LAND, CANE AND COCONUTS
Papers on the rural economy of Fiji

H. C. BROOKFIELD
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Contents of the three substantive papers are listed at the beginning of each paper
EDITOR'S PREFACE

In view of the Introduction provided below by Frank Ellis, which describes the background and origin of these papers, only a brief editorial preface is necessary. Present and past members of the Department of Human Geography have done a great deal of work in Fiji, beginning almost 30 years ago in the 1950s, and the tradition has been continued. Seven members of academic staff have worked in the country and five doctoral theses have been written on Fijian topics. In addition, the first South Pacific islander to obtain a PhD in Geography was a Fijian, and worked in this Department though he did his field research elsewhere. While the present collection arises from a recent experience in which two members of staff were involved, their papers here also draw heavily on earlier research. Among this substantial contribution, special mention should be made of Professor Oskar Spate's monumental and influential report on The Fijian People: economic problems and prospects (Fiji Legislative Council Paper 13 of 1959, Suva: Government Printer). Oskar may be said to have set a fashion which others have tried to follow, that of relating research to problems of policy in development.

Fiji is a small country, but contains great variety, and as the most developed country in the South Pacific island region it also has more economic and social diversity than most of its neighbours. This publication is concerned with aspects of Fiji's rural economy, and the diversity is underlined by the fact that we treat of frontiers of agricultural expansion on the one hand, and of a region in economic decline on the other. The papers are intended to inform and also to advise. Since they are sectoral papers, they do not attempt to take account of the whole context of Fijian policy-making in rural areas except in so far as a knowledge of this context provides background. Nor do they cover all the problems of rural Fiji; attention is focussed on land, employment and innovation, and it will be noted that while in one industry we see a great need for innovation, in another we see advantages in resisting the adoption of a more capital-intensive technology. We do not expect universal agreement with what we say, in Fiji or elsewhere. Indeed, an anonymous economist who read these papers in an earlier form disagreed most strongly with our whole approach and castigated us for not adopting free-market principles in our analysis. We have taken heed of his words, but to have followed all of his advice would clearly have led us toward very different
conclusions from those which we reach, conclusions which we hope are informed by an understanding, albeit critical, of Fijian realities.

We thank two anonymous referees for comments which we have tried to incorporate, and Dr G.J.R. Linge who undertook the task of obtaining, interpreting and reinforcing these comments, since the series editor is also an author in this case. We particularly thank Dr Manfred Bienefeld, who as team leader of the EEC Employment and Development Mission did some painstaking work on our early drafts and has encouraged us to publish the results. Though each of us adds his own individual acknowledgements, we collectively thank all those who helped us in Fiji and in Canberra, and in particular Pauline Falconer and Carol McKenzie for their excellent work in word-processing the text. Theo Baumann, Nigel Duffey, Manlio Pancino and Keith Mitchell have all had a hand in producing our maps and diagrams. Yvonne Byron has assisted in the final editorial work.

The three papers are unequal in length and in nature. We have varied series convention slightly by dividing the longest of the three into chapters in order to provide an additional level of sub-heading; in view of the differences full standardization has not been possible. Some conflicts of statement between different papers have been allowed to stand. The imperfections that remain are the responsibility of the series editor, to whom they should be sheeted home.

H.C. Brookfield

Canberra
September 1985
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NOTE ON FIJIAN ORTHOGRAPHY AND TERMS

The standard Fijian spelling of names and terms is used throughout this publication. For those who are unfamiliar with this spelling, it will be useful to note that:

'b' 'd' and 'g' are pre-nasalized, being pronounced 'mb', 'nd' and 'ng'
'c' is always soft, pronounced 'th'
'q' is a heavily pre-nasalized 'g', pronounced 'ngg' as in 'finger'

It will be helpful to present again a valuable aid to understanding (or obfuscation) contributed by Oskar Spate:

A mbastaandal mbarman from Ba
Onthe mbythylend all ambout Ra
A ngirl from eathh koro (village)
He'nd kerekere or mborrow
Ad ce mbambies were mborn in ce mbar.

Except for names, however, we have in general avoided using Fijian terms where international terms are available. Thus we use 'taro' and not 'dalo', and 'chief' rather than 'ratu', though in the latter case and some others the translation is not exact. Use of descent-group terms is restricted, and is explained where it occurs, except that mataqali, the descent-group level by which collective Fijian land-ownership is registered — not always accurately — is sometimes used without explanation. Indigenous Fijians are referred to as 'Fijians', while the descendants of Indian immigrants are referred to as 'Indo-Fijians' and not as 'Indians', a usage which we are pleased to see becoming more common. 'Part-Europeans' are the descendants of mixed unions, usually between Fijians and immigrants of European origin.

One term is unavoidable. This is 'yaqona' (yanggonha), being both the _Piper methysticum_ plant, and the drink made by solution of its powdered root or stem in water. Elsewhere in the Pacific known as 'kava', this mildly narcotic 'Fiji grog' is immensely popular, having spread from ceremonially restricted use to become the common drink of Fijians and many Indo-Fijians, consumed both with traditional ceremony and also on the most casual occasions.
General map of Fiji, showing principal places named in the text
INTRODUCTION TO PAPERS 1, 2 AND 3

Frank Ellis

The three papers contained in this volume are the outcome of research into various aspects of employment generation and income distribution in Fiji agriculture, undertaken in 1982 and 1983. The papers were originally prepared as Working Papers for the Fiji Employment and Development Mission, which submitted its final report to the Fiji Government in 1984. Revised versions are published together here in order to make available to a wider readership the results of the research.

The Fiji Employment and Development Mission was a project requested by the Fiji Government to make a comprehensive assessment of the employment situation in the Islands and to make recommendations for future economic strategy. The Mission undertook the bulk of its work in the period between August 1982 and August 1983, and one of the authors of the present collection, Frank Ellis, was on permanent secondment in Fiji throughout this period. The other two authors, Harold Brookfield and Gerard Ward, undertook their research as consultants to the project. The final report of the mission, written by the team leader after all of us had left, was published (Bienenfeld, 1984).

Since these three papers cover quite distinct topics, and are written by persons of differing disciplinary backgrounds, some information on the context within which they were prepared and the themes which unite them is appropriate.

The instigation of an Employment Mission reflected the emergence, at the beginning of the 1980s, of a sharp slow down in the rate of economic growth and new employment creation in Fiji. This also coincided with a record level of annual new entrants into the job market, reflecting an earlier phase of population growth in excess of three per cent per annum. The downturn in Fiji economic performance at this time was related to the deepening of world recession. However, what was not known with any great accuracy was how the Fiji economy had managed to remain so buoyant during the difficult years of the 1970s, which sectors of the economy had contributed most to job creation in that era, what domestic factors were responsible for the incipient stagnation in new employment, and what were the main constraints on future employment
expansion. The Employment Mission was concerned with seeking answers to this array of questions.

Fiji's economic performance in the 1970s can be summarised as follows. The decade divided into two distinct phases. In the first of these the leading sectors of economic growth, and hence also of employment and income creation, were government, manufacturing, mainly for the small domestic market, and tourism. Growth in these sectors slowed down in mid-decade, and their leading role passed to the small-farm sugar industry, which underwent a major expansion into the early 1980s. This smooth transition between sectors, allied to the foreign exchange role of tourism in the first phase and sugar in the second, enabled Fiji to survive the external pressures of two major oil price increases and imported international inflation. However, this pattern of development seemed to have come up against severe constraints by 1982: further expansion of sugar was limited by the slump in the world market, domestic manufacturing was limited by the small size of the domestic market, tourist growth was adversely affected by the recession, and prospects for alternative export expansion were likewise limited by recession and distance from overseas markets.

A central feature of the experience in the 1970s was the fortuitous balance struck between the different sectors, especially with respect to employment and incomes in agriculture. One main component of Fiji agriculture, the small-farm sugar economy, provided both increased employment and rising real incomes which moved broadly in parallel with income growth elsewhere in the economy. The other main component of Fiji agriculture, the Fijian village economy, confronted rising domestic demand for marketed output and underwent a considerable degree of reorientation from mainly subsistence to more commercial production in this period. Here too, real prices of domestic food crops and cash incomes moved in parallel with other parts of the economy, although with greater internal variation due to the heterogeneous nature of this sub-sector with respect to land access and distance from markets. This experience of relatively buoyant employment and income opportunities in agriculture meant that, most unusually for a developing country, rural-urban migration kept in balance with the growth of the urban labour market and Fiji to a great extent avoided the emergence of widespread open urban unemployment at least up to 1982. One of the critical issues which thus emerged was whether agriculture could continue to play this role into the future.
The study by Gerard Ward on land use and land availability provides a foundation to the other two papers. It shows that the buoyant agricultural sector conditions of the 1970s were largely predicated on the availability of unimproved land which could be brought into permanent cultivation. This was especially important for sugar cane expansion but was also relevant in the changing patterns of production in the village economy. By the end of the 1970s this expansion at the extensive margin had approached its limits. Future growth in agricultural output will require much more emphasis on raising land productivity in existing crop areas, especially if ecologically unsound farming patterns are to be avoided. This intensification of land use is constrained by the land ownership structure, the rigidities of which may need to be modified if optimum use of existing arable land is to be achieved.

The paper by Frank Ellis on the Fiji sugar economy substantiates the great importance of the expansion of small-farm sugar production for employment creation in the second half of the 1970s. It is estimated that a number of jobs equivalent to 40 per cent of new entrants to the labour force was created by the sugar industry between 1976 and 1980, either as new cane farmers or as seasonal cane cutters. The paper also shows how this expansion of employment was associated with rising real per-capita incomes for those involved in the industry. However, the rise of sugar was halted in the early 1980s both by shortage of land of appropriate quality and location, and externally by the slump in world sugar prices. The future growth of sugar is constrained by such considerations, and the capability of the small-farm structure to adapt flexibly to changing market conditions may become its most significant feature in the future.

While the paper on sugar is concerned with a sector of the Fiji economy which was providing rising jobs and incomes up to the early 1980s, that by Harold Brookfield on the coconut economy presents a more mixed and complex picture. The coconut economy is of necessity defined rather loosely to cover those areas of the Fiji Islands where copra production has historically been the dominant commercial crop, but in which numerous other agricultural activities take place with varying degrees of market orientation. Coconut production itself, the oldest form of commercial agriculture in Fiji, was subject to many problems in the 1970s. Erratic and depressed international prices, lack of investment in new plantings,
increasing transport difficulties, and shortage of labour are all examined in this paper. However, in taking a fairly wide view of the coconut areas, the Brookfield paper also points to the offsetting factors which permitted these areas to participate in the more general growth of real incomes occurring elsewhere in the Fiji economy in the 1970s. Growth in cash crop production was not just confined to the sugar areas of Fiji, but was also occurring throughout the village and coconut economy due to the rising consumption and price trends for hitherto subsistence crops such as yaqona, taro and cassava.

Brookfield arrives at a cautiously optimistic conclusion regarding the future prospects of the coconut regions of Fiji as a whole, and of the coconut industry in particular. These conclusions are contingent on the resolution of certain major policy issues, associated with new capital investment in the copra industry, and improvement in the transport systems for the coconut producing islands.

All three papers suggest that Fiji in the mid-1980s is at a crossroads where critical decisions will be required concerning appropriate patterns of agricultural development into the future. With new land for cultivation becoming increasingly scarce, constraints on future expansion of sugar cane production, and uncertainty surrounding the future prospects for coconuts, there is an urgent need to find new crops and farm systems which can enable Fiji agriculture to play the same positive role in the development of the country as it has done in the recent past.

Reference:

LAND, LAND USE AND LAND AVAILABILITY IN FIJI

R. Gerard Ward
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<td>4</td>
<td>Viti Levu - in use/committed land</td>
</tr>
<tr>
<td>5</td>
<td>Vanua Levu - in use/committed land</td>
</tr>
<tr>
<td>6</td>
<td>Viti Levu - unused/uncommitted land (c. 1978-80)</td>
</tr>
<tr>
<td>7</td>
<td>Vanua Levu - unused/uncommitted land (c. 1978-80)</td>
</tr>
<tr>
<td>8</td>
<td>Viti Levu - unused/uncommitted land (c. 1978-80)</td>
</tr>
<tr>
<td>9</td>
<td>Vanua Levu - unused/uncommitted land (c. 1978-80)</td>
</tr>
</tbody>
</table>
The rapid growth of population in Fiji, from 400,000 in 1960 to approximately 700,000 in 1985, has been one of the underlying concerns of policy makers for over a quarter of a century. The need for employment creation has been a continuous preoccupation of government. Since the Burns Commission reported on natural resources and population trends in Fiji in 1959 (Burns, 1960), the role of land development in creating new farms and rural employment has been prominent in the public and official mind. Successive development plans have stressed the need to bring more land into commercial production and to increase on-farm employment opportunities.

At the same time, another goal has been the preservation of the structure of Fijian society and the 'Fijian way of life'. Both are rooted in rural Fiji with the system of land tenure tying social and political structures to the allocation of land. Meanwhile, the growing number of Indo-Fijians has maintained pressure for agricultural land from that quarter. It has been a common belief amongst the Indo-Fijian community that the reservation of considerable areas of Native Land for use only by ethnic Fijians has seriously impeded access to, and development of, land by Indo-Fijians. As will be shown below, the area of unused reserve land which is, in fact, usable, is relatively small. Nevertheless, the belief remains and is in itself an important element in ethnic relations and a background consideration in the formulation of land and development policy.

It is argued in this paper that the amount of unused land suitable for development is now quite small. Land use competition is much more intense than a decade ago. Until the present, land development and an increase in the number of farms has been seen as a process of bringing virgin land into production. The availability of such land is now so limited that if policies aimed at increasing rural employment are to succeed, they will have to be based on intensification of land use rather than development of new areas.

A number of trends within the rural sector are also leading to situations in which fewer, rather than more, people are likely to be supported directly in primary production in the medium term. These trends relate to matters of land
availability and quality, land tenure, labour mobilisation and, in the Fijian village sector, the changing balance between the subsistence and the commercial components. It is argued, therefore, that policies which depend on subsistence or semi-subistence farming absorbing (at a satisfactory level of living) those who cannot find work in the urban or fully commercial sectors, will become increasingly difficult to maintain. At the same time, several of the processes of change in agriculture and land use have the effect of undercutting the foundations of the Fijian social structure and hence are at odds with the other policy of supporting that structure.

A. THE LAND RESOURCE

Sources of data

Compared with most developing countries, Fiji is very well provided with information on the quality of its land resource, the tenure under which it is held, and the use to which it is put. Certain gaps or deficiencies in the data are discussed later in this paper and suggestions made for filling these gaps and for making comparative analysis of the information easier for planning.

The key document for land use planning is the soil survey prepared in the late 1950s by Twyford and Wright (1965). This study has been supplemented subsequently by the work of the Land Use Section, Ministry of Agriculture and Fisheries (MAF). The Section has undertaken more detailed soil surveys of areas of special interest and, in conjunction with the New Zealand Soil Bureau, is engaged in bringing the soil classification used by Twyford and Wright into line with recent international conventions. Table 1 sets out the area of land in each of four broad categories of land quality in terms of potential use for arable, tree crops and pastoral farming, as assessed by Twyford and Wright.

The soil categories of Twyford and Wright have been reassessed by the Land Use Section, MAF and potential for forestry has been included in the assessment. Table 2 sets out the resulting figures.

Both the Twyford and Wright and the MAF classifications show that less than 20 per cent of the country is suitable for permanent arable farming and that about 40 per cent is so
TABLE 1: LAND CAPABILITY FOR AGRICULTUREa

<table>
<thead>
<tr>
<th>Land class</th>
<th>Area</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td></td>
</tr>
<tr>
<td>A First class (usable without improvement)</td>
<td>3,558</td>
<td>19.4</td>
</tr>
<tr>
<td>B Second class (usable with minor improvement)</td>
<td>1,932</td>
<td>10.5</td>
</tr>
<tr>
<td>C Third class (usable only after major improvement)</td>
<td>5,868</td>
<td>31.9</td>
</tr>
<tr>
<td>D Fourth class (quite unsuitable for agriculture)</td>
<td>7,021</td>
<td>38.2</td>
</tr>
<tr>
<td>Total</td>
<td>18,379</td>
<td>100.0</td>
</tr>
</tbody>
</table>

a Including pasture


TABLE 2: LAND CAPABILITY FOR AGRICULTURE AND FORESTRY

<table>
<thead>
<tr>
<th>Land class</th>
<th>Area</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td></td>
</tr>
<tr>
<td>I Suitable for arable agriculture</td>
<td>2,934</td>
<td>16.0</td>
</tr>
<tr>
<td>II Unsuitable for arable. Suitable for tree crops or grazing</td>
<td>7,865</td>
<td>42.8</td>
</tr>
<tr>
<td>III Marginal grazing or forestrya</td>
<td>6,523</td>
<td>35.4</td>
</tr>
<tr>
<td>IV Unsuitable</td>
<td>1,057</td>
<td>5.8</td>
</tr>
<tr>
<td>Total</td>
<td>18,379</td>
<td>100.0</td>
</tr>
</tbody>
</table>

a Includes managed use of native forest

Source: Land Use Section, MAF.
TABLE 3: LAND CAPABILITY: MAJOR ISLANDS
(in km²)

<table>
<thead>
<tr>
<th>Land class</th>
<th>Viti Levu Area</th>
<th>%</th>
<th>Vanua Levu Area</th>
<th>%</th>
<th>Other islands Area</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1,667</td>
<td>15.7</td>
<td>941</td>
<td>16.2</td>
<td>326</td>
<td>16.9</td>
</tr>
<tr>
<td>II</td>
<td>4,324</td>
<td>40.6</td>
<td>2,686</td>
<td>46.3</td>
<td>854</td>
<td>44.3</td>
</tr>
<tr>
<td>III</td>
<td>4,112</td>
<td>38.6</td>
<td>1,877</td>
<td>32.3</td>
<td>533</td>
<td>27.6</td>
</tr>
<tr>
<td>IV</td>
<td>540</td>
<td>5.1</td>
<td>303</td>
<td>5.2</td>
<td>215</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Total 10,643 5,807 1,928

Source: Land Use Section, MAF.

steep or has such poor soils that it is suitable only for watershed conservation, forestry or carefully controlled extensive grazing. It is important to recognise that the above tables may exaggerate the area which it will be practical to use for agriculture or forestry. First, no allowance is made for the areas needed for housing, roads, and other non-agricultural uses. Second, a considerable amount of the potentially usable land is located in small scattered pockets, difficult of access by land or sea, and therefore unlikely to be used effectively for commercial farming in the foreseeable future, even though it may be usable by an isolated, and dominantly subsistence dependent village.

Third, some trends in agriculture result in less, rather than more, land being appraised as suitable for agriculture. For example, shifting cultivation for subsistence purposes can be carried out on steep slopes provided cultivation periods are short and bush fallow periods are long. As the proportion of cash crops increases, the area each household needs under crop increases, so the fallow is often shortened and the cultivation period lengthened. Fertility and slope stability are not maintained and land which formerly supported subsistence-only cultivation can no longer be considered 'usable' for the new forms of agricultural systems. Furthermore, hand cultivation allows greater use of steeper slopes than mechanical tillage and as agriculture becomes more dependent on mechanical (or even animal) power, the area
assessed as 'potentially arable' may have to be reduced. Individual farmers and farm workers may well be better off as a result of the availability of mechanical power but this does not alter the fact that fewer may be supported per unit area of land. Thus, the figures in Tables 1 and 2 need to be interpreted with some care as it is unlikely that all the land classed as 'usable' could actually be used economically for agriculture or forestry, and with technological and economic change the proportion may well decrease.

**Slope and the erosion hazard**

One of the key constraints on land use is angle of slope and this factor becomes more critical as hand cultivation gives way to cultivation with animal or mechanised power. Root crops and some shrub or tree crops planted with digging sticks can be grown even on slopes of over 45° and sites have been surveyed where this occurs in Fiji, despite the severe erosion risk. The Fiji Sugar Corporation (FSC) considers that sugar cane should not be grown on slopes over 10°, though steeper slopes are used and the Native Land Trust Board (NLTB) does lease steeper land than this for sugar cane farms, and the FSC has awarded cane contracts despite its own guidelines. The risks in this policy are serious. Nevertheless, the greater part of Fiji's land is too steep for permanent cultivation with 67 per cent of the area having slopes of over 18°. Table 4 shows the proportions for the larger islands, and indicates clearly the restrictions on agricultural use.

Fiji has relatively high annual rainfall, even in the dry zone, and given that 67 per cent of the country has slopes of over 18° the erosion risk is high. High intensity rains are quite frequent and coastal areas are likely to receive a fall of 10 mm of rain in one hour once in five years (Ward, 1965:52). Rainfall erosivity levels are high by world standards with Erosion Index figures in Fiji of 700-800 units, and over 1,000 in some areas, compared with a range of 200-400 in major agricultural areas elsewhere. Thus the risks of cultivating or overgrazing steeper land are high in Fiji (Swartz, 1974) and conservation measures are essential for long-term use of such land. Given that much of any future expansion of arable farming will have to take place on sloping land, there is need for stricter use of soil conservation measures than has occurred in the past few decades.
TABLE 4: 'VERY STEEP TO MOUNTAINOUS LAND'
over 18° slope

<table>
<thead>
<tr>
<th>Island</th>
<th>% of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viti Levu</td>
<td>67</td>
</tr>
<tr>
<td>Vanua Levu</td>
<td>72</td>
</tr>
<tr>
<td>Taveuni</td>
<td>49</td>
</tr>
<tr>
<td>Kadavu</td>
<td>78</td>
</tr>
<tr>
<td>Beqa</td>
<td>70</td>
</tr>
<tr>
<td>Ovalau</td>
<td>66</td>
</tr>
<tr>
<td>Gau</td>
<td>51</td>
</tr>
<tr>
<td>Koro</td>
<td>77</td>
</tr>
<tr>
<td>Vanua Balavu</td>
<td>68</td>
</tr>
<tr>
<td>Lakeba</td>
<td>40</td>
</tr>
<tr>
<td>Moala</td>
<td>70</td>
</tr>
</tbody>
</table>

Source: Land Use Section, MAF. Based on Twyford and Wright.

Distribution of land classes

As noted above, Fiji is well served for data on land quality. The soil maps of the Twyford and Wright survey are available at a scale of 1:126,720 (two miles to one inch) while the Land Use Section, MAF, have transferred land quality data for the areas unused in 1978 to maps at 1:50,000. For broad strategy planning it would be useful to have these data generalised to a scale of 1:250,000 so that Viti Levu and Vanua Levu could each be shown on one sheet. The comparable data from the Twyford and Wright Survey have been generalised and previously published, though at a much smaller map scale (Ward, 1965). These maps are reproduced here as Figures 1 to 3.

