia Timber Cor		23616	3462229	146.60	821281		
Total for month/quarter		79114	12845817	152.26	2864038		
Year to date		385126	55235669	143.42	12660385		

Run date: 17/07/91 Form FD 81

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: Ann. Year: 1990

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co.		61732	7591341	122.97	2121133		
Allardyce Lumber Co.		39127	6987918	178.60	1573164		
Integrated Forest Industry		31291	4387222	140.21	945137		
Dalsol		15575	2123620	135.84	466595		
Hyundai Timber Co,		29782	4845652	162.15	1083375		
Eagon Resources Dev,		55552	8624819	153.78	1904329		
Taisol Investment		9051	1279151	141.33	284292		
Kayuken Pacific		17414	2678980	153.83	596829		
North New Georgia Timber Cor		125382	16757849	133.74	3683531		
Total for month/quarter		385126	55235669	143.42	12660385		
Year to date		385126	55235669	143.42	12660365		

Run date: 12/08/91

Form FD 91

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 1 Year: 1991

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Kalena Timber Co,		6516	917665	140.83	217198		
Allardyce Lumber Co,		7902	1582953	200.32	388925		
Integrated Forest Industry		5412	753758	139.27	178298		
Dalsol		2079	290883	139.98	71325		
Hyundai Timber Co,		9614	1558073	161.23	369495		
Eagon Resources Dev,		9602	1567527	163.25	413193		
Taisol Investment		1011	236829	234.25	57313		
Kayuken Pacific		6249	1052835	169.31	252795		
rth New Georgia Timber Cor		19733	2646355	134.11	624593		
Total for month/quarter		68117	10604269	155.67	2565127		
Year to date		68117	10604069	155.67	2565127		

Run date: 12/08/91

Form FD 91

MINISTRY OF NATURAL RESOURCES
FORESTRY DIVISION

LOG EXPORT RETURNS

Month/Quarter: 2 Year: 1991

Licensee	Ships Name	Volume Exported	Shipment Value	Unit Value	Export Duty	Export Entry	Destination
Allardyce Lumber Co,		3983	626379	159.52	151377		
Integrated Forest Industry		11021	1645889	149.33	398736		
Dalsol		3012	493652	163.92	117766		
Hyundai Timber Co,		8878	1523753	171.79	364329		
Eagon Resources Dev,		25127	4564532	181.88	1094068		
Kayuken Pacific		2739	594755	217.22	143556		
Naibona Co.		2146	363844	169.55	86738		
North New Georgia Timber Cor		31527	4731659	150.08	1123828		
...al for month/quarter		88404	14553301	164.62	3472680		
Year to date		156521	25157458	160.73	6037727		

APPENDIX 10

FORM - R.B.

RESEARCH PERMIT

Permission is hereby given to:

1. Name: Ross MacDonald Cassells(B.ForSc)

2. Country: New Zealand.

3. To undertake research in (subject): Non - Timber Subsistence Uses. Of Tropical Forests.

4. Area Council(s): Choiseul Area Councils and other areas Councils in Western Province.

5. Province(s): Western

6. Conditions:

   a. To undertake research only in the subject areas specified in 3 above.

   b. To undertake research only in the Area Council specified in 4 and the Province(s) specified in 5.

   c. To observe with respect at all times local customs and the way of life of the people in the area in which the research work is carried out.

   d. You must not, at any time, take part in any political or missionary activities or local disputes.

   e. You must leave 4 copies of your final research report in English with the Solomon Islands Government (Ministry responsible research) at your own expense.

   f. A Research Fee of $.150.00..... and deposit a sum of $.200.00.... must be paid in full or the Research Permit will be cancelled. (See Sect 3. Subject. 7 of the Research Act).

   g. This research is valid until 8th August, 1991 provided all conditions are adhered to.

   h. A failure to observe the above conditions will result in the automatic cancellation of this permit and the forfeit of your deposit.

Signed: HON. Sam Alasia. Date: 8th MAY 91

MINISTER FOR EDUCATION & HUMAN RESOURCE DEVELOPMENT

FORM - R.B.

RESEARCH PERMIT (EXTENTION)

Permission is hereby given to:

1. Name: Ross MacDonald Cassells (B for SC)

2. Country: New Zealand

3. To undertake research in (subject): Non-Timber Subsistence uses of Tropical Forests.

4. Area Council(s): Choiseul Area Councils & other areas in the Western Province.

5. Province(s): Western & Choiseul

6. Conditions:

   a. To undertake research only in the subject areas specified in 3 above.

   b. To undertake research only in the Area Council specified in 4 and the Province(s) specified in 5.

   c. To observe with respect at all times local customs and the way of life of the people in the area in which the research work is carried out.

   d. You must not, at any time, take part in any political or missionary activities or local disputes.

   e. You must leave 4 copies of your final research report in English with the Solomon Islands Government (Ministry responsible research) at your own expense.

   f. A Research Fee of $.150.00..... and deposit a sum of $..... must be paid in full or the Research Permit will be cancelled. (See Sect 3. Subject. 7 of the Research Act).

   g. This research is valid until....8th Nov. 1991..... provided all conditions are adhered to.

   h. A failure to observe the above conditions will result in the automatic cancellation of this permit and the forfeit of your deposit.

Signed: Hon. Sam Alasia Date: 30/7/91

MINISTER FOR EDUCATION & HUMAN RESOURCE DEVELOPMENT

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