Class Ai land, which is suitable for arable crop farming, is generally restricted to the delta plains and alluvial flats of the major river systems and the narrow terraces along the stream and river valleys (Figure 1). A high proportion of this land, and the Class Aii land suitable for pastoral farming, is already in use. Furthermore, in the past 25 years the introduction of sugar cane varieties which have been bred for poorer soils has allowed cane cultivation to expand onto land which previously would have been regarded as suitable for
Soils suited to permanent agriculture without improvement

- Class A1 - suited to crop farming
- Class A11 - suited to pastoral farming or afforestation

Figure 1: Class A land.
The data on which Table 7 is based may be rearranged to show the distribution of land classes within each category of tenure. This is done in Table 8. It is important to stress that the proportions shown in Tables 7 and 8 are derived from comparison of map data at a scale of 1:250,000 where 1 cm represents 2.5 km, and thus may be taken only as approximations. Nevertheless they appear to be the best figures available. In the mid-1970s an attempt to provide estimates of a similar type was made by the Land Use Section, MAF, and the results are given in Table 9. It is not clear how the estimates were made and the resulting figures appear to understate by about half the area of Freehold Land in the better classes. In the case of Crown Land the understatement appears greater. In the case of Native Land the area of better land seems overstated, and the area of poor land (classes VIa and VIb) understated. Because of doubts about the figures quoted in Table 9, more reliance is placed on the proportions given in Tables 7 and 8.

Although Freehold and Crown Land account for only 16.8 per cent of the three islands, they included 35.6 per cent of the first class potential arable land and relatively little of the poorest land. Only 15.4 per cent of the unleased Native Land in 1959 was Class Ai or Aii land. Most (85.3 per cent) of the land which Twyford and Wright suggest is 'quite unsuitable for agriculture' (Class D) was unleased Native Land in 1959. It is sometimes asserted that the Native Reserves lock up large areas of high-quality land which might be used more efficiently if available for leasing more freely. Table 9 indicates that about 60 per cent of the Reserve land is suitable for agricultural or pastoral use — and this is probably a considerable overestimate. Less than one third of Fiji is in Reserves (Table 5). Given that a considerable proportion of the Class A land shown as 'unleased Native Land' in Table 7 is not in Reserve, and much of the Reserves are in use already, the assertion that the Reserves lock up large areas of unused good land is not strongly supported. Even if all Reserves were revoked, no great area of accessible, high-quality, vacant land would become available for use by non-Fijians.

Tables 7 and 8 suggest that unleased Native Land does include significant areas of usable land. How much of this is now in use is unknown. Unfortunately no consolidated set of maps exists showing what Native Land is actually leased. Maps are held at the district office of the NLTB but they are not necessarily up to date and they are not prepared on a scale
## TABLE 9: LAND TENURE AND LAND QUALITY

<table>
<thead>
<tr>
<th>Land suitable for:</th>
<th>Freehold</th>
<th>Crown land</th>
<th>Native Reserve</th>
<th>Native non-Reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Arable land Class I</td>
<td>238.77</td>
<td>80.94</td>
<td>1,096.72</td>
<td>903.81</td>
</tr>
<tr>
<td>II Arable land Class II</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>III Rice/dairy land</td>
<td>358.15</td>
<td>161.88</td>
<td>462.57</td>
<td>396.65</td>
</tr>
<tr>
<td>IV Tree crop/pasture</td>
<td>596.92</td>
<td>566.57</td>
<td>1,618.78</td>
<td>2,326.82</td>
</tr>
<tr>
<td>V Grazing (beef)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV+V Tree crops/pasture</td>
<td>955.07</td>
<td>728.45</td>
<td>2,081.35</td>
<td>2,723.47</td>
</tr>
<tr>
<td>VIa Largely forestry</td>
<td>297.01</td>
<td>646.22</td>
<td>1,632.74</td>
<td>5,915.66</td>
</tr>
<tr>
<td>VIb Useless land</td>
<td></td>
<td>161.88</td>
<td>283.29</td>
<td>649.11</td>
</tr>
<tr>
<td>Total</td>
<td>1,490.85</td>
<td>1,617.48</td>
<td>5,094.10</td>
<td>10,192.05</td>
</tr>
</tbody>
</table>

a Excludes 628.09 sq km of reserves in Eastern Division for which data not available.

Source: Land Use Section, MAF.

which would make them directly compatible and comparable with the maps showing other forms of tenure (e.g. the 1968 DOS 1:50,000 series) or land quality. Until comparable scale data are available a very serious gap exists in the information needed for land use planning.

Expansion of leasehold land

Despite the absence of map information on Native Lease land, some general comments can be made. Since the preparation of the 1959 data given in Tables 7 and 8, the area
of land under Native Leases has increased dramatically to about one quarter of the country. The rapid expansion of pine forest areas, of pastoral farming, and of sugar cane growing (including the Seaqaqa scheme) accounts for much of this. Figures 4 and 5 (below) indicate the expansion of the area 'in use' between 1958 and 1978 and the greater part of this has taken place on land now held under leasehold. The extent to which this form of expansion of land occupation and use can continue will be discussed below. Table 10 sets out the number of NLTB leases current in October 1982.

TABLE 10: NUMBER OF NATIVE LAND LEASES, OCTOBER 1982

<table>
<thead>
<tr>
<th>Category</th>
<th>To Fijians</th>
<th>To Non-Fijians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural leases</td>
<td>2,988</td>
<td>11,335</td>
</tr>
<tr>
<td>Class J leases b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forestry leases</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Hotel/resort leases</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Commercial/industrial leases</td>
<td></td>
<td>1,008</td>
</tr>
<tr>
<td>Other leases (residential, government, church, etc.)</td>
<td>4,522</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14,323a</strong></td>
<td><strong>4,083</strong></td>
</tr>
</tbody>
</table>

| **Total**                             | **24,024** |

a Of these 13,650 are for arable crops, gardening or tree crops, 622 for grazing, and 51 for dairying.

b Leases of Reserve land to Fijians. Many will be used for agriculture.

Source: NLTB.

Official NLTB statistics suggest that the number of leases has been fairly stable for some years but this is misleading as a considerable number of leases, perhaps as many as 3,000, have lapsed through non-payment of rent and have been removed from the lists. Most of these are in coconut areas and were first used by individuals taking leases from their own mataqali as a requirement for assistance under the coconut rehabilitation program of the 1960s. Once the rehabilitation grants had been received, and spent, it is not
Figure 4: Viti Levu - in use/committed land.
Brought into use between 1958-1978
'Committed' to use in 1978
In use in 1958
Not in use or 'committed'

0 10 20 30 kilometres

SOURCE: Based on 1958 and 1978 surveys (see text). F.P.C., M.A.F., and Department of Forests data

Figure 5: Vanua Levu - in use/committed land
surprising that the lessees saw little point in paying rent to the NLTB and their own kin group when, under customary tenure, the coconut palms themselves guaranteed continued right of use with or without rental payment. In these cases, the reversion from leasehold to customary tenure does not imply any actual change in land use, or in usufruct. The cancellation and removal of an unknown number of leases from the lists means that, with the statistics available at present, it is not possible to say how many new leasehold farms have been occupied in the past decade.

Consequences of the tenure system

It was noted earlier that the type of tenure under which a parcel of land is held can be a determinant of who may use it, and its possible use. Native Reserve cannot be leased to a non-Fijian although Fijians, whether or not members of the owning group, can obtain 'Class J' leases within Reserves. Like all other leases of Native Land, the Class J leases must be obtained from the NLTB acting on behalf of the owners. Freehold Land may be held by members of any ethnic community but the limited extent of such land often means that prices are high as the market is restricted. In the case of coconut estate land recently on the market it seemed that asking prices were valuing it in terms of potential use for resorts rather than as agricultural land. In such cases, and in the vicinity of urban areas, land occasionally lies idle as owners prefer to speculate on the possibility of making a sale for non-farm purposes rather than tying up the land under an agricultural lease for a number of years. Crown Land can also be leased in some circumstances and such leases can be held by non-Fijians as well as ethnic Fijians.

In the past two decades changes in the legal arrangements for term of lease and conditions of renewal have meant that reasonable security is usually available to farmers on leaseholds and some of the difficulties experienced by farmers on annual tenancies in the 1950s and early 1960s have been alleviated. Nevertheless, the fact remains that the open market operates in respect of less than one-tenth of the land area.

Where Native Land is leased, the rents are distributed to clan (mataqali) members (after the NLTB has deducted a fee of 25 per cent) on a basis which reflects socio-political status within the mataqali. For example, the three individuals who
are chiefs of the mataqali and the two larger groups which encompass it, share 22.5 per cent of the rents and the other members share the remaining 52.5 per cent. As Lloyd points out, this pattern of distribution has sustained and reinforced 'the political role of the chiefs' and 'had a disastrous effect on the economic attitude of the mataqali owners...[and] served as a disincentive to Fijian development of the lands they own'. Furthermore, when the 52.5 per cent 'was divided equally amongst them it amounted to a mere pittance and was certainly not sufficient to induce them to do other than spend it on consumer goods' (Lloyd, 1982:221). Clearly, there is a great deal of inequality in access to land, the distribution of monetary benefits which accrue from it, and marked segmentation of the land market. Because of the socio-political power of chiefs it would be very difficult to bring about any far-reaching change in the basic structures of the tenure system.

There is evidence, however, that some of the most important changes now taking place in land tenure in Fiji are occurring within village communities in relation to the use of Native Land. As Table 10 shows, over 7,000 leases are held by Fijians and this suggests that about 20 per cent of Fijian farmers (excluding farm workers) are farming outside the village system. The remainder use land, either reserved or unreserved, under customary forms of tenure and rights of use. As long as the majority of Fijians have the opportunity to use customary land without rental payments for subsistence cropping, and for some cash cropping, then village communities will be able to absorb some additional population in the largely non-monetary economy, and provide a security net for those unable to find urban or other wage employment. A number of trends suggest that this condition will not be maintained for much longer.

Land is not distributed with any degree of equality between owning groups. In part, this simply reflects the inequalities existing at the time of survey and registration of Native Land. In the decades since mataqali (or, in some areas, extended families or i tokatoka) holdings were registered, the differential growth, or decline, of owning groups has led to greater divergence between the size of these groups and the areas of land held. Thus some groups with few members now hold large areas while others, with many members, have little land. Where traditional systems of allocating land for use applied, such divergence in legal holdings was of limited significance. Members of mataqali with little land,
or whose holdings were located at some distance from the village, were able to use the land of more fortunately placed groups. Recompense was made through customary processes, was non-monetary, and usually not very demanding. In areas with little pressure on land no significant material recompense was necessary.

Changes on mataqali land

Studies in the late 1950s showed that in villages which were close to urban areas or were otherwise firmly locked into commercial farming or other monetary activities, land owners were reluctant to allow other members of their own village who were short of land to have access to garden land through traditional mechanisms. In such areas the monetary value of land, realisable by leasing or through cash cropping, was fully recognised and 'lending' land to members of other mataqali was rarely practised (e.g. see Ward, 1960 and 1965). Elsewhere this was not the case and many Fijian farmers planted freely on the land of other mataqali. For example, along the Wainibuka valley many of the villagers were members of mataqali who had left their own lands in the hills to east and west of the valley and moved, by customary agreement, to live close to the river (and, later, the road) and use the land of other villagers.

Table 11 shows, for four villages, the proportion of gardens which, in 1958-60 were planted on land other than that of the planter's own mataqali. Comparable figures are given for 1983 for three of the villages.

Reluctance to allow non-mataqali members to use land is now much more widespread. Table 11 shows how the relationship between ownership and use is now much closer in two of the three sample villages which have been resurveyed. Confirmatory evidence, though not of a quantitative form, is available from other surveys carried out for the Fiji Employment and Development Mission in 1982-83. This evidence also suggests that through much of central Viti Levu the level of intravillage disputes over land has risen in the last decade.

There are several causes for these tendencies. First, the introduction of cash crops alongside subsistence crops often increases the area planted per head and thus reduces the
### TABLE 11: GARDEN AND LAND OWNERSHIP

<table>
<thead>
<tr>
<th>Village</th>
<th>Province</th>
<th>% of gardens not on planter's land (year)</th>
<th>% of gardens not on planter's land in 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliadrau</td>
<td>Namosi</td>
<td>76 (1958)</td>
<td>67</td>
</tr>
<tr>
<td>Sote</td>
<td>Tailevu</td>
<td>74 (1959)</td>
<td>37</td>
</tr>
<tr>
<td>Sasa</td>
<td>Macuata</td>
<td>32 (1960)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Nabudrau</td>
<td>Rewa</td>
<td>88 (1959)</td>
<td>89</td>
</tr>
</tbody>
</table>

Note: No commercial pressure on Nabudrau land; increased pressure at Sote and, to lesser extent, Saliadrau; considerable emphasis in Sasa on commercial copra production.

a In the case of Saliadrau, villagers make much use of land belonging to a related mataqali, most of whose members live in a nearby village. If this area is excluded and only the land of the six Saliadrau mataqali is considered, the figures are 69 per cent for 1958 and 46 per cent for 1983.

Source: Field surveys: for 1958-60, see Ward, 1965. 1983 figures are provisional.

Area surplus to immediate requirements of the owning mataqali. Second, the fact that several of the key cash crops are long-term tree crops means that land can be locked up in one individual's or family's hands for much longer periods than with most food (mainly root) crops. Owners are reluctant to allow their land to be committed to others for long periods, and thus will often decline to lend land except for short-term crops. Third, the increasing monetisation of other transactions within village communities is reducing scope for reciprocity by non-monetary means and this reduces the chances of being 'repaid' through customary mechanisms for land which has been informally 'lent'. Fourth, the monetary value land has acquired makes owners more reluctant to lend land, and thus give up potential income. Fifth, the fencing of considerable areas for cattle grazing has restricted the area available for food crops. Where the fenced pasture occupies alluvial flats, food gardens have been forced onto poorer, steeper and less accessible land. Conversion of land to pasture tends to commit large areas to use by individuals.
Several of the above processes lead to increasing areas of land being committed for long periods to use by individuals and their immediate families. Twenty-five years ago, very few Fijian farmers used more than four ha of land. Today, individual cattle holdings of twenty ha, and leases for other purposes of eight to twelve ha are common. The average farm on the Yalavou project in southwest Viti Levu is about 200 ha. Even where formal leases have not been issued there are signs of larger individual holdings emerging. The corollary is that the area available for the increasing number of other Fijian villagers is declining. In a number of areas mataqali with little land in relation to their population are finding it difficult to supplement their holdings through customary arrangements. It seems that real land deprivation does exist, and will increase among Fijian people. In the last decade, many villages which were formerly declining in population have experienced an increase. The semi-subsistence system has absorbed extra people and helped reduce pressure for urban employment. The current trends in the use and allocation of land still held under customary systems suggest that village communities will not be able to continue to absorb growing numbers of people in the semi-subsistence economy beyond the next five to ten years unless major changes in land use practices occur.

C. CHANGES IN LAND USE

Sources on land-use change

Two sources of information are available for assessing change in the area of land which has been in economic use over the last 25 years. Agricultural censuses conducted in 1968 and 1978 provide statistics on the areas under each of a range of crops or types of land use. Unfortunately the censuses did not use the same definitions and methods of sampling were not identical. Therefore it is difficult to compare the two censuses and be confident that changes in the statistics represent true trends.

Table 12 is presented here more 'for the record' than for any real practical purpose in the present context. It is impossible to accept that the area under crops actually fell between 1968 and 1978 by 14.7 per cent. The area of sugar cane harvested is known, from Fiji Sugar Corporation sources, to have increased from 45,999 ha in 1970 to 54,476 ha in 1978
TABLE 12: AREAS OF MAJOR CROPS, 1968 AND 1978

<table>
<thead>
<tr>
<th>Crop</th>
<th>1968 ha</th>
<th>1978 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar cane</td>
<td>53,175</td>
<td>54,518</td>
</tr>
<tr>
<td>Coconuts</td>
<td>72,295</td>
<td>66,630</td>
</tr>
<tr>
<td>Bananas and Vudi</td>
<td>6,656</td>
<td>216</td>
</tr>
<tr>
<td>Taro</td>
<td>4,685</td>
<td>2,937</td>
</tr>
<tr>
<td>Cassava</td>
<td>6,906</td>
<td>6,934</td>
</tr>
<tr>
<td>Yaqona</td>
<td>3,085</td>
<td>2,463</td>
</tr>
<tr>
<td>Rice</td>
<td>9,860</td>
<td>9,896</td>
</tr>
<tr>
<td>Maize</td>
<td>1,520</td>
<td>633</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>789</td>
<td>329</td>
</tr>
<tr>
<td>Sorghum</td>
<td>418</td>
<td>177</td>
</tr>
<tr>
<td>Ginger</td>
<td>34</td>
<td>123</td>
</tr>
<tr>
<td>Yams</td>
<td>1,468</td>
<td>683</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>647</td>
<td>283</td>
</tr>
<tr>
<td>Cocoa</td>
<td>2,190</td>
<td>459</td>
</tr>
<tr>
<td>Tobacco</td>
<td>418</td>
<td>152</td>
</tr>
<tr>
<td>Beans</td>
<td>655</td>
<td>394</td>
</tr>
<tr>
<td>Pigeon peas</td>
<td>696</td>
<td>371</td>
</tr>
<tr>
<td><strong>Total area cultivated</strong></td>
<td>146,434</td>
<td>124,898</td>
</tr>
</tbody>
</table>

a Includes minor crops not listed above. Excludes double cropping.


and as not all the area planted in cane is harvested in any one year, the area carrying cane in 1978 must have been higher than that given in Table 12. The area under cane contracts rose from 61,983 ha in 1968 to 76,321 ha in 1978 and to 96,965 ha in 1981. The coconut figures may be questioned and other evidence suggests that the areas under yaqona increased rather than fell. The 1978 agricultural census report itself suggests that the cassava area recorded is too low and general observation certainly supports this view. The decline in the area under pigeon peas, groundnuts, beans and maize is in keeping with the known expansion of sugar cane and the replacement of these crops by cane. This has occurred both on long-established cane farms, which often ceased to grow minor...
crops when sugar prices were high in the mid-1970s, and on mixed-crop farms which converted to cane.

The 1978 agricultural census suggests that 3,197.9 km² were 'in farms' and this represents 17.4 per cent of Fiji's total land area. On Viti Levu (including Beqa and Yasawas) the proportion was 15 per cent. However, this figure does not include land under pasture. The 1968 census reported 370.5 km² under pasture, of which 283.8 were in Viti Levu. Since then there has been a substantial increase in the pasture area and the 1978 land use survey maps show 835.9 km² under pasture in Viti Levu alone. The agricultural census data take no account of land under afforestation (365 km² in Viti Levu in December 1981), roads or urban areas.

A second set of sources, the land use surveys of 1958, 1968 and 1978, provides an alternative means of assessing change in land use and, because the data are location specific, it is possible to relate the areas used and unused to the distribution of land of different quality categories. Three land use surveys have been made covering most of the country. All were based on aerial photographs, supplemented by ground checks, and all were prepared at the same scale of 1:50,000.

The surveys were:

1958: conducted by R.G. Ward. Unpublished but manuscript maps held by author. Simplified version published at 1:250,000 by Directorate of Overseas Surveys as DOS (L.U.) 3022 and available from Department of Lands, Suva.

1968: conducted by Directorate of Overseas Surveys (DOS). Transparencies held by Department of Lands, Suva. The 1958 and 1968 surveys used the same base maps (1:50,000 topographic series).

1978: conducted by Land Use Section, MAF, with Vanua Levu on 1:50,000 topographic series base maps (manuscript originals held by Land Use Section, Labasa) and Viti Levu on provincial maps (transparencies held by Land Use Section, Koronivia and Lautoka).
In using the results of these surveys it is important to realise that where land is shown as being in use for sugar cane, for example, this will encompass some unplanted areas within farms, areas used for farm housing and that occupied by adjacent roads and the like.

Table 13 provides estimates of the proportion of land 'in use' in Viti Levu, Vanua Levu and Taveuni in 1958 and 1978. The estimates are derived from maps at a scale of 1:250,000. These maps have been further reduced and are provided here as Figures 4 and 5.

The expansion of land in use

In Viti Levu the area of land 'in use' increased by 233 per cent between 1958 and 1978 (and by 283 per cent if 'committed land' is included) while the rural population of the island increased by 31 per cent between 1958 and 1976. The comparable figures for increases in land in use for Vanua Levu and Taveuni are 254 per cent and 51 per cent respectively, with rural population increases 1956-76 of 51.4 and 30.9 per cent. Expansion of the area 'in use' has continued since 1978. The fact that the increase in area 'in use' has not been matched by comparable increases in rural population highlights some key characteristics of land use development over the past quarter century.

By 1958 the greater part of the Class A and B land suitable for arable farming was already occupied, primarily by sugar cane and coconut farms (cf. Figures 1 and 2 with 4 and 5). Cane farms on the best land (Class A) in the late 1950s could support population densities of about 270/km². On marginal land the figure was closer to 40/km² (Ward, 1965:152). The dramatic increase in the area of land under cane which took place in the latter 1970s mainly occurred on Class B, or even Class C land. At Seaqaqa sugar cane farms average twenty ha compared with about four ha on the best land of the older cane areas. In other words, most of the expansion of land use since 1958 has been onto second class (Class B) and marginal land (Class C) which cannot support densities comparable to those on land already occupied by 1958.
TABLE 13: PROPORTION OF LAND IN USE
% of total area of island

<table>
<thead>
<tr>
<th>Island</th>
<th>(1) In use in 1958</th>
<th>(2) Put into use 1958-1978</th>
<th>(3) In use in 1978 (1)+(2)</th>
<th>(4) 'Committed' in c.1981a (3)+(4)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viti Levu</td>
<td>10.4</td>
<td>24.3</td>
<td>34.7</td>
<td>5.2</td>
<td>39.9</td>
</tr>
<tr>
<td>Vanua Levu</td>
<td>7.2</td>
<td>18.3</td>
<td>25.5</td>
<td>7.1</td>
<td>32.6</td>
</tr>
<tr>
<td>Taveuni</td>
<td>22.9</td>
<td>11.7</td>
<td>34.6</td>
<td>36.3</td>
<td>70.9</td>
</tr>
</tbody>
</table>

'a Committed' land includes that which lies within the boundaries of major development projects such as Yalavou, Seaqqa, or Fiji Pine Commission leases, but which is as yet undeveloped. The absence of maps showing land leased by the NLTB means that not all 'committed' land can be identified and thus the figures given are underestimates. Crown Tiri (mangrove) Land reserves are included in the 'committed' category. In Taveuni it includes former Forest Reserve, now called Nature Reserve.

Sources: Land Use Surveys 1958 (R.G. Ward) and 1978 (Land Use Section, MAF) and data from Fiji Pine Commission and Department of Forests.

In the case of coconut farming the relatively low returns per hectare will rarely support population densities of over 40/km², even on the best quality land (Ward, 1965:162), unless the tree crop systems are intensified by intercropping (e.g. with cocoa) or inter-grazing. A great deal of the expansion of land use has been through the establishment of the Fiji Pine Commission's pine plantations and the Department of Forestry's hardwood and other plantations. Both developments are, in the main, on lower quality land and, as extensive forms of land use, are unlikely to support high densities of rural population. They are likely to provide higher cash incomes to the existing village population.

The major pastoral settlement scheme at Yalavou provides about 100 farms averaging approximately 240 ha each and, apart from the farm families, is likely to generate about 50 additional rural jobs. Therefore, schemes like this are
unlikely to support population densities of more than about four/km². Farms on cattle schemes in the wet zone are generally smaller, but even projects such as the Naitutu-Sote Beef Scheme, where holdings average approximately 35 ha, are unlikely to support more than about 30/km².

Thus, the general tendency has been for new land development to be for less intensive farming matching the generally lower quality of the unused land compared with that which was in use in the late 1950s. This is clear from Tables 8 and 9, and from a comparison of Figures 1 to 3 with Figures 4 and 5. It would be unrealistic to expect most of Fiji's currently unused but usable land to support rural population densities of an order higher than between 20 and 40/km².

**Land needs, cash crops and material welfare**

In the case of Native Land occupied under customary tenure and used for mixed subsistence-cash crop agriculture, the assessment of supportable population is much more complex. Under a purely subsistence system, and on good quality land, a predominantly root crop agricultural system incorporating adequate fallow periods might support population densities of the order of 100 to 150/km² if no land is needed for forestry, firewood or hunting areas. In fact, densities of this level will be achieved rarely because of variable land quality. Nevertheless, the high yields attainable from root crops for relatively low labour inputs make this a theoretical possibility if there is little need to purchase food and consumer goods. Most of the cash crops grown in Fiji do not yield comparable returns in terms of food energy purchasable from the output per hectare (e.g. Clark, 1977). When cash crops are added to, or replace, the subsistence crops the land requirement per family increases. The increase is obviously greater with conversion to low intensity forms of commercial farming such as grazing or copra production (c.f. Bayliss-Smith, 1980). The type of change which is occurring is illustrated by the increase in the area used per head in three villages surveyed in 1958/59 and again in 1983. In the village of Nabudrau no cash crops were grown in either year and the area of gardens planted per head did not change from 1959 to 1983 (1) (Table 14). In Saliadrau, the area of land in use per head, including pasture, increased by 80 per cent between 1958 and 1983 and in Sote the area per head increased by 125 per cent.
TABLE 14: AREA USED\textsuperscript{a} PER RESIDENT PERSON

<table>
<thead>
<tr>
<th></th>
<th>1958/59 ha/person</th>
<th>1983 ha/person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nabudrau</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Saliadrau</td>
<td>0.1</td>
<td>0.18</td>
</tr>
<tr>
<td>Sote</td>
<td>0.16</td>
<td>0.36</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Includes land planted in crops or in fenced pasture. Does not include fallow land or mahogany plantations (Saliadrau), or leases held by Sote people under the Naitutu - Sote Beef Scheme, or leased to Department of Forests for plantations.

Source: Field surveys.

The increase in area used per head is linked to rising levels of material welfare in the villages and the rising cash incomes of Saliadrau and Sote have led to construction of houses built of sawn timber or concrete blocks, and purchase of furnishings, vehicles and a wide range of consumer goods. In the case of Nabudrau, periods of work in towns rather than cash cropping have provided the cash to purchase consumer goods or building materials. It is important to recall that in addition to an increase in area of land used, a change from subsistence to cash cropping may result in a reduction of the proportion of any area which can be considered usable. Thus pressure on land is increased from two directions.

Given the great variation in rates of population change within villages, the areas and quality of land available, the degree of commitment to either subsistence or commercial farming and the ease of access to non-agricultural employment, it is not possible to give any accurate assessment of how long village communities will be able to continue to absorb more people at acceptable levels of living. The answer will obviously differ greatly from region to region and be influenced by local factors, and depend on changing attitudes towards what is an 'acceptable level of living'.

A general indication of the levels of rural population density which might ultimately be reached in Fiji as agriculture becomes more commercially oriented is provided by
TABLE 15: RECOMMENDED BLOCK SIZES IN AGRICULTURAL SUBDIVISIONS

Figures in brackets give population densities per km²

<table>
<thead>
<tr>
<th></th>
<th>Suitable land</th>
<th>Marginal land</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha (pers/km²)</td>
<td>ha (pers/km²)</td>
</tr>
<tr>
<td>Sugar cane</td>
<td>6 (120)</td>
<td>10 (72)</td>
</tr>
<tr>
<td>Other arable</td>
<td>4 (180)</td>
<td>8 (90)</td>
</tr>
<tr>
<td>Coconuts</td>
<td>8 (90)</td>
<td>12 (60)</td>
</tr>
<tr>
<td>Beef cattle</td>
<td>80 (9)</td>
<td>160 (5)</td>
</tr>
<tr>
<td>Dairy cattle</td>
<td>20 (36)</td>
<td>60 (12)</td>
</tr>
</tbody>
</table>

These density figures assume 1 additional rural job for every 2 farms; 1 source of income per family; average family size of 6, 20 per cent of land area unusable or used for non-farm purposes, e.g. roads, housing, fuelwood, reserves, etc.

Source: Crop areas based on data from Land Use Section, MAF.

considering the size of holdings which are judged to be 'economic' under different crops or types of farming.

The figures given in Table 15 should be taken only as a guide. Nevertheless, the conclusion which must be drawn is that as more Fijian farmers commit themselves to predominantly commercial farming the number of people who will be directly supported in rural areas must be expected to remain static, or even decline, despite the use of larger areas of land. Furthermore, when the quality of the land which is at present unused in Viti Levu and Vanua Levu is examined, it is clear that new subdivisions or other forms of land occupation will cater for relatively small numbers of people on new farms. The questions which cannot be answered with any certainty are how many more people can the mixed subsistence-cash crop system absorb, and for how long will this system provide security for those unable to find wage employment elsewhere? The general trends in land use and land tenure suggest that it would be unwise to count on village agricultural systems playing the role they have in the late 1970s and early 1980s for more than another decade. All the trends and most of the exhortations are towards greater commercialisation of life and
there seems little likelihood that this will change. If these trends and exhortations continue, and if the current aspirations of people are maintained, then the shrinking reserve of unused land, the expanding needs per head and low quality of most unused land will choke off the capacity of rural villages to serve as a source of social security for Fijians.

D. THE UNUSED LAND

The quality of unused land

Figures 6 to 9 show the areas of land in Viti Levu and Vanua Levu/Taveuni which are suitable for some form of agricultural or grazing use (Class A, B and C - Table 1 and Figures 1 and 2), but which were not in use or not 'committed' in about 1978. Thus, the areas shaded on these maps represent the blank areas on Figures 4 and 5, less the Class D land shown in Figure 3. Figures 6 and 7 indicate that the greater part of the unused or uncommitted land is of Class C quality with soils suited to permanent agriculture or pastoral use only after major improvements. These improvements include major soil conservation measures on the steeper land, major drainage schemes on poorly drained areas or heavy regular fertilizer applications on infertile soils. The implication in terms of support of population is that future land use will be extensive on such areas with low population densities. Table 16 gives the approximate proportions of the unused but usable land in different classes.

In western Viti Levu the areas of unused land in the upper headwaters of the Ba River and between the Sigatoka Valley and the Nausori Highlands are likely to be most suited to extensive grazing or pine afforestation, although distance to processing plants may be a problem in the latter case. Figure 8 shows much of this land is in Native Reserve. The unused land of Seru and Namosi Provinces is generally hilly and the cost of providing access will be relatively high. There may be prospects for tree crops, grazing, and perhaps further planting of hardwoods on land which is generally not under Native Reserve.
Class Ai - suitable for pastoral farming without improvement
Classes Ai and B - Ai suitable for crop farming without improvement and B suitable for crops or pasture after minor improvement
Class C - usable after major improvement

SOURCE: Based on Figures 1-4

Figure 6: Viti Levu - unused/uncommitted land (c. 1978-80)
Class Ai - suitable for pastoral farming without improvement
Classes Ai and B - Ai suitable for crop farming without improvement
and B suitable for crops or pasture after minor improvement
Class C - usable after major improvement

Figure 7: Vanua Levu - unused/uncommitted land (c. 1978-80)
TABLE 16: APPROXIMATE PERCENTAGE OF USABLE
UNUSED LAND BY LAND CLASS

<table>
<thead>
<tr>
<th></th>
<th>Viti Levu</th>
<th>Vanua Levu</th>
<th>Taveuni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Ai</td>
<td>17</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Class Ai and B</td>
<td>21</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Class C</td>
<td>62</td>
<td>72</td>
<td>83</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: See Table 1 for land classes. Class Ai is suited to permanent crops without improvement; Aii is suited to permanent pastoral farming or afforestation without improvement; Class B is suited to permanent crop farming or pastoral farming after minor improvements; Class C is suited to permanent agricultural, pastoral or afforestation use only after major improvements.

Unused land of higher quality

The best prospects for expansion of agriculture and pastoral farming in Viti Levu are in Tailevu and the eastern part of Naitasiri and there is more unused Class B land here than in other parts of the island. However, it must be noted that in this area there has been very rapid expansion of pasture, and of crop production (e.g. ginger) and cocoa planting in the period since 1978. This expansion is not allowed for in Figures 4, 6 and 8, and thus part of the area shown as unused or uncommitted in Figures 6 and 8 has, in fact, already been put into use. The road system of this area is already relatively well developed and a great deal of agricultural expansion has taken place outside formal subdivisions, mostly by Fijians. Proximity to the market of Suva has been, and will continue to be, a major advantage for this area.

The same applies to the lower Rewa delta where areas of Class Ai and B land lie unused but where a combination of factors inhibit use. Much of this land does not have road
access to Suva because of absence of bridges over the Rewa tributaries. The cost of boat transport to Suva, or to the roads at Wainibokasi or Naqali is high and inhibits production of root crops. Some drainage provision would be necessary. Much of the area is Native Reserve, but registered holdings are small and fragmented. The alternative to farming is employment in Suva and people from this area of Noco, Nakelo and Rewa tikina have been closely involved in urban employment for over 50 years. All these factors reduce the attractiveness of farming for those who hold this land. The effect of the urban shadow on land use is also seen further up the Rewa River where good land formerly used for sugar cane production is at present used only for low intensity grazing or agriculture. Clearly, land such as this could be used more intensively and, if the difficulties of tenure and motivation could be overcome, might contribute much more to supporting rural population than would further extensive projects such as Yalavou.

Elsewhere in Viti Levu the prospects for putting more land into production are very limited although, obviously, many villages have land which could grow cocoa, yaqona or other cash or subsistence crops. It is clear from earlier sections of this paper that, in the main, planting on such land is likely to contribute to higher cash incomes for resident villagers rather than new farm employment.

The tenure of unused land

Figures 8 and 9 show the tenure under which the unused and uncommitted land is held. These maps highlight another way in which the area of 'uncommitted' land is overstated. Freehold land which is currently unused is included in this category, and as Figure 8 indicates, some significant areas of such land lie in relatively accessible locations. Such land might have to be purchased by the Government if it were to be developed for farming, otherwise it may be left idle awaiting the chance of sale for some non-agricultural purpose. An unknown proportion of the unreserved Native Land is already leased and thus is strictly 'committed' even if not in use. Until consolidated, up-to-date maps of all land under NLTB leases are available, it is difficult to provide an accurate assessment of what land resources remain available for development.
Figure 8: Viti Levu - unused/uncommitted land (c. 1978-80)
Figure 9: Vanua Levu - unused/uncommitted land (c. 1978-80)
As in Viti Levu the years 1958 to 1978 saw a rapid increase in the area of land in use in Vanua Levu (Figure 5). The Seaqaqa project, expansion of cane growing elsewhere, and the establishment of pine forests by the Fiji Pine Commission (which continued after 1978) were the main contributors but as Figure 5 shows, new areas were brought into use in all parts of the island. The rate of increase of the area in use was 6.5 per cent per year from 1958 to 1978 while the rural population of Vanua Levu increased at 2.1 per cent per year from 1956 to 1976.

Figure 5 shows areas of land which were 'committed' to use in the early 1980s. These areas include the nature reserve of Taveuni, mangrove areas (Crown Tiri land), land leased for pine afforestation (or freehold land on which afforestation has begun or is planned), and some subdivision areas (such as Dogotuki) where development is reported to have started. However, the 'committed' area is undoubtedly underestimated on Figure 5. The World Bank tree crops project proposals would entail commitment of considerable areas which do not appear in the 'committed' category in Figure 5, and some other project areas do not appear because of lack of data or uncertainty about their status. Due to lack of data on Native Leases it is not possible to show as 'committed' land which in fact is already leased to farmers or graziers but which is not shown as 'in use' in the 1978 MAF land use survey.

Prospects for further land development

Some indication of the prospects for further land development, and a comparison with existing areas in use, is provided by Figures 7 and 9. These are constructed on the same basis as Figures 6 and 8. Areas already in use or 'committed', and Class D land ('unsuitable' for agriculture) are eliminated from consideration. The remaining land (unused or uncommitted but usable even though major improvements may be necessary) is then classified on the bases of land quality (Figure 7) and tenure (Figure 9).

As Table 16 shows, the greater part of the unused though usable land is of Class C quality, requiring major improvements if permanent use is to be made of it without land degradation. Extensive forms of land use and low population densities can be predicted. The area of unused Class Ai land (suitable for arable farming) is small and is grouped with
Class B land. Much of this lies along the coast of Natewa Bay and may be opened for more commercial development by roads now under construction or planned. Tree crops and pasture are likely to be the main types of farming and hence only low to medium densities are likely to be supported (see Table 15). The people of existing villages are likely to provide many of the farmers for new land occupation in this area, further reducing the number of 'new' farmers supported. Class Aii land, suitable for pasture or afforestation without improvement, accounts for 11 per cent of the unused but usable land (Table 16) and is likely to support only low densities. The general conclusion must be that although development schemes already planned or proposed (e.g. World Bank tree crops, Korotolotolu River Basin, Dreketi rice and citrus schemes) can provide a significant number of new farms over the next five to ten years, there are clear land limits to the continuation of these forms of development beyond the late 1980s.

In Taveuni prospects for new land development are more limited than in Viti Levu or Vanua Levu. Already over 70 per cent of the island is in use or 'committed' (Table 13 and Figure 5). Much of the remainder is under freehold tenure (Figure 9) and only of Class C quality (Figure 7).

E. SUMMARY AND CONCLUSION

A closing frontier

In the past 25 years the area of land in use in Fiji has increased very rapidly, trebling in both Viti Levu and Vanua Levu (Figures 4 and 5). Yet rural populations on these islands have increased by only one third and one half respectively. Expectations of rising income (in both cash and kind), the conversion from subsistence to commercial agriculture or pastoralism, and the generally poorer quality of each increment of land brought into use have all meant that the average new rural family requires more land than its average predecessor. Within the Fijian village society, the increased land demands of each family and the growing tendency for land to be held, formally or informally, for long periods by individuals or nuclear families rather than by extended families (i tokatoka) or mataqali, is reducing the capacity for village communities to absorb population.
Table 17 shows that in about 1980 over 80 per cent of Viti Levu, 67 per cent of Vanua Levu, and almost 80 per cent of Taveuni were already in use or were unsuitable for permanent agricultural or afforestation use. The unused Class A and B land accounts for no more than six per cent of Viti Levu, ten per cent of Vanua Levu and four per cent of Taveuni.

Since the mid-1950s land use and rural development planning in Fiji seems to have been based on the general premise that, despite tenure constraints which applied to particular communities, there were considerable reserves of unused land suitable to meet future requirements. The major developments, such as the expansion of sugar cane production, and the establishment of pine forests and pastoral farming, all took place on land which was largely unused hitherto. On a general scale, competition for land was not a major problem, although there were regions, especially in western Viti Levu, where it was not possible for all would-be farmers to obtain farm holdings.

TABLE 17: PROPORTION OF LAND IN USEa OR AVAILABLE FOR USE c. 1980

<table>
<thead>
<tr>
<th></th>
<th>Viti Levu</th>
<th>Vanua Levu</th>
<th>Taveuni</th>
</tr>
</thead>
<tbody>
<tr>
<td>In use, or Class D</td>
<td>84%</td>
<td>67%</td>
<td>79%</td>
</tr>
<tr>
<td>(unsuitable for use)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unused Class C</td>
<td>10%</td>
<td>24%</td>
<td>17%</td>
</tr>
<tr>
<td>(usable after major improvements)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unused Class Aii</td>
<td>3%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>(usable for pasture or afforestation without improvement)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unused Class Ai</td>
<td>3%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>(usable for crops or pasture without improvement) and Class B (usable for crops or pasture after minor improvements)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Figures rounded.
Recent changes at the margin

Ample evidence can now be found that the position has changed quite dramatically over the last five years. Three examples illustrate the changed circumstances. In the first case, the period of the seventh development plan (DP7) (1978-80) saw an expansion of sugar production from 272,000 to 475,000 tonnes. DP8 proposed an increase in production to 550,000-600,000 tonnes by 1985 (Central Planning Office, 1980:105). The development of cane varieties which gave reasonable yields from poorer soils allowed much of the increase to be obtained from second (or even third) class land brought into cane production for the first time and from the major Seaqaqa scheme. In Ra Province some 250 new cane contracts were let in the year to March 1982. But by late 1982 expansion of the cane perimeter in Ra Province had reached the stage where very steep slopes were being cultivated with little hope of sustained production. Some 'cane farms' had only about one ha of suitable land. In some of these areas the costs of providing access were out of all proportion to expected returns, and in 1982 some 1,900 tonnes of cane could not be harvested because of lack of access. It is understandable that Fijian villagers should seek cane contracts given the high returns possible. But for those with little experience of ploughland agriculture, over-optimistic use of steep land has been common. The Fiji Sugar Corporation has granted cane contracts to people with no suitable land, despite the Corporation's own guidelines. The NLTB has granted leases for cane farms on such land and in areas where provision of access is uneconomic. More rational and coordinated development is obviously required. If sugar production is to be maintained, or increased (assuming markets can be found), then the best prospects may lie in achieving higher yields from those old cane areas with the best soils which have not maintained or increased yields as much as might have been possible over the last decade. In other words, it may now be time for greater intensity of production from the existing and better cane land rather than a 'new frontiers' approach.

The second example is provided by the current position of pine afforestation in western Viti Levu. Over 307 km² have been planted but relatively little unplanted land is available for further expansion in Southeast Viti Levu. Competition for land has emerged between forestry and pastoral farming in this area. Although the upper catchment area of the Ba River may allow expansion of continuous pine plantations if access is
not too difficult, the most promising prospects for further pine planting may lie in the integration of wood lots into those cane farms on the hill country inland and south of Nadi. This could be a desirable form of intensification.

The third case is found in the wet zone of Viti Levu where the expansion of grazing in village land has led to considerable areas being committed to pasture. Many villages of Naitasiri, Tailevu and Ra Provinces have relatively little flat alluvial land but in the 1950s and 1960s this land supported most of the root crops grown for subsistence use or sale. Much of this top quality arable land is now under pasture or, in the Wainibuka Valley, under cocoa. Food crop gardens are being forced increasingly onto the poorer soils of the less accessible slopes, a process which increases the disincentives for planters. The capacity of villages to continue to absorb population in the dominantly subsistence sector depends directly on the capacity to maintain root crop production. The greater competition for use of the best land, and its commitment to relatively low intensity forms of use undermines that capacity.

Toward a national land policy

These emerging forms of land use competition all indicate that future land use planning and strategies for increasing rural production will have to be directed towards achieving higher yields from land already in use and towards a closer fit between land use and land capacity. The experience of sugar farming expansion in Ra Province indicates the need for much closer attention to soil conservation both in future land development projects and on existing farmland. In the early 1980s, Land Development Co-ordinating Committees were set up on a Divisional basis, and in early 1982 the Land Conservation Board agreed that work should start on a National Land Use Policy. Evidence presented to the West Division Land Development Co-ordinating Committee in mid-1982 indicated clearly the increase in land competition between major user categories in western Viti Levu. An examination of the summary evidence given in this paper (e.g. Figures 4 to 9) shows that there is a need for a more detailed examination of the country's rural land resources, its present ownership and use. There appears to be a major role for an interdepartmental group both in searching out unused but usable land and in resolving some of the emerging land use conflicts. Sub-optimal use of land is common in Fiji and is
unlikely to be resolved readily by market forces because of the rigidities of certain aspects of land tenure, and the limited nature of the land market.

The search for unused but usable land needs to be carried out at two levels of detail. In western Viti Levu a considerable number of landless families depend on seasonal cane cutting for existence. A detailed study of land use and tenure is likely to reveal small pockets of land which could be made available to such families as residence and food garden blocks, thus alleviating their problems. The prospects for integrating forestry and farming in this region requires surveys at a comparable level of detail.

Elsewhere the type of analysis for which Figures 6 to 9 provide a broad brush picture should be carried out using existing maps of 1:50,000 scale. For a complete picture it will be essential to obtain accurate and up-to-date maps on the same 1:50,000 scale showing land leased by the NLTB and the Crown. The Directorate of Overseas Survey 1968 series already shows other land tenure categories (e.g. Freehold, Crown, and Native Land (reserved and unreserved)). The 1978 land use data (MAF) are available at 1:50,000 but would need to be transferred to the standard sheet lines in the case of Viti Levu. With these changes the following would all be available at the same scale:

- 1968 and 1978 land use (with later data available for pine forests)
- land capability maps
- land tenure
- mataqali holdings (parts of Viti Levu - Forestry Department)

With these data available on the same base maps, it becomes a relatively simple matter to make rapid assessments of the possibilities for further land development in any region. At present the absence of any consolidated, up-to-date set of these data means that a great deal of time is spent by officials and consultants pulling together material which should, and relatively easily could, be immediately to hand in the Central Planning Office.

The generalised data provided in Figures 6 to 9 and information such as that in Tables 7 and 8, suggest that the use made of Freehold land might be scrutinised in detail and consideration given to means of ensuring that the better
quality land under Freehold tenure is put into productive use. For historical reasons, the Freehold land tends to be well located for access to internal markets or export ports and a disproportionate amount of the better class land is freehold. In southeast Viti Levu, where locational advantages are greatest, Freehold land is often underutilised to a surprising degree and the reasons for this warrant further examination.

One common result of increasing pressure on land is increased erosion, and many examples can be found in Fiji. Over the last two decades conservation measures appear to have been neglected, in contrast to the firm and far-sighted steps which were taken in the 1950s. Perhaps it is easier for a colonial administration not answerable to a local electorate to give effect to tough conservation policies than it is for a democratically elected government. Existing agencies such as the NLTB and the FSC already have the power to exert control on poor farming practices, but it is reported that in the mid-1970s NLTB staff would classify any land then growing cane as 'arable', irrespective of slope. Co-ordination and standardisation of land use planning practices are obviously needed. Conservation will become increasingly important as more of the poorer classes of land is brought into use. The 1983 inquiry into water and land resource legislation is an important first step but conservation will only be effective if there is a strong, well staffed, executive authority, close integration between government departments and instrumentalities, and a strong political will (c.f. Clarke and Morrison, forthcoming).

It is clear that over the last two decades Fiji has been fortunate that unused land of reasonable quality has been available for new farm establishment, and that in the Fijian village sector the mixed cash-subsistence socio-economy has been able to absorb many more people. The trends which are traced in this paper suggest that these two advantages cannot be relied on for more than a few more years. Infrastructure costs per new farm will rise and the time is approaching when these will often outweigh the potential benefits. Thus, future strategies for rural development will have to be based on greater intensification of land use, although a parallel trend of increasing farm size may also become more obvious as higher standards of living are sought by farmers. It seems unlikely that the next twenty years will see as great an increase in rural population as occurred in the 1960s and 1970s, and as a consequence the urban and non-agricultural sectors will be called on to provide a higher proportion of the new jobs than they have provided in the last five years.
NOTES

1. This excludes very occasional making of copra from a small area of palms growing a considerable distance from the village. Neither the area of these groves, nor the frequency of harvesting appears to have changed between 1959 and 1983.

ACKNOWLEDGMENTS

This paper is based on work done in 1982 and 1983 while the author was a member of the Fiji Employment and Development Mission. I am grateful to Mr John Samy, Permanent Secretary, Ministry of Economic Planning and Development, for permission to use material which appeared in the Fiji Employment and Development Mission's Final Report to the Government of Fiji, Parliamentary Paper No. 66 of 1984. In addition to acknowledging the help received from other members of the Fiji Employment and Development Mission, staff of the Central Planning Office and Fiji Government departments, I would like to thank Mrs L. Ho and Mrs M. Herbert, Director's Section, Research School of Pacific Studies, Mrs P. Falconer, Mr K. Lockwood and Mr K. Mitchell, Department of Human Geography, Research School of Pacific Studies, and the staff of the Photographic Unit, John Curtin School of Medical Research, for their help with research assistance, cartography and preparation of the paper.
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FIGURE

1 Geographical distribution of cane sectors by mill area 1980

General Note: dollars ($) mean Fiji dollars throughout and t means metric tonnes
A. SUGAR PRODUCTION IN FIJI

Introduction

This paper reports the results of research into employment and income trends in the Fiji sugar industry in the period 1970 to 1982. It therefore covers the first twelve years of Fiji's independence from Britain, as well as an era in which there were great upheavals in the international economy associated with rising oil prices, international inflation, and the onset of world recession. As a small, open economy Fiji may have been expected to experience these difficulties particularly severely. However, at least part of the picture which emerges from this study is the way in which the structure of the sugar industry helped to offset the potential problems created by international events, thus permitting Fiji to experience growth in real per capita incomes at a time when many other oil-importing developing countries went into sharp economic decline.

The study is of interest not only with respect to patterns of development in contemporary Fiji. It also has wider relevance in the context of farm-size strategies for agriculture in developing countries, in which an increasing body of argument and evidence emphasises the positive attributes of small farms compared to large scale agriculture, not only with respect to employment and equity objectives but also in terms of economic efficiency (Lipton, 1977; Griffin, 1979; Berry and Cline, 1979).

The sugar industry in Fiji has evolved for more than half a century on the basis of small, peasant farms. A mainly leasehold basis of land tenure coupled with contractual restrictions on cane delivery to sugar mills has acted to prevent the consolidation of holdings and the emergence of large growers. Cane harvesting is entirely manual, due to a prohibition on the importation of mechanised harvesters, and this has contributed both to the stability of the small-farm structure and to the labour intensity of the industry. These features have combined to give an agricultural export sector which (a) generates a large volume of employment relative to the aggregate volume and value of output, (b) ensures that a high proportion of gross income is returned to domestic factors of production, principally labour, rather than to imported machines, and (c) ensures that this domestic income is fairly evenly distributed amongst the various participants in sugar production and processing.
History of the industry

Some notes on the historical, international, and macroeconomic context of the contemporary Fiji sugar economy are relevant to the subsequent examination of its employment and income aspects. The industry began as a plantation system based on the recruitment of indentured labour from India in the period 1879 to 1916. From an early stage ownership was concentrated in the hands of a single, foreign enterprise, the Colonial Sugar Refining Company (CSR) of Australia. The transition of the industry from a plantation to a small-farm structure in the 1920s and 1930s has been described elsewhere (Anderson, 1974; Gillion, 1977; Moynagh, 1981). The main factor was an acute labour shortage arising from the termination of new indenture recruitment in 1916, the cancellation of indenture contracts still in force in 1920, and the capacity which then existed for the immigrant population to enter agriculture on their own account as leasehold farmers rather than to continue working as wage labour for CSR. After a period of experimentation CSR opted for an outgrower production system based on a fairly uniform farm size of 4.05 ha for its tenant farmers (Ward, 1980). Tenant farmers could only sell cane to CSR mills under contract, and no individual cane farmer was permitted to hold more than one contract. The company continued to own and operate the sugar mills and the industry infrastructure (such as the tramways for the haulage of cane to mills). The production system which emerged involved tight managerial control by CSR over its tenant farmers, but at the same time created a model of decentralised small-farm production with great equality of production units, and hence of incomes, amongst its participants.

In subsequent decades of consolidation the main intermittent conflict between CSR and the cane growers concerned the division of the gross income of the industry between the two parties. Various different formulae for this division were negotiated in different periods, but of chief interest for the contemporary development of the industry was the controversial outcome of an independent enquiry chaired by Lord Denning in 1969, referred to as the 'Denning Award' (Fiji Government, 1970). The Denning Award advocated a straight split of the gross proceeds from sugar and molasses sales in the proportions of 65 per cent to growers and 35 per cent to CSR, irrespective of fluctuations in market prices or in unit costs of sugar processing arising from trends in the volume of production. In earlier contracts this division had been much
more favourable to CSR. For example, in the Eve Contract which lasted from 1962 to 1969 the reference split was 57.75 per cent to growers and 42.25 per cent to the CSR, and the company was also protected from incurring losses by an adjustment mechanism which ensured that they could recover full processing costs in the event of adverse prices in a particular year.(1)

The Denning Award was vigorously contested by CSR (CSR, 1970), and the company's inability to obtain a reversal of the judgment led to its decision to withdraw from the Fiji sugar industry (Moynagh, 1981:231-41). After prolonged negotiation the ownership of the milling side of the industry was taken over in 1973 by a parastatal enterprise, the Fiji Sugar Corporation (FSC), with majority shareholding by the Fiji government.(2) At the same time former CSR land came under government ownership, and the leasehold tenant farmers of the CSR became tenants on government land.

The industry since 1973

Production trends in the Fiji sugar industry between 1970 and 1982 reflect the departure of the CSR, the change in industry management, a drive for expansion by the new FSC, and the rising grower share in total sugar proceeds. Between the Denning Award and the mid-1970s all indices of industry performance showed a marked decline (Table 1). This reflected the uncertainty surrounding the future of the industry up to 1973 and deterioration of infrastructure such as sea walls and drainage canals due to lack of renewal by the outgoing CSR. Under the Fiji Sugar Corporation these trends were sharply reversed, in part by renewal of infrastructure, in part by rapid growth in the issue of new cane contracts (detailed below), and in part by further increases in the growers' share of total income from sugar and molasses sales. The division of gross proceeds was altered further in favour of the growers in 1975 (70 per cent to growers and 30 per cent to the millers), and again in 1980.(3) Hence one of the most significant features of sugar industry development since 1970 was a series of increases in the proportion of total income passed back to growers. The average grower share was 71.4 per cent in 1981.

The summary outcome of these events was an expansion of the sugar industry of the order of 40 per cent between the early 1970s and the early 1980s. Taking three-year averages
**TABLE 1: PRODUCTION DATA FOR THE FIJI SUGAR INDUSTRY 1970–82**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cane harvested tonnes</th>
<th>Area harvested ha</th>
<th>Cane yield tonnes/ha</th>
<th>Sugar production tonnes</th>
<th>Molasses production tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>2,885,820</td>
<td>45,999</td>
<td>62.74</td>
<td>360,847</td>
<td>107,178</td>
</tr>
<tr>
<td>1971</td>
<td>2,545,394</td>
<td>47,315</td>
<td>53.80</td>
<td>321,649</td>
<td>85,023</td>
</tr>
<tr>
<td>1972</td>
<td>2,238,246</td>
<td>43,804</td>
<td>51.10</td>
<td>302,938</td>
<td>76,985</td>
</tr>
<tr>
<td>1973</td>
<td>2,497,586</td>
<td>45,790</td>
<td>54.54</td>
<td>301,237</td>
<td>95,171</td>
</tr>
<tr>
<td>1974</td>
<td>2,152,400</td>
<td>44,832</td>
<td>48.01</td>
<td>273,490</td>
<td>70,898</td>
</tr>
<tr>
<td>1976</td>
<td>2,285,257</td>
<td>47,141</td>
<td>48.48</td>
<td>295,852</td>
<td>81,315</td>
</tr>
<tr>
<td>1977</td>
<td>2,674,374</td>
<td>52,295</td>
<td>51.14</td>
<td>362,378</td>
<td>105,169</td>
</tr>
<tr>
<td>1978</td>
<td>2,849,234</td>
<td>54,476</td>
<td>52.30</td>
<td>346,690</td>
<td>106,181</td>
</tr>
<tr>
<td>1979</td>
<td>4,058,018</td>
<td>62,134</td>
<td>65.31</td>
<td>473,181</td>
<td>163,290</td>
</tr>
<tr>
<td>1980</td>
<td>3,360,291</td>
<td>64,556</td>
<td>52.05</td>
<td>396,157</td>
<td>128,939</td>
</tr>
<tr>
<td>1981</td>
<td>3,931,432</td>
<td>65,888</td>
<td>59.67</td>
<td>469,972</td>
<td>151,824</td>
</tr>
<tr>
<td>1982</td>
<td>4,074,864</td>
<td>69,270</td>
<td>58.83</td>
<td>486,679</td>
<td>150,049</td>
</tr>
</tbody>
</table>

a Refers to the Fiji Sugar Corporation financial year from 1 April–31 March.

b This is the series for the volume of cane harvested as measured by grower deliveries. It differs slightly from an alternative series found in some publications referring to the volume of cane crushed.

**Source:** Fiji Sugar Corporation.

At the beginning and end of the period, the area under production increased from 45,700 ha to 66,570 ha (up 46 per cent); cane production rose from 2.6 to 3.8 million tonnes (up 46 per cent), and sugar production rose from 328,000 to 451,000 tonnes (up 38 per cent). As these figures suggest, the average yield of cane per hectare held more or less the same between the beginning and end of the period, while the yield of sugar per tonne of cane declined moderately.

The post-1974 expansion of the sugar industry made a significant contribution to the growth of the Fiji economy as a whole in this period, quite aside from the employment and income aspects which are the main focus of this paper.
Between 1970 and 1980 foreign exchange earnings from sugar and molasses rose from $32.3 million to $186.2 million, which increased sugar's share of domestic exports from 66 per cent to 81 per cent. In this decade the average share of sugar in domestic exports was 75 per cent, roughly ten per cent higher than its average share in the preceding decade. The contribution of sugar production and processing to Gross Domestic Product at factor cost also rose in this period, from around twelve per cent to sixteen per cent. This was in a period when real GDP rose by 4.6 per cent per annum and real GDP per capita at 2.6 per cent per annum.

This increased reliance on a single crop for export earnings is not entirely unproblematic, as the vast literature on undue specialisation in unstable agricultural exports testifies. In the context of the opportunities and constraints confronting Fiji in the 1970s, on the other hand, sugar expansion must be considered in hindsight to have been highly beneficial. No other productive activity could have been geared up for export sufficiently fast to compensate for the rising international prices of imports in this period, and a comparison of Fiji macroeconomic performance with that of other oil-importing, agricultural-exporting, developing countries in the 1970s (World Bank, 1983) provides an ex post justification of the merits of the strategy.

**Fiji and the world sugar market**

The international market for Fiji sugar is obviously critical for the viability of the industry, especially given the production expansion of the 1970s. International trade in sugar takes place largely under bilateral contractual arrangements, and the residual free market is notoriously volatile. In the past the free market has displayed cyclical behaviour in which roughly five low-price years are followed by two high-price years, the upward turn in the cycle being caused either by the eventual collapse of production in the weaker producing countries due to prolonged periods of low prices, or to adverse climatic conditions in a major producing country (World Bank, 1980).

Fiji participates in one of the major bilateral contracts in international sugar trade, the Sugar Protocol of the European Economic Community/Africa Caribbean Pacific Lomé Convention. This guarantees an assured market for 172,000 tonnes of sugar at stable prices fixed in close relation to
the prices obtained by EEC sugar growers under the Common Agricultural Policy. This price is substantially above recent world market levels ($370 per tonne, compared to a world market price of about $195 per tonne in 1982 and under $100 in mid-1985). In addition during the 1970s, Fiji benefitted from two cyclical booms in the free market price for sugar, the first occurring in 1974/75 and the second in 1980/81. It is partly due to its expanded capacity to reap maximum advantage from the latter boom that Fiji was able to stave off the detrimental impact on the domestic economy of world recession until 1982. In addition to the Lomé Convention, Fiji also participates in other long term contractual agreements for sugar sales with Malaysia, Singapore, New Zealand, and China, but these serve mainly to guarantee outlets for the volume of sugar produced; they do not generally involve preferential prices.

Various factors suggest that the international market for sugar may become more difficult in the future than it has been in the past. The advent of large sugar surpluses in the EEC, due to the high guaranteed prices of the Common Agricultural Policy, creates pressure for the abandonment of the Sugar Protocol from producer interest in the EEC, and ensures heavy downward pressure on free market prices as the EEC seeks to reduce stockpiles by subsidised exportation on the world market. In addition the degree of protection and subsidy afforded to sugar elsewhere in the world economy means that production is much less responsive than in the past to low prices, and excess supply could become a permanent feature of the international market. When coupled with the rapid growth in the industrial countries of sugar substitutes (e.g. high glucose corn syrup), and stagnation in world demand, future market prospects for Fiji sugar look more than somewhat precarious.

**The land tenure system**

The final point of contextual relevance here concerns the land tenure system in Fiji, which is unusual (see also Ward in this volume). Only eight per cent of the entire land area of the Fiji Islands is owned in private freehold title, a further ten per cent being held by the state (still referred to as 'Crown Land'), and the remaining 82 per cent being held by indigenous Fijian mataqali and administered for them by a statutory authority, the Native Land Trust Board (NLTB). The latter is constitutionally inalienable from the 7,000 or so
mataqali under which it was inscribed following legislation of the Colonial administration in 1880 (France, 1969). This ownership structure means that few of the Indo-Fijian small farmers, either in sugar production or elsewhere, are freehold owners of their farms. The majority of sugar growers are leasehold tenants either on Crown Land (which now includes ex-CSR freehold land) or NLTB land. The statutory duration of leases is thirty years, and rent levels are determined by the relevant statutory authorities, not by individual mataqali owners. This land tenure system ensures fairly strong security of tenure for the sugar growers, and at the same time has acted as a powerful brake on the processes of private land concentration which tend to typify agrarian change under freehold ownership (Anderson, 1974).

B. EMPLOYMENT TRENDS AND THE DIVISION OF GROSS SUGAR INCOME

The intention here is to give an overview of employment trends in the Fiji sugar industry between 1970 and 1982, before examining the position with respect to growers, cane cutters, and sugar mill workers in greater detail. In addition a summary picture is given of the division of the gross proceeds of sugar and molasses sales between the various participants in the industry for a recent year.

Employment trends

Trends in employment in sugar cane production are summarised in Table 2. This distinguishes three main employment categories in this activity:

(a) the sugar growers themselves, the numbers of which correspond closely to the number of sugar farms, and which consist of the single member of each farm household who holds the contract for delivery of sugar to mills;

(b) the number of 'grower's sons' (i.e. adult male members of farm households) who are engaged on the farm, the figures for which are obtained from an annual census of the size and composition of the cane harvesting labour force;

(c) the number of cane cutters hired from outside the farm family (i.e. wage labour), figures for which are again available from an annual census of the harvesting labour force.
TABLE 2: ESTIMATED TREND OF EMPLOYMENT IN SUGAR CANE PRODUCTION, GROWERS AND NON-GROWER MEMBERS OF HARVESTING GANGS, 1970-82

<table>
<thead>
<tr>
<th>Year</th>
<th>Growers supplying cane&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Non-grower members of harvesting gangs&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Growers' sons Substitutes&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>15,542</td>
<td>5,748 7,367</td>
<td>28,657</td>
</tr>
<tr>
<td>1971</td>
<td>15,290</td>
<td>5,440 6,172</td>
<td>26,902</td>
</tr>
<tr>
<td>1972</td>
<td>15,364</td>
<td>5,298 6,371</td>
<td>27,033</td>
</tr>
<tr>
<td>1973</td>
<td>15,372</td>
<td>5,802 6,177</td>
<td>27,521</td>
</tr>
<tr>
<td>1974</td>
<td>15,815</td>
<td>4,834 5,019</td>
<td>25,668</td>
</tr>
<tr>
<td>1975</td>
<td>16,994</td>
<td>5,179 5,671</td>
<td>27,844</td>
</tr>
<tr>
<td>1976</td>
<td>17,130</td>
<td>6,065 6,450</td>
<td>29,645</td>
</tr>
<tr>
<td>1977</td>
<td>17,156</td>
<td>6,237 7,424</td>
<td>30,817</td>
</tr>
<tr>
<td>1978</td>
<td>19,216</td>
<td>6,985 7,955</td>
<td>34,156</td>
</tr>
<tr>
<td>1979</td>
<td>19,545</td>
<td>7,897 9,106</td>
<td>36,548</td>
</tr>
<tr>
<td>1980</td>
<td>19,898</td>
<td>8,600 10,700</td>
<td>39,198</td>
</tr>
<tr>
<td>1981</td>
<td>21,051</td>
<td>8,494 10,917</td>
<td>40,462</td>
</tr>
<tr>
<td>1982</td>
<td>22,091</td>
<td>8,677 11,234</td>
<td>42,002</td>
</tr>
</tbody>
</table>

<sup>a</sup> From 1976 onwards refers to growers holding valid cane contracts plus so-called indemnity growers (non-contract growers supplying cane).

<sup>b</sup> Calculated from the annual Harvesting Gang Strength censuses of the Fiji Sugar Corporation, assuming an average working week for harvesting gangs of five days.

<sup>c</sup> Hired wage labour.

Source: Fiji Sugar Corporation.

With respect to the last of these three categories i.e. the hired cane cutters, it is relevant to note that cane harvesting in Fiji is a seasonal activity lasting for roughly seven months in the year. Thus for this category the harvesting season does not adequately describe their employment for the whole year. The majority proportion of
labour in this category are landless Indo-Fijians who derive their incomes in the so-called 'slack' season from intermittent casual work in and around the cane farming areas. A minority proportion are Fijian villagers who migrate into the cane areas for the duration of the harvesting season and return to their villages in the slack season. More details on this category of the sugar labour force are contained in Section D below.

A number of features of interest are revealed in the figures of Table 2. The first is the strong upward trend in the total employment represented by the three categories from 1974 onwards, corresponding to the expansion of the industry which took place in this period. The second is the significance of 'grower's sons' in the total picture, demonstrating that small-farm cane production is a family operation which provides employment and income for more economically active persons within the household than just the grower himself. The third is the changing proportion of employment between the different categories such that non-growers in the harvesting labour force have been increasing much more rapidly than the number of growers taken alone. Between 1974 and 1982 the number of growers increased by forty per cent while the number of non-growers in harvesting gangs increased by 102 per cent. This trend may in part reflect demographic factors associated with the average age of registered cane growers and the increasing employment of sons to undertake agricultural tasks including cane harvesting. It also reflects the rising real incomes which cane growers experienced during the 1970s, both permitting more members of the family to be retained on the farm and the increased use of hired labour for cane harvesting.

The figures of Table 2 are considered to underestimate slightly the total employment in sugar cane production since they do not include growers' sons of working age who are present on the farm but do not participate specifically in harvesting, nor do they include women members of growers' households who are actively involved in the production process. Total employment in sugar cane production suggested in the 1976 Population Census (Fiji Government, 1977) at 30,757 persons was 3.8 per cent higher than the 29,645 persons estimated for the same year in Table 2 from FSC data sources. In constructing the estimated trend for aggregate sugar employment in the Fiji economy, including labour in sugar processing, the assumption is made that cane employment should be adjusted upwards by this same factor in all years.(6)
TABLE 3: ESTIMATED TOTAL SUGAR INDUSTRY EMPLOYMENT AND
SHARE OF TOTAL LABOUR FORCE 1970-82

<table>
<thead>
<tr>
<th>Year</th>
<th>Adjusted employment sugar cane</th>
<th>Employment sugar processing</th>
<th>Total sugar employment</th>
<th>Total Fiji labour force</th>
<th>Sugar industry %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>29,750</td>
<td>3,630</td>
<td>33,380</td>
<td>142,350</td>
<td>23.4</td>
</tr>
<tr>
<td>1971</td>
<td>27,920</td>
<td>3,620</td>
<td>31,540</td>
<td>147,000</td>
<td>21.5</td>
</tr>
<tr>
<td>1972</td>
<td>28,060</td>
<td>3,640</td>
<td>31,700</td>
<td>152,050</td>
<td>20.8</td>
</tr>
<tr>
<td>1974</td>
<td>26,630</td>
<td>3,570</td>
<td>30,200</td>
<td>163,370</td>
<td>18.5</td>
</tr>
<tr>
<td>1975</td>
<td>28,880</td>
<td>3,660</td>
<td>32,540</td>
<td>169,480</td>
<td>19.2</td>
</tr>
<tr>
<td>1976</td>
<td>30,750</td>
<td>4,100</td>
<td>34,850</td>
<td>176,322</td>
<td>19.8</td>
</tr>
<tr>
<td>1977</td>
<td>31,970</td>
<td>3,920</td>
<td>35,890</td>
<td>181,620</td>
<td>19.8</td>
</tr>
<tr>
<td>1978</td>
<td>34,430</td>
<td>4,020</td>
<td>38,450</td>
<td>187,720</td>
<td>20.5</td>
</tr>
<tr>
<td>1979</td>
<td>37,910</td>
<td>4,060</td>
<td>41,970</td>
<td>194,230</td>
<td>21.6</td>
</tr>
<tr>
<td>1980</td>
<td>40,660</td>
<td>4,410</td>
<td>45,070</td>
<td>201,380</td>
<td>22.4</td>
</tr>
<tr>
<td>1981</td>
<td>41,970</td>
<td>4,120</td>
<td>46,090</td>
<td>208,070</td>
<td>22.2</td>
</tr>
<tr>
<td>1982</td>
<td>43,598</td>
<td>4,101</td>
<td>47,699</td>
<td>214,180</td>
<td>22.3</td>
</tr>
</tbody>
</table>

a Data of Table 2 above adjusted upwards to take account of economically active persons in sugar cane production not included in the simple addition of growers plus non-grower members of harvesting gangs. A multiplication factor of 1.038, obtained from comparison with the 1976 Census figure for sugar cane employment, used for all years.

b Average monthly FSC employment (including administration) during the crushing season.

c Assumes a constant Labour Force Participation Rate at the 1976 Census level, after adjustment for additional working age people retained in secondary and higher education.

Source: Fiji Sugar Corporation.

Own calculations and estimates.
Table 3 summarises the estimated total direct contribution of the sugar industry to employment in Fiji over the period 1970 to 1982. Several points may be noted. First, almost the entire increase in total employment was attributed to the expansion of labour use in cane production and harvesting, the level of employment in sugar processing having remained static since 1976 except in periods when capital improvements were being undertaken at sugar mills. Second, at 22.2 per cent of the Fiji total labour force in 1981, employment in sugar was significantly higher than the contribution of the industry to GDP in that year at sixteen per cent. This emphasises the relatively labour-intensive nature of small-farm sugar production compared to other monetised economic activity in Fiji. Third, between 1976 and 1980 the sugar industry is estimated to have provided new jobs for some 10,200 persons, or forty per cent of new entrants to the labour market in that period. This is significant in explaining how the rate of open unemployment probably fell in Fiji during the late 1970s, in a period when new employment in formal sector activities (government, manufacturing, and services) was falling off sharply.(7)

Distribution of income from sugar

The employment trends by themselves suggest the wide diffusion of income from sugar sales in Fiji. As a first approach to quantifying this aspect the division of the gross receipts from sugar and molasses sales in a particular year, 1981, is summarised in Table 4. The most striking feature of this division of the sugar 'cake' is the high proportion of gross income which was returned to direct labour in production and processing. The total share of domestic labour (items 3, 7, 8 and 9 in Table 4) amounted to $93 millions or 61 per cent of total sales income in 1981. This amount accrued to the estimated 46,000 persons employed in the industry as growers, cane harvesters, mill workers and FSC staff in 1981. A further $44 millions or 29 per cent is attributed to the non-wage costs of production and processing (items 2, 4 10 and 11 in Table 4) which comprises both direct material inputs (fuel, fertilizers etc.) and the cost of hired local services (mainly lorry and tractor hire for harvesting and cultivation). Net profits and financial charges only accounted for $7 millions or five per cent of gross income in 1981, and a similar proportion was accounted for by export and profit taxes accruing to government.
TABLE 4: ESTIMATED DISTRIBUTION OF GROSS SUGAR INCOME, 1981

<table>
<thead>
<tr>
<th>Income category</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$'000</td>
</tr>
<tr>
<td>A. Gross income (Sugar and molasses sales)</td>
<td>151,380</td>
</tr>
<tr>
<td>Less: 1. Export taxes</td>
<td>5,120</td>
</tr>
<tr>
<td>2. Marketing deductions(^a)</td>
<td>1,790</td>
</tr>
<tr>
<td>B. Income for distribution</td>
<td>144,470</td>
</tr>
<tr>
<td>C. FSC share</td>
<td>41,310</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>3. Wages and salaries</td>
<td>17,270</td>
</tr>
<tr>
<td>4. Non-wage costs</td>
<td>14,450</td>
</tr>
<tr>
<td>5. Financial charges(^b)</td>
<td>3,420</td>
</tr>
<tr>
<td>6. Profit before tax</td>
<td>6,310</td>
</tr>
<tr>
<td>[6a. Profit tax</td>
<td>2,310</td>
</tr>
<tr>
<td>D. Growers' share</td>
<td>103,160</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
</tr>
<tr>
<td>7. Operating surplus</td>
<td>40,260</td>
</tr>
<tr>
<td>8. Harvesting labour</td>
<td>19,660</td>
</tr>
<tr>
<td>9. Other labour costs</td>
<td>15,720</td>
</tr>
<tr>
<td>10. Purchased inputs(^c)</td>
<td>9,830</td>
</tr>
<tr>
<td>11. Other cash costs(^d)</td>
<td>17,690</td>
</tr>
</tbody>
</table>

\(^a\) Includes the so-called Certified Deductions made to cover the costs of the Sugar Board and agricultural research.

\(^b\) Depreciation, financial reserves, etc.

\(^c\) Fertilizers, weedicides, mill mud, etc.

\(^d\) Mainly hire costs for tractors and lorries used in cane harvesting, and tractors used for cultivation. This category also includes the cost of seed cane and land preparation for replanting.

Source: FSC data and author's own calculation based on approximate growers' cost information.
An important implication of this distribution is that the proportion of total sugar income which is retained in the domestic economy rather than leaked into imports is high by comparative international standards for this kind of activity. (8) The 1977 input-output table for Fiji estimated that the import content of cane production was 7.2 per cent of cane output value, and the import content of sugar production was 10.7 per cent of processing value added. Taken together these percentages would imply that only eight per cent of gross sugar value represented a direct leakage into imports on the production side. Alternative figures supplied by the FSC for the year 1981 suggest a rather higher proportion, roughly twelve per cent of the gross output value, as the direct import cost of the industry. This is still a very low leakage into imports for an open oil-importing island economy lacking domestic manufacturing capacity for capital goods and major agricultural inputs. (9)

**Linkage effects**

The overall employment and income contribution of the sugar industry should also take account of domestic linkage and multiplier effects. First, a significant proportion of the consumption of those engaged in the industry is orientated towards locally produced goods (especially *yaqona* (10)) which creates secondary income effects outside the sugar areas. Second, the expansion of cane production has created indirect employment, especially in the small-scale road transport sector involved in cane cartage. Third, the sugar industry is an important source of government revenue through taxation and this again has important indirect employment and income effects.

In short, the employment trends and income flows described above illustrate the powerful capacity of an expanding small-farm production system to create jobs and to diffuse incomes widely through the rural economy. It would be incorrect to say that there are no problems; co-ordinating the activities of over 20,000 small farmers is not easy, and the international market poses a potential peril. Nor, however, should the difficulties be exaggerated in comparison to the positive attributes of the system. It is in this context that the more detailed study of the main participants in the Fiji sugar industry is developed over the next three sections.
Figure 1: Geographical distribution of cane sectors by mill area 1980. Source: Booker Agriculture (1981).
C. SUGAR CANE PRODUCTION AND THE SUGAR GROWERS

Distribution and organisation of production

Sugar cane cultivation in Fiji is located on the north and west coasts of the island of Viti Levu and the north coast of the island of Vanua Levu. The total area under sugar cane was estimated at 86,153 ha or 31 per cent of total farmland in the 1978 Census of Agriculture (Fiji Government, 1980:74). In 1982 the total area under contract to the Fiji Sugar Corporation was 91,801 ha of which 69,720 ha was in active production that year. The production area is spatially organised around four sugar mills, of which three are in Viti Levu (Lautoka, Rarawai, and Penang) and one is at Labasa on Vanua Levu. For administrative purposes, the cane zone associated with each mill is divided into sectors (Figure 1), the activities of growers in each sector being co-ordinated by an FSC Field Office. This system is inherited from the CSR period.

TABLE 5: OUTPUT STRUCTURE OF SUGAR CANE PRODUCTION IN FIJI

AVERAGE 1980-82

<table>
<thead>
<tr>
<th>Ranges of output per grower tonnes</th>
<th>Distribution of growers no.</th>
<th>Distribution of total output tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>7,486 34.3</td>
<td>354,135 9.3</td>
</tr>
<tr>
<td>101 to 150</td>
<td>3,387 15.5</td>
<td>424,192 11.2</td>
</tr>
<tr>
<td>151 to 200</td>
<td>3,066 14.1</td>
<td>539,283 14.2</td>
</tr>
<tr>
<td>201 to 250</td>
<td>2,666 12.2</td>
<td>600,123 15.8</td>
</tr>
<tr>
<td>251 to 300</td>
<td>2,001 9.2</td>
<td>548,972 14.4</td>
</tr>
<tr>
<td>301 to 400</td>
<td>2,002 9.2</td>
<td>685,662 18.0</td>
</tr>
<tr>
<td>401 to 500</td>
<td>664 3.0</td>
<td>295,232 7.8</td>
</tr>
<tr>
<td>501 and over</td>
<td>546 2.5</td>
<td>355,034 9.3</td>
</tr>
</tbody>
</table>

Totals 21,818 100.0 3,802,633 100.0

Source: Fiji Sugar Corporation.
The farm output structure of the Fiji sugar industry in recent years is shown in Table 5. This gives the distribution of cane growers, and the distribution of total cane output, according to different ranges of cane output per grower. The data is a three-year average for the period 1980 to 1982. The table shows that 85 per cent of growers produced an average of 300 tonnes of cane or less, and that those growers were responsible for 65 per cent of total cane production. Under prevailing average levels of yield, and taking into account land required for replanting, these figures signify that two-thirds of total output came from 18,600 growers with farm sizes of under seven ha. A further eighteen per cent of total output came from farms producing in the range of 300-400 tonnes. Hence, in the Fiji sugar industry 'larger' farmers producing over 400 tonnes of cane with farm sizes in excess of roughly ten ha accounted for only 5.5 per cent of growers and seventeen per cent of total output. Although land quality is a concealed variable of some importance, a more-nearly equal distribution of access to land and the fruits thereof, especially in cash crop production, would be difficult to find elsewhere in developing countries.(11)

Expansion of the production area

The number of cane growers in Fiji increased from 15,542 in 1970 to 22,091 in 1982 (Table 6). These figures include so-called 'indemnity' growers in the process of applying for cane contracts as well as the majority of growers holding valid cane contracts. They indicate that 6,500 farm households entered sugar cane production in that period. Of this number of new growers, some 2,300, or more than a third, were Fijians as distinct from Indo-Fijians. Thus one aspect of the sugar expansion of the 1970s was the increasing participation of Fijians in the industry, such that by 1982 nearly a quarter of all growers were Fijian.

Most of these new cane growers were established within and on the periphery of the existing cane zones. Thus, they represented in part an intensification of production within the previous delimitation of the cane area and in part an expansion of the area onto rather more marginal lands in terms of suitability for permanent cropping under sugar. A proportion of the former category involved issuing contracts for quite small parcels of land in the gaps between existing ten-acre farms (so-called 'backyard' contracts of under three ha). However, the more general policy in recent years has
### TABLE 6: NUMBER OF CANE GROWERS, CANE PRICES, AND GROWER INCOMES 1970-82

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of growers</th>
<th>Total grower income $'000</th>
<th>CANE price $/tonne</th>
<th>Average gross income $/grower</th>
<th>Real indices&lt;sup&gt;c&lt;/sup&gt; 1970=100.0</th>
<th>Cane price</th>
<th>Ave. income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>15,542</td>
<td>22,013.1</td>
<td>7.63</td>
<td>1,411</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>15,290</td>
<td>20,232.9</td>
<td>7.95</td>
<td>1,302</td>
<td>97.8</td>
<td>86.7</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>15,364</td>
<td>22,160.9</td>
<td>9.90</td>
<td>1,449</td>
<td>111.7</td>
<td>88.4</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>15,372</td>
<td>24,385.2</td>
<td>9.76</td>
<td>1,587</td>
<td>99.0</td>
<td>87.1</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>15,815</td>
<td>44,258.1</td>
<td>20.57</td>
<td>2,879</td>
<td>182.4</td>
<td>138.0</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>16,994</td>
<td>68,275.1</td>
<td>31.60</td>
<td>4,317</td>
<td>247.7</td>
<td>183.0</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>17,130</td>
<td>55,219.2</td>
<td>24.19</td>
<td>3,249</td>
<td>170.2</td>
<td>123.7</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>17,156</td>
<td>71,498.1</td>
<td>26.74</td>
<td>4,174</td>
<td>175.9</td>
<td>148.4</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>19,216</td>
<td>71,225.1</td>
<td>25.00</td>
<td>4,152</td>
<td>155.0</td>
<td>134.2</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>19,545</td>
<td>96,756.0</td>
<td>23.85</td>
<td>5,035</td>
<td>137.3</td>
<td>156.7</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>19,898</td>
<td>118,250.8</td>
<td>35.19</td>
<td>6,050</td>
<td>176.9</td>
<td>164.5</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>21,051</td>
<td>103,166.1</td>
<td>26.24</td>
<td>5,185</td>
<td>118.6</td>
<td>126.8</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>22,091</td>
<td>101,193.0</td>
<td>25.00&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4,839&lt;sup&gt;d&lt;/sup&gt;</td>
<td>105.6</td>
<td>110.2</td>
<td></td>
</tr>
</tbody>
</table>

a FSC financial year 1 April-31 March.

b Total grower income in each year divided by the number of growers of the preceding year (since new growers will not have begun to earn income in their first year).

c Indices in money terms (1970=100.0) of cane price and average gross income respectively deflated by the Consumer Price Index.

d Estimated

Source: Fiji Sugar Corporation for data on number of growers, total grower income, and cane price.
been to issue contracts for 6.1 ha farms (fifteen acres). Given that many such farms are on hilly land or inferior soils where yields are lower than in the traditional zones this policy does not signify a move away from the small farm system. Rather, the extra area is required to compensate for the lower yields, greater liability to the effects of drought, and higher transport costs associated with the outward extension of the cane perimeter.

A total of 800 of the new cane growers were created under a separate project in a new production area known as Seaqaqa on the island of Vanua Levu. The Seaqaqa Scheme was initiated in 1974, and in 1976 was incorporated into a World Bank-financed Sugar Development Project (World Bank, 1976). It involved the opening up of previously uncultivated land located on the Seaqaqa plateau some forty km west of Labasa town and sugar mill, the project being structured on the basis of 800 farms of twenty ha each of which 6.1 ha would be under sugar cane. The growth of sugar production from Seaqaqa was very rapid, rising from 23,700 tonnes cane in 1975 to 251,000 tonnes in 1981 and 316,038 tonnes in 1982. This was a substantially larger output than the steady-state production of 200,000 tonnes envisaged in original project calculations, and testifies to the potential of this kind of project in the Fiji context. However, substantial soil erosion in this and other upland areas recently taken into cane may take its toll of productivity in the future (Clarke and Morrison, forthcoming).

The income of cane growers

The grower price of sugar cane increased from under $10/t in the period 1970 to 1973 to $31.6/t in 1975 and, after a moderate decline, again rose to $35.2/t in 1980. This strong upward trend, albeit with some fluctuations, was determined by the rising growers' share of total sugar income, by the Lomé Convention agreement, and by the two upward cyclical movements in the world sugar price mentioned earlier. In real terms the grower price remained between forty per cent and 150 per cent above its level of the early 1970s throughout the period from 1974 and 1980 (Table 6). In 1981 it declined sharply to only nineteen per cent above its 1970 level in real terms, and in 1982, assuming a final money price of $25/t, it declined again to only six per cent above its real 1970 level.
Table 6 also contains the trends in grower gross income in current and real terms for the same period. These follow the equivalent trends in prices except, due to some improvement in average yields over the period, the real gross income per grower remained above the real grower price in the final years of the series. These trends need placing in a wider context. It is most unusual for the terms of trade of small farmers in developing countries to sustain positive real growth over any length of time. This is due in part to adverse price trends in international markets, in part to the propensity of governments to tax agricultural export crops and especially to tax windfall external price gains in such crops, and in part to wider development policies which tend to depress farm prices relative to non-farm prices (Lipton, 1977: 287-324). In a separate paper the author has shown, first, how the trend of real sugar incomes was part of a more general rise in the income terms of trade of the agricultural sector in Fiji during the 1970s, and, second, how this experience contrasts sharply with that of another mainly agrarian developing country over the same period (Ellis, 1984).

The trend in the real net income of cane growers depends on the behaviour of real costs as well as prices. Unfortunately information on growers' costs of production are difficult to compile with any accuracy for earlier years. An examination of available evidence for 1981(12) suggests that the average unit cost of production then was approximately $16/t, thus giving a net income per grower of $2,100, based on an average output of 210 tonnes per grower and an average net income of $10/t. This figure assumes, however, that all production costs including cane harvesting are experienced as cash expenses by growers. It is therefore a minimum estimate. If, at the other end of the range, all hand cultivation and harvesting were undertaken entirely by family members, together accounting for about $9/t of unit costs, the net return to family labour would rise to $4,000 for an average farm. Again, these figures are worthy of reflection by comparison with the low real incomes usually associated with small-farm production in developing countries.

D. CANE HARVESTING AND HIRED CANE CUTTERS(13)

Cane harvesting in Fiji is entirely manual, and is organised on the basis of a harvesting gang system. This system originated under CSR with the idea that growers on adjacent farms should co-operate together to undertake the
harvesting of their cane. Thus, they formed a group large enough to ensure a continuous rhythm of cutting over the season, given that different blocks of cane on different farms mature at different stages. The merit of such a system is that cutting quotas, issued to ensure an even daily flow of cane to the mills, can be worked out for a manageable number of gangs rather than for the thousands of small growers taken individually. It also means, in the case of cane transported to mills by rail, that the allocation and distribution of cane trucks on the tramline system is a manageable operation. In short, the gang system is a specific solution to the inherent difficulties of co-ordinating the harvesting and transport schedules of numerous small individual cane growers.

The cane-harvesting gangs

In 1982 there were roughly 1,200 harvesting gangs in the Fiji cane zones utilising a total labour force of some 24,000 persons. The number of growers per gang, known as gang members, was roughly seventeen, the average gang strength was 20 persons (total number of cutters and ancillary labour in gang), and the average output per gang was 3,400 tonnes of cane.

The Fiji Sugar Corporation considers these figures to represent a rather sub-optimal average size of gang. Larger gang size, service area and output would better serve the goals of least-cost organisation of cutting schedules, optimal truck allocations, and the maintenance of an even flow of cane on a daily basis into the mills. The low values reflect a tendency towards fragmentation in the gang system caused mainly by the increase of lorry-hauled cane in new production areas not serviced by the tramline network. The size of the harvesting workforce also reflects labour supply pressures which have resulted in a great expansion of employment in this seasonal activity, but at the expense of low average productivity and earnings. These considerations are more fully explained below.

The gang system is regulated by institutional procedures, with which all growers must comply if they are to be issued with cutting orders for their cane. Every grower must be a member of a harvesting gang and sign a gang indemnity form, even if, as is prevalent in new cane areas, he chooses to be responsible only for his own cane. In this case he would constitute a one-member gang. More typically the system
should work briefly as follows. A group of growers on adjacent farms, perhaps numbering 25 to 30, have a meeting in advance of the harvesting season and elect from between themselves a gang committee and a sirdar (gang foreman). Each member-grower is required to supply sufficient labour to cut his own cane, which means that if he, or other members of his family, are not themselves prepared to do the harvesting they must nominate so-called 'substitutes' (hired labour) in their place. Each gang completes a Memorandum of Agreement which specifies the agreed rates of pay for the various gang members, the transport cost per tonne which the gang expects to incur, and the penalties to be imposed on gang members who fail to comply with their obligations. This Memorandum of Agreement, and associated indemnity forms, constitute the basis on which FSC makes cash advances to gangs, advances which are deducted from the final cane payments due to the individual growers.

The size and composition of gangs

Trends in the estimated size and composition of harvesting gangs in the period between 1974 and 1982 are shown in Table 7. The source of this data is an annual census undertaken by FSC throughout the cane zones in October of each year. This reveals the substantial overall increase in the size of the cane harvesting labour force up to 1980, more than 10,000 additional people taking up employment in this activity. The table also shows the declining participation of growers themselves in harvesting (from 25 per cent to eighteen per cent), and the corresponding rising proportion of hired labour (from 38 per cent to 46 per cent). The participation of growers' sons has remained more or less constant over this period, fluctuating between 36 per cent and 37 per cent of gang strength.

A rather more detailed breakdown of the harvesting labour force, showing its ethnic composition and distribution by function, is given for the years 1980-1982 in Table 8. Of the average gang strength of 23,800 persons indicated for this period, 4,200 were growers, 8,600 were growers' sons, and 11,000 were substitutes. This means that the net contribution of cane harvesting to total employment in Fiji was 19,600 persons or 9.5 per cent of the economically active population. Hired wage labour in the sugar industry alone constituted over five per cent of the economically active population. The ethnic composition of hired cane harvesters is relevant
TABLE 7: DISTRIBUTION OF THE HARVESTING LABOUR FORCE BETWEEN GROWERS, GROWERS' SONS, AND SUBSTITUTES 1974–82

<table>
<thead>
<tr>
<th>Year</th>
<th>Growers</th>
<th>Growers' sons</th>
<th>Substitutes&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Total labour force no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>%</td>
<td>no.</td>
<td>%</td>
</tr>
<tr>
<td>1974</td>
<td>3,257</td>
<td>24.8</td>
<td>4,834</td>
<td>36.9</td>
</tr>
<tr>
<td>1975</td>
<td>3,168</td>
<td>22.6</td>
<td>5,179</td>
<td>36.9</td>
</tr>
<tr>
<td>1976</td>
<td>3,808</td>
<td>23.3</td>
<td>6,065</td>
<td>37.2</td>
</tr>
<tr>
<td>1977</td>
<td>3,475</td>
<td>20.3</td>
<td>6,237</td>
<td>36.4</td>
</tr>
<tr>
<td>1978</td>
<td>3,585</td>
<td>19.4</td>
<td>6,985</td>
<td>37.7</td>
</tr>
<tr>
<td>1979</td>
<td>3,984</td>
<td>19.0</td>
<td>7,897</td>
<td>37.6</td>
</tr>
<tr>
<td>1980</td>
<td>4,043</td>
<td>17.3</td>
<td>8,600</td>
<td>36.8</td>
</tr>
<tr>
<td>1981</td>
<td>4,443</td>
<td>18.6</td>
<td>8,494</td>
<td>35.6</td>
</tr>
<tr>
<td>1982</td>
<td>4,287</td>
<td>17.7</td>
<td>8,677</td>
<td>35.9</td>
</tr>
</tbody>
</table>

<sup>a</sup> Hired labour.

Source: FSC Harvesting Gang Census.

because the significance of cane cutting as a source of livelihood differs greatly between the Indo-Fijian and Fijian participants.

Indo-Fijians and Fijians: some differences

For Indo-Fijian cane harvesters the distinction between growers' sons and substitutes is in practice rather blurred. Growth of cane growers' families through the generations has meant that it has become increasingly difficult for all sons, or grandsons of growers to remain on the family small farm. Those who do not leave the cane zones may become substitute cutters for other growers, and while some of them may have some sort of residence on their family farm others become true landless labourers.

The figure of about 6,750 Indo-Fijian substitutes is estimated to include some 5,000 persons who are landless labourers, for whom seasonal cane cutting is the main basis of
survival. (15) This is the poorest social group in the Fiji economy, as we shall see below. This group would experience acute deprivation in the absence of this source of income, access to which is contingent on the present industry structure. The social significance of this form of employment in a society divided into two very separate ethnic groups should not be ignored. The alternative to cane cutting for the landless labourers would be unemployment in towns, with all the social and political implications which this would entail.

TABLE 8: COMPOSITION OF THE HARVESTING LABOUR FORCE

AVERAGE 1980-82

<table>
<thead>
<tr>
<th>Category of labour</th>
<th>Indo-Fijians</th>
<th>Fijians&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Total labour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>no.</td>
<td>no.</td>
</tr>
<tr>
<td>Cane cutters</td>
<td>13,525</td>
<td>5,342</td>
<td>18,867</td>
</tr>
<tr>
<td>Growers</td>
<td>1,866</td>
<td>450</td>
<td>2,316</td>
</tr>
<tr>
<td>Growers' sons</td>
<td>5,925</td>
<td>898</td>
<td>6,823</td>
</tr>
<tr>
<td>Substitutes</td>
<td>5,734</td>
<td>3,994</td>
<td>9,728</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gang overheads&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4,239</td>
<td>693</td>
<td>4,932</td>
</tr>
<tr>
<td>Growers</td>
<td>1,641</td>
<td>300</td>
<td>1,941</td>
</tr>
<tr>
<td>Growers' sons</td>
<td>1,578</td>
<td>189</td>
<td>1,767</td>
</tr>
<tr>
<td>Substitutes</td>
<td>1,020</td>
<td>204</td>
<td>1,224</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total gang</td>
<td>17,764</td>
<td>6,035</td>
<td>23,799</td>
</tr>
<tr>
<td>Growers</td>
<td>3,507</td>
<td>750</td>
<td>4,257</td>
</tr>
<tr>
<td>Growers' sons</td>
<td>7,503</td>
<td>1,087</td>
<td>8,590</td>
</tr>
<tr>
<td>Substitutes</td>
<td>6,754</td>
<td>4,198</td>
<td>10,952</td>
</tr>
</tbody>
</table>

<sup>a</sup>Contains an average of five persons described in the FSC Census as 'Other'.

<sup>b</sup>Refers to all non-cutting members of gangs, i.e. sirdars, linesmen, water carriers, bullock drivers, etc.

Source: FSC Harvesting Gang Census.
The position of Fijians as hired cane harvesters, numbering 4,200 in Table 8, is generally rather different. The majority of Fijian cutters migrate into the cane zones seasonally from villages elsewhere in Fiji and return to their villages at the end of the season, where they have, at minimum, a subsistence basis of livelihood. It is not known accurately, except for the special case of Seaqaqa described below, what proportion of them originate from villages close to the cane zones rather than distant locations in Viti Levu, or from the outer islands. However, interviews with gangs in 1982 suggest that in the Western Division of Viti Levu the main sources of Fijian cutters are interior villages in the same provinces as the sugar zones, together with the Yasawa Islands and Kadavu. Some harvesting gangs have special arrangements with particular villages to supply a given number of cutters each year. Other cutters are sent out from particular villages in collective schemes to raise funds for village projects.

The case of Seaqaqa

The case of the Seaqaqa sugar development project is of special interest. Having been carved out of mainly uncultivated bush in a previously sparsely populated area of Vanua Levu, the Seaqaqa project experiences a genuine, though local and probably temporary, shortage of cane cutters. The resolution of this shortage has hitherto been left to the initiative of individual growers, supplemented to varying degrees by organised recruitment from the outer islands.\(^{(16)}\) The distribution by origin of cane cutters at Seaqaqa during the 1982 season is shown in Table 9. This reveals that only about twenty per cent of the nearly 2,000 cutters originated in Seaqaqa itself or from immediately adjacent settlements. A further forty per cent originated in interior villages of Macuata province, Bua province, and Cakaudrove province, all on the Vanua Levu mainland. The origin of the remaining forty per cent was widely distributed over the entire pattern of islands from Taveuni in the north, through the Lomaiviti group, the northern Lau islands, southern Lau islands and Kadavu. A few of the smaller Lau islands appear to have sent a rather large proportion of their total male population to Seaqaqa in 1982.\(^{(17)}\)
TABLE 9: NUMBER AND ORIGIN OF CANE CUTTERS AT SEAQAQA,

HARVESTING SEASON 1982a

<table>
<thead>
<tr>
<th>Locationb</th>
<th>Cane cutters no.</th>
<th>Percentage distribution %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Northern Division (mainland)</td>
<td>1,220</td>
<td>61.4</td>
</tr>
<tr>
<td>1. Seaqaqa and localc</td>
<td>387</td>
<td>19.5</td>
</tr>
<tr>
<td>2. Other Macuata</td>
<td>270</td>
<td>13.6</td>
</tr>
<tr>
<td>3. Bua</td>
<td>392</td>
<td>19.7</td>
</tr>
<tr>
<td>4. Cakaudrove</td>
<td>171</td>
<td>8.6</td>
</tr>
<tr>
<td>B. Northern Division (islands)</td>
<td>171</td>
<td>8.6</td>
</tr>
<tr>
<td>5. Taveuni</td>
<td>148</td>
<td>7.4</td>
</tr>
<tr>
<td>6. Qamea</td>
<td>23</td>
<td>1.2</td>
</tr>
<tr>
<td>C. Eastern Division (islands)</td>
<td>532</td>
<td>26.8</td>
</tr>
<tr>
<td>(a) Kadavu</td>
<td>18</td>
<td>0.9</td>
</tr>
<tr>
<td>7. Kadavu</td>
<td>18</td>
<td>0.9</td>
</tr>
<tr>
<td>(b) Lomaiviti Group</td>
<td>178</td>
<td>9.0</td>
</tr>
<tr>
<td>8. Ovalau</td>
<td>12</td>
<td>0.6</td>
</tr>
<tr>
<td>9. Koro</td>
<td>91</td>
<td>4.6</td>
</tr>
<tr>
<td>10. Nairai</td>
<td>14</td>
<td>0.7</td>
</tr>
<tr>
<td>11. Gau</td>
<td>61</td>
<td>3.1</td>
</tr>
<tr>
<td>(c) Lau Group</td>
<td>336</td>
<td>16.9</td>
</tr>
<tr>
<td>12. Vanua Balavu</td>
<td>41</td>
<td>2.1</td>
</tr>
<tr>
<td>13. Cicia</td>
<td>93</td>
<td>4.7</td>
</tr>
<tr>
<td>14. Nayau</td>
<td>17</td>
<td>0.9</td>
</tr>
<tr>
<td>15. Moala</td>
<td>57</td>
<td>2.9</td>
</tr>
<tr>
<td>16. Moce</td>
<td>25</td>
<td>1.3</td>
</tr>
<tr>
<td>17. Komo</td>
<td>11</td>
<td>0.6</td>
</tr>
<tr>
<td>18. Namuka-i-Lau</td>
<td>30</td>
<td>1.5</td>
</tr>
<tr>
<td>19. Vatoa</td>
<td>10</td>
<td>0.5</td>
</tr>
<tr>
<td>20. Not specified</td>
<td>52</td>
<td>2.6</td>
</tr>
<tr>
<td>D. Central Division (mainland)</td>
<td>65</td>
<td>3.3</td>
</tr>
<tr>
<td>21. Tailevu</td>
<td>65</td>
<td>3.3</td>
</tr>
<tr>
<td>E. GRAND TOTALe</td>
<td>1,988</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(Notes to Table 9 on next page)
Notes to Table 9

a This table should not be taken as a completely accurate count of the average number of cane cutters at Seaqaqa during the 1982 season. It is based on censuses undertaken by FSC Field Officers which for Natua Sector was early July 1982 and for Bulivou and Salove Sectors early September. Some groups of cutters from the outer islands came for only half the season, while others arrived mid-season.

b The distribution of cutters by origin is subject to some uncertainty due to the repetition of village names in different locations. For example, Levuka features in both Ovalau and Gau; Somosomo may be found in Taveuni, Gau, and Naviti (Yasawas); Tabia is both the railhead near Seaqaqa and a large village near Savusavu (Cakaudrove).

c This refers to cutters from Seaqaqa itself or from immediately adjacent settlements. The majority of these are cutters resident on Seaqaqa farms.

d Refers mainly to villages in the interior around Seaqaqa or in Korotulutulu, Batiri, Dreketi, etc. However, some of these cutters come from villages to the east of Labasa.

e 1,723 cutters were Fijian (86.7%) and 265 cutters were Indo-Fijian (13.3%). 234 of the Indo-Fijian cutters were from Seaqaqa itself, twenty were from nearby locations and eleven were from Bua.

Source: Enumerations undertaken by FSC Field Officers, Seaqaqa.

The pay of cane-cutters

Throughout the cane zones the pay of cane cutters is on a piecework basis per tonne harvested. However, there is great variability in how this piecework system is implemented between different gangs and different locations. In some cases it takes the form of a single uniform payment per tonne agreed by all the grower members of the gang at the beginning of the season; in others the gang agrees only a minimum rate, leaving individual growers to pay their own substitutes a 'bonus' of varying amounts above the minimum rate; in still others a basic rate is tied to a bonus which varies according to the productivity of individual cutters.(18) A sample of
declared rates for cutting green cane, covering 346 harvesting gangs, gave an average rate of $4/t in 1982, with a standard deviation of $0.50. An interesting feature of this exercise was that the rate tended to increase for cane sectors in the vicinity of large towns (specifically it was $5/t close to Lautoka and Labasa towns), and decreased for cane sectors near the smaller mills (Rarawai and Penang) and towards the perimeter of all cane zones.

Construction of a trend for the average piecework rates for cutting green cane is difficult due to the scarcity of historical data. One source of information, hard to find for a run of years, is the record books of payments to cutters kept by gang sirdars. These are very accurate because the gang sirdar must be able to demonstrate to grower members of his gang the payment of wages to each grower's substitutes, and also because they are required for tax purposes. These record books are seldom kept for long because the position of sirdar is usually rotated between gang members, and because losses occur when houses are destroyed by the hurricanes which from time to time hit one or other part of the cane zones.

The wage trend for cutting green cane given in Table 10 is taken from such record books for one gang, selected in part because a complete set of books was available back to 1970 and in part because the data concur accurately with other more fragmentary evidence on this trend. It reveals that the piecework rate increased quite slowly from $0.84/t in 1970 to $1.30/t in 1974, after which it more than doubled to $3.00/t in 1975, and rose sharply again to $4.00/t in 1977. From 1977 to 1982 there was only one minor increase in the money wage to a level of $4.35/t. This progression is closely related to the increases in the grower price of cane in the mid-1970s, and also, up to 1977, closely follows the trend of wage rates elsewhere in the economy. Where it departs from both these comparisons is in the stagnation of the rate since 1977, which implies that cane cutters scarcely participated in the enormous surge of grower income which accompanied the 1980 sugar price boom. It also means that the real wage has fallen since 1977, ending in 1982 at only 65 per cent above its 1970 level in real terms.

Given that cane cutting is paid on a piecework basis, the total earnings obtained by cutters is dependent on the volume of cane which they harvest in a season as well as the wage rate. There is a widely held view in the sugar industry that the productivity of cutters has been declining steadily over
TABLE 10: TREND OF WAGE RATES, GREEN CANE HARVESTING,

NATOVA SECTOR 1970-82

<table>
<thead>
<tr>
<th>Year</th>
<th>Green cane wage rate$ per tonne</th>
<th>Indices 1970 = 100.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic rate</td>
<td>Agreed bonus</td>
</tr>
<tr>
<td>1970</td>
<td>0.65</td>
<td>0.20</td>
</tr>
<tr>
<td>1971</td>
<td>0.65</td>
<td>0.20</td>
</tr>
<tr>
<td>1972</td>
<td>0.80</td>
<td>0.20</td>
</tr>
<tr>
<td>1973</td>
<td>0.90</td>
<td>0.20</td>
</tr>
<tr>
<td>1974</td>
<td>1.00</td>
<td>0.30</td>
</tr>
<tr>
<td>1975</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>1976</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>1977</td>
<td>3.50</td>
<td>0.50</td>
</tr>
<tr>
<td>1978</td>
<td>3.50</td>
<td>0.50</td>
</tr>
<tr>
<td>1979</td>
<td>3.50</td>
<td>0.50</td>
</tr>
<tr>
<td>1980</td>
<td>4.05</td>
<td>0.30</td>
</tr>
<tr>
<td>1981</td>
<td>4.05</td>
<td>0.30</td>
</tr>
<tr>
<td>1982</td>
<td>4.05</td>
<td>0.30</td>
</tr>
</tbody>
</table>

a Refers only to wage rate for cutting green cane, not to total harvesting cost per tonne.

b Index of total money wage rate deflated by the Consumer Price Index.

c Assumes 1982 inflation rate of seven per cent.

Source: Minutes of the Annual General Meetings of Waimalika Portable Line Gang, Natova Sector, Lautoka Mill.

the past decade, though this is not supported by reference to the output and employment trends shown in Tables 1 and 7 respectively. What is certain is that average productivity was uniformly low throughout the period of sugar industry expansion, but whether this was lower than in former decades is a matter for conjecture in the absence of any prior research on this topic. On the basis of the total output and employment figures, mean seasonal output per cutter averaged
200 tonnes of cane between 1974 and 1982 with no discernible trend over that period.

If this finding is correct then the total real income of cane cutters will broadly have followed the trend in real piecework rates given in Table 10. This income is also very low; at a wage rate of $4.00/t and a productivity of 200 tonnes, the average seasonal earnings of cane cutters in 1982 were in the region of $800. A sample of twelve harvesting gangs comprising 408 cutters, undertaken in 1982, gave an average output of only 170 tonnes and an average seasonal income of $700. This sample also showed extreme variability between gangs and between individual cutters. For example, one cutter achieved a seasonal output of 774 tonnes, while there were several gangs in which few, if any, cutters achieved a seasonal output of 150 tonnes.

The evidence of that sample also suggested that the total harvesting employment figures, as derived from the FSC census, may understate the true number of people engaged in cane harvesting and hence also overstate their average productivity and incomes. In particular, sirdars' record books suggested the existence of a large number of intermittent or 'casual' cutters who enter harvesting gangs from time to time during the season, and whose seasonal output is typically under 100 tonnes. The picture of employment and incomes in cane cutting is thus, in truth, rather more complex and fluid than is suggested by neat arrays of aggregate figures, and it seems likely that manual cane harvesting provides varying degrees of income support for a great proportion of the rural Fiji population, especially Indo-Fijian rural dwellers.(20)

In summary, manual cane harvesting in Fiji plays a vital role in providing access to some form of productive employment and income for a growing proportion of the labour force which would otherwise be unemployed. This role arises because of the slow growth of employment outside agriculture from the mid-1970s onwards, which in turn reflects constraints on Fiji's ability to create a dynamic non-farm sector due to the limited size of its domestic market, its geographic isolation remote from overseas markets, and the onset of world recession. One way of describing this role is to look upon cane harvesting as a rather elastic and unplanned 'work sharing scheme', which adapts the amount of employment it offers to the demand for jobs. The main factors which permit this role are, first, the absence of harvest mechanisation, and second, the piecework form of wage payment which makes it
immaterial to the grower whether one or three people harvest a particular volume of cane.

E. CANE PROCESSING AND FSC EMPLOYMENT

The expansion of sugar cane production in Fiji has obviously required greater processing capacity at the four sugar mills, and this was achieved in a series of investment programs from the mid-1970s onwards. This upgrading of processing capacity does not generally require more labour. It typically takes the form of replacing a given piece of mill equipment of a certain capacity rating by a similar piece of equipment with higher capacity, the labour requirements of operation being the same in both cases.

TABLE 11: FSC EMPLOYMENT BY MAJOR CATEGORY, ANNUAL AVERAGE, 1970-82

<table>
<thead>
<tr>
<th>Yeara</th>
<th>General employees</th>
<th>Mechanics</th>
<th>Supervisors and clerks</th>
<th>Admin. staff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>2,358</td>
<td>411</td>
<td>217</td>
<td>228</td>
<td>3,214</td>
</tr>
<tr>
<td>1971</td>
<td>2,457</td>
<td>427</td>
<td>226</td>
<td>246</td>
<td>3,356</td>
</tr>
<tr>
<td>1972</td>
<td>2,279</td>
<td>445</td>
<td>221</td>
<td>229</td>
<td>3,174</td>
</tr>
<tr>
<td>1973</td>
<td>2,487</td>
<td>452</td>
<td>227</td>
<td>233</td>
<td>3,399</td>
</tr>
<tr>
<td>1974</td>
<td>2,223</td>
<td>459</td>
<td>234</td>
<td>238</td>
<td>3,154</td>
</tr>
<tr>
<td>1975</td>
<td>2,216</td>
<td>496</td>
<td>250</td>
<td>266</td>
<td>3,228</td>
</tr>
<tr>
<td>1976</td>
<td>2,414</td>
<td>533</td>
<td>262</td>
<td>259</td>
<td>3,468</td>
</tr>
<tr>
<td>1977</td>
<td>2,496</td>
<td>539</td>
<td>257</td>
<td>238</td>
<td>3,530</td>
</tr>
<tr>
<td>1978</td>
<td>2,557</td>
<td>588</td>
<td>259</td>
<td>244</td>
<td>3,648</td>
</tr>
<tr>
<td>1979</td>
<td>2,671</td>
<td>649</td>
<td>268</td>
<td>247</td>
<td>3,835</td>
</tr>
<tr>
<td>1980</td>
<td>2,840</td>
<td>696</td>
<td>264</td>
<td>252</td>
<td>4,052</td>
</tr>
<tr>
<td>1981</td>
<td>2,474</td>
<td>710</td>
<td>265</td>
<td>258</td>
<td>3,707</td>
</tr>
<tr>
<td>1982</td>
<td>2,543</td>
<td>687</td>
<td>261</td>
<td>271</td>
<td>3,762</td>
</tr>
</tbody>
</table>

a  Fiji Sugar Corporation year 1 April-31 March.

Source: Fiji Sugar Corporation.
Employment in the mills

This consideration is clearly evident in the trends for FSC employment given in Table 11. Mill workers are the largest category of FSC employees, and their numbers hardly changed over the period under consideration. The minor increase, derived by comparing the last three years (2,619 persons) and the first three years (2,365 persons) of the period, is accounted for by the continuing capital works under construction in the early 1980s.

In addition to mill workers the FSC has three other main categories of employees, the skilled workers ('mechanics') responsible for the maintenance and repair of machines and tramway vehicles; the field officers and clerks associated with management of the cane growers; and administrative staff in the mills and head office. The category described as mechanics is the only one which seems to have experienced any real employment growth over the 1970s, and this is a minor category in the overall picture.

Wages in sugar processing

Employment in sugar processing, like that in cane production, is seasonal in nature according to the length of the crushing season. The variation in average labour use in the sugar mills between the slack and crush seasons is that the former is about 75 per cent of the latter. However, most workers are kept on during the slack season to undertake mill renovation after the crush. The situation for different groups of employees in 1982 is shown below:

<table>
<thead>
<tr>
<th></th>
<th>Crush</th>
<th>Slack</th>
<th>Weighted average</th>
</tr>
</thead>
<tbody>
<tr>
<td>General employees</td>
<td>2,873</td>
<td>2,001</td>
<td>2,543</td>
</tr>
<tr>
<td>Mechanics</td>
<td>685</td>
<td>688</td>
<td>687</td>
</tr>
<tr>
<td>Officers/clerks</td>
<td>272</td>
<td>247</td>
<td>261</td>
</tr>
<tr>
<td>Total</td>
<td>3,830</td>
<td>2,936</td>
<td>3,491</td>
</tr>
</tbody>
</table>

Real wages in sugar processing increased very substantially up to 1977, since when they have tended to remain constant. Table 12 gives three alternative indicators of the growth in current and real wages between 1970 and 1982.
### TABLE 12: WAGE TRENDS IN SUGAR PROCESSING 1970-82

<table>
<thead>
<tr>
<th>Year</th>
<th>General employees minimum wage</th>
<th>General employees average wage</th>
<th>All employees average wage</th>
<th>Trends in real wages indices 1970=100.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/per hr</td>
<td>$/per yr</td>
<td>$/per yr</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>0.270</td>
<td>757.7</td>
<td>858.7</td>
<td>100.0</td>
</tr>
<tr>
<td>1971</td>
<td>0.325</td>
<td>947.9</td>
<td>1,047.1</td>
<td>113.1</td>
</tr>
<tr>
<td>1972</td>
<td>0.400</td>
<td>1,083.6</td>
<td>1,199.5</td>
<td>127.5</td>
</tr>
<tr>
<td>1973</td>
<td>0.432</td>
<td>1,024.0</td>
<td>1,147.3</td>
<td>123.8</td>
</tr>
<tr>
<td>1974</td>
<td>0.613</td>
<td>1,889.6</td>
<td>2,015.2</td>
<td>153.5</td>
</tr>
<tr>
<td>1975</td>
<td>0.800</td>
<td>2,234.4</td>
<td>2,362.3</td>
<td>177.2</td>
</tr>
<tr>
<td>1976</td>
<td>0.920</td>
<td>2,402.8</td>
<td>2,613.4</td>
<td>183.0</td>
</tr>
<tr>
<td>1977</td>
<td>1.010</td>
<td>2,757.5</td>
<td>2,993.5</td>
<td>187.7</td>
</tr>
<tr>
<td>1978</td>
<td>1.070</td>
<td>3,037.2</td>
<td>3,290.8</td>
<td>187.5</td>
</tr>
<tr>
<td>1979</td>
<td>1.140</td>
<td>3,317.8</td>
<td>3,559.2</td>
<td>185.4</td>
</tr>
<tr>
<td>1980</td>
<td>1.245</td>
<td>3,939.7</td>
<td>4,249.4</td>
<td>176.9</td>
</tr>
<tr>
<td>1981</td>
<td>1.419</td>
<td>4,274.2</td>
<td>4,591.9</td>
<td>181.3</td>
</tr>
<tr>
<td>1982</td>
<td>1.561</td>
<td>4,403.6</td>
<td>4,775.1</td>
<td>186.4</td>
</tr>
</tbody>
</table>

- **a** Fiji Sugar Corporation financial year 1 April-31 March.
- **b** Total wage bill in this category divided by average annual number of employees.
- **c** Excluding administrative staff.
- **d** Indices of money wages (1970=100.0) deflated by the Consumer Price Index.

Source: Fiji Sugar Corporation and own calculations.

The first of these is the negotiated minimum wage for general employees which increased in money terms from $0.27/hr in 1970 to $1.56/hr in 1982. In real terms this minimum wage rose by 87 per cent from 1970 to 1977 and has since remained about the same so that over the medium term minimum wage increases have compensated fairly accurately for the trend in inflation. The second index is the average annual gross earnings of general employees (including overtime, holiday pay, and sick pay) which increased in money terms from $758/yr in 1970 to $4,404/yr in 1982. This measure appears to show
real increases continuing beyond 1977, but this is due to the amount of overtime available in the period of mill expansion in the late 1970s. By 1982 its real increase above 1970 is the same, at 87 per cent, as that for the minimum wage. The third wage series is for the average annual wage of all employees excluding administrative staff, which rose in money terms from $858/yr in 1970 to $4,775/yr in 1982. Again this follows the same order of magnitude of real increase from 1970 as the other measures, although in this case there appears to have been a slight decline between 1980 and 1982.

These trends show the influence of a joint consultative body called the Tripartite Forum in bringing to an end the rapid real wage increase which occurred in most formal sector activity in Fiji following Independence. The Tripartite Forum, consisting of representatives of government, labour unions, and employers, was established in 1977. Since then wages in the Fiji Sugar Corporation, as elsewhere in formal sector activity in Fiji, have levelled off in real terms, minor annual fluctuations merely reflecting the phasing of nominal wage increases with respect to the rate of inflation. It may also be noted here that the trend of the negotiated minimum wage for sugar mill workers during the 1970s was very similar to that experienced by government employees.(21)

F. CONCLUSIONS AND ISSUES OF FUTURE POLICY

This paper has demonstrated the powerful capacity of small-farm sugar cane production in Fiji to generate large and widespread employment and income effects. It is estimated that in 1982 some 48,000 persons were working in the industry, of which 4,000 were employed in sugar processing, 24,000 were sugar growers or other persons economically active in cane cultivation, and 20,000 were non-grower workers in cane harvesting gangs. When account is taken of the indirect employment effects of the industry, such as cane cartage, it is evident that more than a quarter of the total Fiji labour force in 1982 were employed either permanently or as seasonal wage labour in the sugar industry and closely related activities.
Potential consequences of mechanisation

It is notable that these effects are confined to the labour-intensive agricultural components of the sugar economy, not to its 'modern' capital-intensive component, the sugar mills. This contrast within a single industry in a small economy exemplifies the more general issue of technological choice, and its effects, in the context of the labour abundant, mainly agrarian, economies of the Third World. The utilisation of modern technologies, whether in industry or in agriculture, tends to economise strongly in labour as the factor of production which is in most abundant supply, thus exacerbating the problem of access to productive employment and extending the incidence of deprivation. There is, however, an important distinction between industry and agriculture in regard to this technological choice, on which again the Fiji case sheds light. While manufacturing production often requires highly mechanised techniques in order to produce a standardised output of a specification and quality which is acceptable to the competitive international market, this is seldom true of agriculture. Sugar cane is sugar cane whether it is produced by hand labour on a small farm or on a plantation with tractors and a mechanical harvester. Indeed, in the case of sugar cane harvesting, mechanisation requires a fall in the quality of the output because the mature cane must be burnt to fit limitations of machine design.

The main conclusion of this paper is the demonstrated advantage for Fiji of continuing to preserve and consolidate the small-farm system of sugar production, and the manual harvesting system with which it is associated. This conclusion requires emphasis because it is in the nature of the working of the international economy for commercial pressures to be brought to bear to alter the structure in order to employ more machines. This pressure is most strongly exerted with respect to harvest mechanisation, where the size of the Fiji sugar industry represents a potential market of millions of dollars worth of machines and spare parts, were the Fiji government to lift the import ban on mechanical harvesting equipment.

Harvest mechanisation is the most critical issue of policy choice which the sugar industry in Fiji faces in the future. The evidence of this paper suggests that mechanisation would have deleterious economic and social consequences. On the employment side the arithmetic of this
EMPLOYMENT AND INCOMES IN SUGAR

is simple. With a minimum estimate of around 20,000 non-grower workers in harvesting gangs in Fiji, a mere doubling of the average output per cane cutter would throw 10,000 additional people into the employment market, in which the growth of non-agricultural activity at the time of writing is slow and doubtful. But mechanised harvesting would considerably more than double the average output per person. It has been estimated that the fully mechanised chopper-harvester, such as is now used in the Australian sugar industry, reduces the labour requirements of harvesting to one twentieth its manual level. (22) Nor do the economic implications stop there. In the longer term, mechanisation would cause the disintegration of the small-farm structure, since only the larger and richer growers would be capable of acquiring machines, and their efficient utilisation would require the concentration of farms into much more extensive holdings. It would also greatly and permanently increase the foreign exchange costs of sugar production in Fiji, due to the importation of the machines themselves, spare parts to keep them going, and the fuel to run them. Last but not least, machines could not effectively be used on the more steeply-sloping lands, so that their introduction would widen social differentials within the industry.

Conclusion

This paper has shown how sugar industry development in the 1970s was associated with generally rising real incomes for the various categories of labour in production and processing. Real wages and incomes of all participants rose steeply through the mid-1970s, and for growers reached a peak in 1980. For cane cutters and growers these gains were later subject to erosion, but at least up to 1982 these two groups were still better off than they had been a decade earlier.

If external pressures further erode these income gains in the future, the social group most at risk in the Fiji economy as a whole is the category of landless Indo-Fijian cane cutters. It is tempting to think that the position of this group could be improved by changes, such as reorganisation of harvesting gangs and partial or total mechanisation, which would raise their productivity and hence their seasonal earnings. However, this neglects the labour supply side of the equation. Productivity in cane cutting in Fiji is low because of the number of people who seek labour in the cane fields, not because manual harvesting intrinsically involves
such low output per person. The cause of low productivity is
the absence of alternative work for those who depend on cane
harvesting for family survival. In effect the sugar industry
acts as an informal social security system for a major section
of the population which would otherwise be unemployed. The
fulfilment of this role is clearly contingent on the
flexibility inherent in the current organisation of the
industry.

A final comment is required concerning the future size of
the Fiji sugar industry. The small-farm system has hitherto
proved remarkably robust over a period of some sixty years, in
spite of periods of very low world prices and gloomy
predictions about the future of cane sugar. Part of the
flexibility of the small-farm structure is that individual
growers can adapt to changing market circumstances in a way
which would be impossible for a plantation with a large amount
of fixed capital, invested in a specific line of production.
In times of adverse prices the individual sugar growers are
able to utilise part of their farm for the cultivation of
subsistence crops or alternative cash crops, and
correspondingly reduce their commitment to sugar production.
In the future this flexibility may become more important,
since Fiji may not be able to sustain the level of its sugar
output in the face of adverse international market conditions.
This is not a reason to take irrevocable steps to reduce
permanently the size of the industry. In the final analysis,
the growers themselves will decide whether, and at what price
levels, it is worth their while staying in cane production.
The equilibrium output for a given cane price will thus tend
to find its own level.
NOTES

1. There was much debate about whether the Eve Contract gave the millers 'all their costs as a first charge' against the gross proceeds (Fiji Government, 1970:5). The reference division in the Eve Contract was arrived at by first deducting 30% of the gross proceeds to cover millers' costs, and then granting growers a proportion of 82.5% of the remaining 70% of the proceeds (Fiji Government, 1961:28-33). In an attempted rebuttal of Denning, CSR (1970:16-19) pointed out that the practical effect of this formula was the same as a straight split of 57.75% to the growers (82.5% of 70% = 57.75% of the gross). However, this proportion was arrived at by full deduction of costs at the time of negotiation, and was subject to an adjustment mechanism which ensured that the CSR could claw back half of any additional costs incurred above the 30% guideline as a first charge against revenue. Given that CSR also received the 17.5% of the 70% left for distribution, the net effect of the Eve Contract was that it was arithmetically almost impossible for CSR to make a loss under its provisions.

2. The Fiji Government holds eighty per cent of the share capital of FSC, the remaining twenty per cent being held by institutions of Fiji ownership or private individuals of Fiji citizenship.

3. The 1980 increase gave higher percentage proportions to the growers only for the value of sales derived from output above specified quantities. These were 72.5% for sugar production in excess of 325,000 tonnes, and 75% for sugar production above 350,000 tonnes.

4. The quota held by Fiji under the Sugar Protocol of the Lomé Convention is the same as that previously held under the Commonwealth Sugar Agreement, which regulated sales of cane sugar into the United Kingdom prior to EEC Accession in 1973.

5. The agreements with Malaysia, New Zealand, and Singapore, covering 145,000 tonnes in 1983, were at prices rather more favourable than, but linked to, those ruling on world markets. The agreement with China, covering 40,600 tonnes in 1983, was at world price levels.

6. This is a relatively minor assumption designed to achieve
 comparability with the 1976 Population Census and does not substantively affect the orders of magnitude underlying the discussion which follows.

7. It was estimated by the Employment Mission in 1983 that the rate of open unemployment in Fiji may have declined from 6.7% in 1976 to as low as 4.7% in 1979, in spite of a major slow down in the growth of formal sector employment outside the sugar industry and a rising trend of new entrants to the labour force.

8. To give one comparative figure, the average proportion of gross export revenues returned to domestic factors of production in the case of plantation production of bananas in Central America was 53% in the 1970s (Ellis, 1981).

9. These figures for the import cost of sugar production include only the major categories of capital goods and intermediate inputs (fertilizers, chemicals) imported and distributed to growers by the Fiji Sugar Corporation. They exclude purchase of inputs by individual growers out of their own income, which in the input:output table are subsumed in the import costs of consumption rather than production.

10. Yaqona (Piper methysticum) is a root-crop beverage consumed in substantial quantities by both ethnic populations, but is grown almost exclusively in the Fijian village economy. Indo-Fijian consumption of this crop on its own ensures a significant transfer of income from the sugar economy into the village sector.

11. For international comparisons of farm size structure, the reader is referred to Berry and Cline (1979).

12. The source of information on average production costs given here was the Fiji Sugar Corporation.

13. This section represents a highly condensed summary of a detailed report on cane harvesting in Fiji, based on fieldwork and interviews with harvesting gangs undertaken in late 1982. The original report was produced as Working Paper No. 9 of the Fiji Employment and Development Mission, entitled 'A Study of Employment and Earnings in Cane Harvesting in Fiji', (Central Planning Office, Suva, August 1983).
14. The annual census of harvesting gangs undertaken by the FSC is a highly accurate source of information on many aspects of the harvest labour force. It is a comprehensive census covering all gangs; it is based on seven days continuous observation during which, for each day, the gang sirdar is required to record the exact number of people working in the gang; and it is very detailed as to the composition of gang strengths by function and ethnicity. Its one major problem lies in the way FSC aggregates the data and converts it from man-days to number of people, in which the critical assumption is made that all gangs worked for a full seven days during the census work (i.e. total man-days are aggregated and this total is divided by seven). An examination of a sample of census returns in 1982 revealed that this assumption was quite incorrect: the sample average number of days worked was five, not seven, yielding a forty per cent revision upwards of the total size of the harvesting labour force for a given total number of man-days. This paper uses the conversion factor of five rather than seven for all the data on total employment in cane harvesting.

15. This figure accords closely with separate evidence yielded by the 1977 Household Income and Expenditure Survey (Fiji Government, 1982), and an as yet unpublished Employment Survey undertaken by the Fiji Bureau of Statistics in 1982.

16. A recruitment which is organised, it is understood, by the Prime Minister's Office through the Fijian Administration.

17. If the number of cutters cited in Table 4 is compared to the number of households given in the 1976 Population Census we get for Cicia island 93 cutters from 278 households; for Moce island 25 cutters from 86 households; and for Nayau island 12 cutters from 75 households. H.C. Brookfield informs me that in 1983, when the Government-managed search for cane-cutters was extended still more widely, all but three able-bodied men from a village on Fulaga had gone to Seaqqa. Fulaga was in receipt of hurricane-relief supplies at the time, and concern was expressed that it would be difficult to carry the next delivery across the island from the landing to the village!
18. A more detailed account of these piecework wage systems can be found in the original working paper on cane harvesting, cited in footnote 13 above.

19. Wage payments to cane harvesters are subject to a flat rate income tax of 2.5%, deducted at source by the gang sirdar.

20. One calculation made by this author suggested, on the basis of including intermittent and 'casual' cutters in the computation of average productivity from the sample, that the true figure of 'employment' in cane harvesting might be 30,000 persons (or fifteen per cent of the economically active population in 1982).

21. It follows almost exactly the trend for government wage workers in the Public Works Department.

22. Private communication with Dr Andrew Macgregor, then of Central Planning Office, Fiji, the figure being based on research into the impact of harvest mechanisation undertaken in Barbados in the mid-1970s.
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AN HISTORICAL AND PROSPECTIVE ANALYSIS

OF THE COCONUT ECONOMY AND THE COCONUT DISTRICTS OF FIJI

Harold Brookfield
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This study of the coconut industry of Fiji, and of the regional economy of the 'coconut districts' of Fiji, is a somewhat shortened version of a report prepared for the Government of Fiji within the Fiji Employment and Development Mission (FEDM), and completed in September 1983. I have not again visited Fiji since its completion, and the text has been only lightly revised to update its contents. Large parts of the text follow the report word-for-word, the principal changes being at the end where the report discussed implementation of a 'Tree-crops Development Project' which Government decided not to prosecute as planned.

Substantial detail is presented, for the reason that this is the only place in which much of this detail is gathered together. During most of the period that has elapsed since completion of the original report the price of copra has remained favourable, easing many of the pressures on the industry and region which are described in the following pages. However, a major decline began early in 1985 and continued at least through August, although further cyclones and drought in the Philippines have checked output in that country. The effect of two years of good prices would form an interesting conclusion to this study, but for want of the necessary field work it has to go unreported. Most of the paper therefore ends with the industry just emerged from its longest and most severe depression in recent times.

My work on the coconut industry of Fiji began in the 1960s, when it formed part of research for Melanesia (Brookfield and Hart, 1971). It was resumed and greatly intensified during the life of the UNESCO/UNFPA Population and Environment Project in the Eastern Islands of Fiji between 1974 and 1976. It was again taken up in 1982 and 1983, as part of my work for FEDM, and in the course of a revisit to our 1974-76 research sites by T.P. Bayliss-Smith, R.D. Bedford, M. Brookfield and myself. A series of 'snapshots' is supplemented by documentary research and from ephemeral sources.

The financial backing for research has included the Australian National University, UNFPA through UNESCO, and the EEC through FEDM. I am grateful for much help in Fiji from the Coconut Board, the Central Planning Office, the Ministry of Agriculture and Fisheries and the Ministry of Fijian Affairs, and am particularly grateful to the Prime Minister's
Department for the invaluable provision of a ship in which to revisit several islands in 1983. Numerous Fijian farmers, and a considerable number of planters have been most generous with time and information; among companies, Burns Philp have been outstandingly co-operative. In Canberra, Kim Ayvazian and Judith Ly have given invaluable research assistance, and Theo Baumann and Nigel Duffey have drafted the maps and diagrams. Pauline Falconer and Carol McKenzie word-processed the text, and endured numerous changes.

Note: Long tons are 'lt', and tonnes 't' throughout.
COCONUT ECONOMY

CHAPTER 1

DEFINITION AND MEASUREMENT

A. DEFINITION OF THE COCONUT ECONOMY AND REGION

The 'coconut economy' is here taken to mean the production complex in which copra and coconut oil are and/or have long been major sources of cash income. Within the 'coconut regions' there are many farms which produce no copra, or produce it only rarely. Vegetable crops, and more recently yqona, are important alternative sources of cash; fish may also be sold. However, coconut palms dominate the coastal landscape of these regions, and the copra trade is the basis of their transportation system. Farms growing coconuts comprise only thirteen per cent of all farms in Fiji by the 1978 Census of Agriculture; they exceed fifty per cent only in the three Provinces of Rotuma (where apparently 112 per cent of all farms grow coconuts), Cakau and Lau, and exceed twenty per cent in Rewa (the delta and Beqa), Kadavu, Lomaiviti and Bua. Significant areas are also found in parts of Tavelevu and Macuata, and on the Yasawas (Ba). The 'coconut regions' thus defined hold between 90,000 and 100,000 people, and about ninety per cent of the 8,681 'farms' growing coconuts, as defined by the Agricultural Census, lie within them. This census figure is improbably small; on Taveuni and Qamea alone 1,131 farms sold copra in 1974 and 1975 (Brookfield and Hardaker, 1978).

A 'constant' to be remembered: the food use of coconuts

Throughout Fiji, coconuts are also used for food. In the coconut regions almost every cooked meal employs coconut milk (lolo) derived by grating the meat and straining the product. Data collected in the rural areas show that families with good stands of palms might consume about 600 nuts/capita/yr, and a reasonable estimate of average consumption might lie between 300 and 400. At 6,000 nuts to a tonne of copra, then, each twenty persons would at the lower figure consume the equivalent of a tonne. Actual consumption varies greatly, but on certain islands it may absorb nuts equivalent to from ten to thirty per cent of normal copra production, and substantially more in periods of low yield after drought or...
hurricane.

Estimates of the domestic consumption of coconuts cover a wide range, and figures of around 5,000 to 8,000 tonnes copra equivalent used a few years ago have been raised to from 13,500 to 15,000 tonnes by Coconut Board estimates made in 1978 and cited in FAO (1980) and in the documentation of the Tree-crops Project. The FAO team offered a projection of domestic use as high as 24,000 tonnes of copra equivalent by 2006. The shift toward higher estimates has probably moved from understatement to overstatement of the actual position, but it seems very clear that domestic consumption is increasing and that it now absorbs a large proportion of the total output in areas close to urban markets, such as Rewa, the Yasawas and Macuata. In early 1983 whole nuts were selling at from eight to ten cents in Labasa, at fifteen cents in Suva market and at up to twenty cents husked in suburban Suva shops, or in Lautoka. This writer has seen forty bags of whole nuts being transported, under unknown freight-cost arrangements, on a Government vessel sailing from Lau to Suva; the nuts were consigned to a Chinese wholesaler. It is possible, though not verifiable, that a significant part of the recent decline in copra production is due to the growing market for whole nuts within Fiji, and this possibility has to be borne in mind.

B. THE AREA UNDER COCONUTS AND THE AGE OF TREES

Most current documentation on the coconut industry, including the basic documentation of the Tree-crops Project, estimates the coconut area of Fiji to be within the range of 80,000 – 89,000 ha. However, the 1978 agricultural census (Rothfield and Kumar, 1980) found only 66,030 ha. All statements on yield are greatly affected by the area on which production is based, and in Appendix I a detailed examination is made of the evidence. From this examination it is concluded that the high-range estimates should be rejected, and that the 1978 agricultural census figure should be regarded as the best estimate, notwithstanding certain imperfections and doubts.

The same examination of the evidence leads to questioning the age estimates of trees. It is found that all age estimates presented in the recent documentation rest on a survey made in 1950, adding subsequent planting but subtracting nothing; all trees ever planted and still
standing in 1950 are assumed still to be standing today. This is demonstrably improbable and there exist data from which better estimates can be derived. It is concluded that although a significant proportion of bearing trees are aged, having been planted before 1918, the proportion of very old trees is less than is generally stated in documents describing the industry. The conclusions of Appendix I are set out below.

Some conclusions about area and age of trees

(a) There is evidence that the coconut area has consistently been over-estimated in most of the literature since World War II. The best estimate of the present area seems around 66,000 ha. It is suggested that this may have grown from around 50-55,000 ha in 1950, about 40-45,000 ha at the onset of the depression in 1930, and perhaps 20-25,000 ha about 1920.

(b) There is evidence that the area and proportion of trees of very old age has consistently been over-estimated. The 1950 data probably estimated a much larger area of pre-1915 trees than were ever planted in those early years, and this source of error has been carried forward until 1980, without amendment.

(c) It is suggested that on the estates, and in some mataqali areas, planting continued at a fairly high rate from late in the nineteenth century until about 1930, and was continued during the depression period on some holdings. Thereafter there was a decline in investment that has continued in a large part of the estate sector; the land-settlement scheme and its sequels have, however, led to substantial new planting on Fijian land, especially on those areas of Fijian land where there is individual tenure under the Land Development Ordinance, and subsequent arrangements.

(d) The consequences of a hiatus in planting after World War II are therefore more serious in the estate sector, much of which relies heavily on palms planted before 1940. There is less reliance on old trees in the Fijian village and settlement sector. This should be reflected in the performance of these two sectors.
(e) Far too little is known about the industry, in terms of area, density and age of palms, and hence also yield and economic life. What should be supplied by hard data is supplied instead by myth. Certain of these myths can be demonstrated to be wrong; others can only be doubted. There is need for accurate information, much of which could readily be obtained at comparatively low cost.
A. PLANTATION AND SMALLHOLDER MODES OF PRODUCTION

Since the break-up of the sugar estates in the 1920s the term 'plantation' in Fiji has been synonymous with the larger-scale coconut producers. Most are in the Northern Division where 209 were recognised by the 1978 Agricultural Census; they had 22 per cent of the coconut area, with an average of 195 ha under palms. There are also a few such units in the Eastern Division, not sampled in the 1978 census. The 'plantations' are not, however, a single and indivisible category, nor is the plantation/smallholder boundary any longer clearly defined. Between thirty and forty of the 'plantations' -- more properly 'estates' -- continue operation as large-scale, centrally-managed production units, employing from ten to as many as seventy workers housed on the estate. They are on freehold or leasehold land, and are operated by both individuals and companies; the largest are owned by multi-nationals. The remainder range from smaller versions of the large estates to holdings that are little more than family coconut farms; some employ a few regular workers but many employ none; most are held by part-European and Indo-Fijian owner-operators, on freehold or leasehold land, although there are some small estates, and a very small number of larger ones, which belong to Fijians. Some of these latter are on formerly alienated land over which leases have expired; some are on individual land within Fijian traditional title (e.g. kovu-kovu, chiefly title); some are the land of mataqali with few surviving members; a few are on freehold land. Their mode of operation ranges from a modified form of the plantation system, through a family-farm type of operation to management by Co-operatives.

Nor is smallholder operation of a single type. Individual holdings of coconuts are recognised on undivided mataqali land, where such holdings are mostly small and scattered. More fully-individualised land emerged first through the galala system, and since the 1960s by subdivision in the land-settlement areas, most of which lay beyond the limits of coconut-planted land at the time of subdivision. Whether or not protected by formal leases, such blockholders
expect title to their land for at least a thirty-year period. Others, holding grants on Fijian title, have their land 'in perpetuity'. A large part of the new planting of coconuts in the 1960s and early 1970s took place on this land, most of which was reclaimed from bush for the purpose. A few of the blockholders have tracts which are the equal of small 'estates' in area; some employ labour, and are more substantial producers of copra than are some of the small 'estates'.

This complex structure, which also contains further elements that have not yet been reviewed, has arisen out of a simple dichotomy between 'plantation' and 'Fijian' land in the early days of the industry. In order that it be understood, its evolution must briefly be traced.

**B. THE EARLY HISTORY OF THE INDUSTRY**

**Origins of the commercial coconut industry** (Figure 1)

Commercialisation of coconut production began in the Fijian system and was only later adopted by European settlers. Coconut oil, obtained from the partly dried coconut meat by pressing, was a minor pre-contact product which became important when it became an item bought by traders early in the nineteenth century. When Tongan dominion was established over Lau, an annual tax of 68 litres of coconut oil per adult male was imposed (Knapman, 1975). Surplus production of coconuts was quickly enlarged, leading to the replacement of other crops by coconuts on much of the coastal arable land. There were already coconut oil 'factories' in Fiji in the 1860s, but between 1870 and 1880 the development of copra-crushing in Europe led to a shift in demand from oil to copra. Taxes and church contributions became payable, through the trade stores, in copra, which was also accepted in payment for consumer goods. Although it did not expand fast enough to suit the traders, the coconut-based cash economy was already firmly established in eastern Fiji by 1890.

The initial plantation crop in Fiji was cotton, and after its failure in the 1870s several other crops were tried. Land was obtained on freehold or lease at a great rate on Cakaudrove in the 1870s, and mainly on lease in northern Lau. The main centre of the planters was in southern Taveuni, where three estates planted sugar in the 1870s. The less-well capitalised planters, however, turned to coconuts, using the
Figure 1: Copra production and prices 1875-1981.
Figure 2: The coconut districts of northern Fiji.
wide spacing that has become standard in order to permit intercropping while the coconuts were not yet in bearing. After the failure of experiments with tea and coffee, and the collapse of the Taveuni Sugar Company in 1895, coconuts became the sole estate crop in eastern Fiji and Cakaudrove, often in association with cattle on the large estates.

The reason for the total adoption of coconuts in the estate sector was probably twofold. In the first place the price of copra ranged from $18-30 per long ton (lt) in the period 1875-85 when most decisions were made, and after sinking as low as $12-18/lt in 1889, recovered steadily to surpass $20/lt again in 1899 after which there was a steady improvement to $44/lt in 1913 and then some fluctuation to a peak of $69.40/lt in 1920 (Figure 2). Provided the costs of production could be contained, copra was a profitable crop. Costs were contained during this period by the availability first of Solomon Island and New Hebridean labour, then Indian labour, at determinate cost under indenture; Indian labour, with higher recruitment costs was not much employed in the coconut industry until after 1900. In the second place coconut cultivation does not require a high labour density, though the clearing and planting of new land does. The undercapitalised planter who tried to make do with a small labour input could hang on if his own abilities as a manager allowed him to do so, while his better funded neighbours could use larger quantities of labour which, once imported, cost only some fourteen cents/day. Such men were able to expand their plantations, often taking over the land of their less successful neighbours as the latter failed.

There was therefore rapid consolidation. An early land map of Taveuni shows over eighty estates which rapidly diminished in number. The population of the island included over 500 Indians in the 1890s, mostly employed in sugar cultivation at that time, and 666 in 1916. The latter were employed on only sixteen estates; two of these employed over 100 Indians. At that time there were almost 1,500 Indian indentured workers in the coconut districts as a whole, together with a number of 'free' Indo-Fijians some of whom themselves employed labour. However, the coconut industry never employed more than about ten per cent of all indentured Indian workers in Fiji (Bedford, 1978).
The industry between the two World Wars

In the coconut regions as elsewhere, the Fijian population continued to decline until after 1920. Until then almost all the increase in copra production must have come from the estates, which around this time were at their zenith. Some estates which now employ twenty to forty workers then employed from 80-130. Several estates had their own stores and hospitals. In the 1920s, steam-heated copra driers were constructed which in their day were among the most advanced in the Pacific. Oral recollections obtained in 1976 describe a longer working day than at present. Meanwhile clearing and new planting continued. Fijian workers, from the eastern islands in the main, were also drawn into the industry on the Cakaudrove estates, replacing Indo-Fijians who left after 1920. Even in the mid-1930s, when the copra price briefly improved, 670 new contract workers from Lau were signed on for Taveuni estates in 1936; production improved to a new peak, and replanting was resumed. The subsequent return of depression, which took production down to less than fifty per cent of the 1936 peak by 1942, seems to have taken the heart out of the industry. The consequences warrant examination.

In the Fijian village sector there were similar problems. According to some observers of the 1930s, Fijians responded by withdrawing from the cash economy (e.g. Thompson, 1940). Others argue that dependence on purchased goods had by this time become a 'subsistence need' (Knapman, 1975). There is evidence to support the latter view. The Lauan production of copra, excluding the estates, rose from 1,500 lt in 1907 to 4,000 lt in 1940, representing almost 25 per cent of the national total in that year. Whereas estates, on a classical profit-maximisation/loss-minimisation strategy, responded to the second half of the depression by reducing production and laying off workers, the Fijian villagers, behaving as Chayanovian family farmers, responded by increasing production in order to sustain living standards. Unfortunately, this important shift of emphasis within the industry remained wholly unappreciated for another thirty years. The planters, rather than the Fijian producers, had the ear of the authorities.
The industry after World War II

As Figure 1 demonstrates, the price of copra improved sharply after the end of World War II, and production of copra increased rapidly. On the basis of an area estimate of 50,000 ha around 1950, the mean yield of the industry in the years 1948-52 would have been 0.67 tonnes (t)/ha, reaching 0.80 t/ha in 1952. This compares with an average yield in 1926-29 of 0.71 t/ha, based on a low-range estimate of only 40,000 ha of coconuts; if the area were 45,000 ha in 1936, the best pre-war production year, yield would then have reached 0.76 t/ha.

Improvement in yield in the 1950s was achieved by attracting a large new labour force into the estate sector of the industry, and by a substantial increase in the village production of copra, the two in unknown proportions. The new workers in the estate sector, many of them still on one-year contract at that time, included both Fijians and Indo-Fijians. The Fijian population of Cakaudrove increased by 33 per cent in 1946-56, and that of Taveuni alone by 69 per cent, against a national increase of only 26 per cent. The 1956 Fijian population of Cakaudrove Province included 3,507 who were living outside the Province in which they were enumerated as 'landowners', even though most of them came because they 'owned' no worthwhile land; 63 per cent of them came from the four Provinces of Lau, Macuata, Lomaiviti and Tailevu. Indo-Fijians also came from rural areas of the main islands. The Indo-Fijian population of Cakaudrove almost trebled between 1936 and 1966, and on Taveuni increased by 151 per cent between 1946 and 1956 (Bedford, 1978).

Planters improved both wages and conditions in order to attract labour. In 1940 day workers were paid only fifteen cents/day, hardly more than before 1920. In 1946 copra cutters received around thirteen cents/45 kg bag of green copra, that is about 48-50 cents for a normal day's work. By 1948 estates were offering eighty cents/day for day workers and some paid up to $1.00 (Brookfield, 1978). Estate-workers' housing, most of which had been little if at all improved since before 1920, and which was the subject of a strong but ineffective assault by the Health Department in 1944-45, was improved and on some estates rebuilt during the 1950s. Indo-Fijian traders set up shops, and a few cinemas were also built in the copra districts. Heavily-indebted planters were able to dispose of their land to newcomers, who continued to enter the business well into the 1960s.
During this period the whole surplus output of the industry was purchased by the British Ministry of Food, and in 1948 a nine-year contract was signed at a price not allowed to vary by more than ten per cent from one year to the next. Island Industries Ltd, a subsidiary of the Carpenter organisation, established their oil mill at Suva in 1946, exporting the oil after 1948 under this U.K. contract. In 1950 they added a refinery yielding cooking oils and margarine as end-products; unfortunately the process failed to produce a stable margarine, and the whole refinery was closed in 1956. Under the stimulus of a good market, copra production remained consistently above 30,000 t/yr, and surpassed 40,000 t in 1956.

The growth of Fijian production was important during this period. Expansion of the coconut area in the Fijian sector was largely spontaneous, though efforts were made by agricultural extension officers to assist the minority of independent farmers outside the village system. A 'campaign' for replanting started in 1951 achieved only 2,000 ha by 1953 when the scheme was said to have failed for unexplained 'want of interest' (Masefield, 1958). However, production from Lau and Lomaiviti, most of it Fijian, trebled in the three years 1954-56. With funds made available by the improvement in price, the Co-operative movement was launched in 1948 and spread through the coconut districts during the 1950s. By 1954-56, 92 per cent of the sales income of producer-marketing societies was provided by copra, and societies in the coconut districts provided eighty per cent of the paid-up capital in Fijian producer-marketing societies by 1959 (Spate, 1959). The opportunity of a period of rising production and good prices was used to make changes designed to foster Fijian development. In 1951 the Fijian Development Fund was established on the basis of a 'cess' of $20/lt (now charged as $20/t) on all Fijian-produced copra, and despite withdrawals mainly for village housing, built up a balance of $1.2 million by 1958.(1) This cess, plus a general cess for rhinoceros beetle control introduced in 1953, reduced the direct benefit received by Fijian copra producers. After 1963, when more restrictive licensing of copra buying was introduced, the Co-operative Societies became the main buyers in most areas and the alternative outlet of the usually Indo-Fijian or Sino-Fijian storekeeper was removed throughout most of the coconut area, since they were denied licences. Thereafter, only the larger producers were able to by-pass the Co-operative Societies and consign copra directly to Suva. It is significant, however, that around Savusavu, and on Taveuni,
where alternative outlets remained available through larger commercial dealers, the Co-operative movement made little headway.

C. THE MALAISE OF THE COCONUT INDUSTRY IN THE 1950s AND 1960s

Notwithstanding greatly improved economic conditions, most observers found the industry -- and rural Fiji more generally -- in a depressing state during this period. This is especially true of the estate sector, the output of which stagnated after 1955 despite favourable economic conditions. In 1953 O'Loughlin (1956) estimated 45 per cent of production as having come from an estate sector which held 42 per cent of the coconut land. By 1958 figures given to Spate (1959) indicated that 41 per cent of production still came from the estates. These were low estimates, and as late as 1965 some sources gave more than half the total production to the estates. Profits were comfortable: by O'Loughlin's data they averaged 54 per cent of revenue over all copra estates between 1950 and 1953. Wages and salaries represented 33 per cent of revenue. Yet it is clear that very little was re-invested in the land; only a minority of estates went in for extensive replanting during this period. O'Loughlin gives the reason: with present prices good and future prices uncertain, it is rarely perceived as profitable to thin old stock so as to underplant with new palms that will not bear for from six to eight years. Consequently, much even of the new planting that was done took the form of underplanting without any removal of old palms, retarding growth and diminishing the ultimate yield. The 'two-storey coconut forests' that result are rarely high producers.

Arising perhaps from memories of the depression, uncertainty about the future has been a constant feature of the post-war industry. At the beginning of the period, confidence was not improved by the damaging effects of a major hurricane that affected a large part of the copra region in 1948 and reduced output until 1951; this was then followed by a further hurricane in 1952 in Viti Levu and the Yasawas, and by a drought in 1953. Even the U.K. contract became a source of complaint in the early 1950s, when the world price rose faster than the permitted increase in the Fiji price. From 1953 until late in the 1960s it was feared that the rhinoceros beetle would greatly damage the palms; before this pest was brought under temporary control by biological means it had spread to a large part of the group. Upward pressure on wages
was resisted, but the first unsuccessful attempts at unionisation of estate labour were made during the 1950s and caused disquiet among the planters. After the mid-fifties estate labour forces were in decline, and the rate of increase of both Fijian and Indo-Fijian populations in Cakaudrove -- the main estate Province -- fell below national levels in the intercensal period between 1956 and 1966. Wherever possible, machinery was substituted for labour; on one Taveuni estate, use of a mechanical weed-cutter made possible a reduction of labour from 38 to eighteen workers. Fertilizers were not introduced.

There was growing concern over the increasing age of trees especially in the estate sector. In 1954 a Coconut Rehabilitation Committee recommended a replanting programme at a rate of 1,518 ha/yr, but no action was taken. An Economic Review Committee in 1953 recommended establishment of a coconut research station, but after sites had been investigated the proposal was finally rejected by the Standing Finance Committee in 1957. No reason emerges from the files. A modest amount of research on hybridisation and selection of high-yielding palms continued both on estates and by the Agriculture Department, and has been sustained since, but it was on too small a scale, and was not integrated into any programme.

Burns, Silsoe and afterwards: replanting and new planting

The Burns Commission in 1960 commented trenchantly on the state of the industry, and recommended a replanting scheme, initially for a five-year trial period, designed to achieve replanting of 1,619 ha/yr. They also made a number of other recommendations, including steps to improve the quality of copra, and diversification especially on the small estates of Vanua Levu. Government acted on the subsidy proposals, and also commissioned a special report on the coconut industry in 1962. This report (Silsoe, 1963) has some technical faults, especially in regard to transportation costs in the industry. It was over-optimistic about the prospects for expansion in a labour-scarce economy, but it supported the subsidy proposals and its other recommendations had important consequences. Apart from introducing a pricing formula which was replaced only in 1983, Silsoe was also responsible for the introduction of grading on a rigorous basis, for steps to eliminate use of smoke-drying, and for more restrictive licensing of copra-buying. These steps had a positive effect on the
quality of copra, especially copra produced by Fijians and by the smaller estates. The results of the replanting and new planting drive were, however, equivocal. Most certainly they did not lead to any expansion of production, though they may have delayed its decline.

The subsidy scheme went through two phases, the first in the 1960s and the second initiated in 1971, and modified later in the 1970s. Although the Burns Commission had recommended a loans system, the scheme actually introduced was a subsidy, in three parts. The first, which applied to all Fijian producers, was limited to the cleaning and thinning of existing groves and provided a total aid of $24.71/ha over three years. The second, which applied to all holdings in individual tenure, including estates, concerned replanting, and offered $61.78/ha over seven years. The third and most important was the subsidy for new planting, on selected land, and offered $83.13/ha over seven years. The third was the most popular, but its administration was inadequate, and a good deal of subsidised planting took place on very inferior land. The cleaning and thinning subsidy had very small effect.

One important aspect of the replanting and new planting subsidy programmes was their limitation to land held under individual title. This limitation, which followed the spirit of the Spate and Burns recommendations as well as those of Silsoe, is related to the implementation of the Land Development Ordinance of 1961, the most important single product of the Spate and Burns reports for the Fijian rural economy. This ordinance, and the Land Development Authority (LDA) program which it established, made provision for the individual leasing of Fijian mataqali land to Fijians. The LDA and its wider effects are discussed elsewhere (Brookfield, in preparation), but it should be recorded that subdivision was not only pushed with great enthusiasm, but was also taken up with such enthusiasm in some parts of the country. One of these parts was Taveuni, where the pace of subdivision soon grew out of hand with 456 applications for lease blocks by 1967, but subdivision was continued after the collapse and winding-up of the LDA in 1969. It still continues, and the Native Land Trust Board has only recently caught up with the registration of leases on this land. As of 1976, there were 404 blocks in Taveuni, including two earlier freehold subdivisions of which one was Indo-Fijian, covering 4,173 ha of which 41.5 per cent was developed. Most of this 1,733 ha carried coconuts, though some of the higher altitude land was
unlikely to yield copra, and some plots were without coconuts. It was estimated, however, that at least thirty per cent of the developed area had not been tended since the coconuts were planted, and would yield no production without new clearing and planting (Brookfield, 1978). This reflects a situation which, according to some unofficial estimates, affects as much as eighty per cent of all subsidy-aided planting; once the subsidy was obtained, the plots were neglected, or the new palms were allowed to be shaded out by the old palms under which they were planted. The estimate of eighty per cent is certainly too high, but there is no doubt that a significant proportion of the subsidy planting was lost.

The 1971 revision of the scheme emphasised replanting, and included subsidies for replanting on matagali land, a recognition of the failure of the cleaning and thinning scheme which was all that had formerly been offered to villagers without leases. Farmers were to be selected on the basis of their integrity and ability, and the suitability of their land (Davidson, 1972). The maximum area allowed was to be 0.4 ha/yr on any one holding, with a total five-year cash subsidy of only $27.18/ha; fertilizer was also to be provided. Thinning of old groves to a density of not more than 74/ha at year five was required. Most work done was in the Northern Division, where a good start of 490 ha replanted and 436 ha of new planting was recorded in 1971-72. However, the price collapse in 1972 reduced incentive; this was followed by the boom of 1973-74 when very good incomes could be made without the need of hard work, and then by the further collapse in 1975. In 1975, plans were again modified, offering a higher cash subsidy. This was effective only in parts of the Northern Division, where an over-target result of 630 ha was recorded in 1976 followed by 476 ha in 1977. Elsewhere there was either lack of interest in the scheme or lack of enthusiasm in the administration; the notion of subsidy planting had become discredited. The 1975 scheme perished, not to be revived.

Silsoe had pointed out in 1963 that the $1,800,000 proposed for the initial scheme would be far from the total liability of Government, but did not spell out details. This is unfortunate, because failure to make provision for transport improvements, in particular, must be regarded as one of the reasons for the partial failure of his proposals. More than this, however, no attempt was made to value the work inputs required. At a daily wage of $1.50 around 1960, the maximum level of subsidisation over seven years offered only
the equivalent of 55 man-days of labour. The 1971 scheme offered much less. In consequence, it is not surprising that once the basic work was done and the initial subsidy of $29.65/ha for new planting or $17.30/ha for replanting had been claimed and received, the lower maintenance subsidies attracted little interest during a time when the returns for copra production were already becoming more variable than in the 1950s.

If, as in a Chayanovian calculus, the 'drudgery of self-exploitation' is only undertaken for adequate perceived reward, the neglect of much of the new planting could have been predicted; it is surprising that a modest degree of success was achieved at all. Silsoe, and others, seem to have assumed either that Fijians could be cajoled or persuaded into a low discounting rate of future gain, or that they required only a small carrot in order to persuade them to undertake work they intended to do anyway. Two passages from Silsoe (p.33 and p.34) sum up the approach:

Fijians have been offered payment at a rate which should more than pay for everything that has to be bought. The rest of the job is just a bit of hard work. Thinning down ultimately to 80 palms per acre [198/ha] will increase the total yield considerably... It is difficult to be asked to cut down old trees still bearing nuts, but I am sure it pays the grower and that for only a short time will there be fewer nuts.

The grower was not so sure. Possibly it was only those growers, Fijian and non-Fijian, who intended anyway to replant or to plant coconuts on newly acquired land who took full advantage of the bit of extra cash in hand that the scheme provided. This is borne out to some degree by Davidson's (1972) comments on Northern Division growers, who achieved almost 8,000 ha between 1965 and 1972 --- but without much felling of old palms; the pace of work, he maintained, was set by the farmers themselves, not by the authorities administering the subsidy.

The coconut industry in the late 1960s and early 1970s

In the 1960s the coconut industry attained a production close to 40,000 t for the last time. This production was achieved on a coconut area under 60,000 ha and perhaps not
more than 57,000 ha, which would imply a mean yield of up to 0.70 t/ha. In spite of substantial new planting and replanting during the 1960s, both production and yield have since fallen. The 1977 peak of 31,957 t, achieved on 66,000 ha, yielded only 0.48 t/ha. By the time of the 1976 census, population in the coconut districts was widely in decline and almost everywhere suffering from heavy age-selective emigration. Sea freight costs began to rise rather sharply after 1965; an index with 1958 = 100 rose to 113 - 125 at different outer island points by 1967, then more steeply to 125 - 135 by 1969 (Baker, 1972). Returns from copra production were reduced accordingly, while the cost of the consumer goods for which copra was produced rose in the same or greater proportion. In the absence of other opportunities the response might have been to increase production, but because other opportunities were available, principally through migration, the response became instead a partial withdrawal of inputs from copra production into other activities, either locally or elsewhere in Fiji. By 1970 the conditions of production in the coconut districts had already reached a state in which the new and different subsidies introduced in 1973 and 1975 began to be contemplated.
NOTES

1. Although the Fijian Development Fund was used to assist in the improvement of housing, very little was invested in development, and almost none of it in the coconut industry itself. At the end of the fifties Spate (1959, p.66) commented:

    we now have the paradox that while Provinces are crying out for quite small sums to finance immediate developments, a third of some [$1,200,000] of Fijian capital is invested in general Government loans and two-thirds in developing the continent of Australia, while the merest fraction -- excluding [the development-board-run plantation on] Wakaya well under one per cent -- is invested in specifically Fijian development, apart from the use of actual withdrawals, which again is mostly spent on welfare not development.

Both the Burns and Silsoe (1963) reports also criticised the cess. The Burns Commission (1960, p.55) commented in particular on the low priority given to expenditure on the copra industry itself in the list of suitable purposes for withdrawal of funds. The system remains unchanged, with only the addition that the 'basic tax' is now also deducted from copra payments to Fijians. In periods of low copra price, the $20/t cess has taken a large share of the received price. In the last weeks of unstabilised copra pricing in 1975 it absorbed 37.5 per cent of the price paid for Grade II copra at Somosomo in Taveuni. In western Cakaudrove, Natewa Bay, and some island areas in the early 1970s, the addition of the cess to freight and personal transport costs was sufficient to offer producers a negligible or even a negative return on small quantities of copra brought in for sale; a case is recorded (Davidson, 1972) in which such a seller had to borrow to pay his fare home. The use of copra for taxation in the nineteenth century established a pattern which, albeit transformed into forced saving for specified welfare purposes, was continued through a period in which incentives to re-invest in the cash-producing industry might have been a better policy. Only the effects of inflation have finally made the fixed-sum cess of minor significance since the later 1970s.
THE COCONUT ECONOMY IN A PERIOD OF STRESS

A. THE ECONOMIC BACKGROUND OF STRESS: THE PRICE OF COPRA

The market for coconut oil is characterised by a small number of large end-users, who also employ other oils and fats in the manufacture of a range of edible and inedible products. Coconut oil has advantages in soap and detergent manufacture, and in the manufacture of margarine and shortening, over palm-kernel oil and over soyabean and palm oil respectively, but both these advantages have been reduced in the 1970s by research aimed at improving substitutability. The effect has already been to drive down the long-term relative price of coconut oil and hence of copra. In the short-term however the main determinant of the copra price is supply (South Pacific Commission, 1982). By far the main supplier of both coconut oil and copra is the Philippines, and marketing in that country is ill-organised to prevent gluts and shortages. The price-peaks of 1973-74, 1978-79 and 1983-85 were mainly the consequence of a drastic shortfall in Philippine supply, in the last case augmented by a poor US soyabean crop in 1983. Low price periods have had more variable causes. That of 1972 was due to a high level of copra production, that of 1975 to a generally high level of supply of all oils, and that of 1980-82 to over-supply of palm oil and soyabean oil, coupled with the general recession. Abundant supply, augmented by a recent growth of Indonesian production, is again making itself felt in 1985.

The reasons for the instability of the copra price in the 1970s therefore all lie outside Fiji, and this will continue to be so, at least while copra and coconut oil are produced mainly for export. The effects in Fiji have been very severe, the more so as copra has a low elasticity of supply so that little advantage can be taken of good short-term market conditions. Figure 3 shows the fluctuation in the 'assessed price' by the Silsoe formula both in monetary terms and also in 'real' terms weighted by the annual cost of living index as determined by PEDM. In real terms, this price fell as low in 1981-82 as in the worst months of 1972 and 1975, and remained depressed for a longer period.
Figure 3: Copra prices and monthly deliveries 1971 - 81
B. THE EMERGENCE AND GROWTH OF PROTECTIVE ACTION BY THE STATE

In 1971-72 the price of copra fell to levels not experienced since the 1940s (Figure 1), while at the same time the escalation of seaborne freight rates continued (Figure 4). A weighted index for sea freight rates with 1967 = 100 at all points rose to 133 - 180 in different parts of the archipelago by 1972 (Baker, 1974). After delivery of their copra to a selling point, many producers found themselves with no profit, and some were unable even to meet the costs of transport (Aidney, 1972). A Suva price of $68/t became only $55/t even at Savusavu, and only around $40/t or even less for suppliers who had to hire trucks or boats to bring their produce to the point of sale. After inflation, producer income at Suva prices dropped by sixty per cent between 1970 and 1972 (Coconut Board, 1983), and the fall was greater than this for most producers. But for the sharp improvement that began at the beginning of 1973, the industry would very soon have reached a state of crisis with widespread cessation of production.

In January 1972 Government introduced a 'Freight Subsidy' scheme in order to ease the position of outer island suppliers and customers. The object was to equalise the rate charged for copra and certain other commodities by subsidising the difference between a standard rate -- then $7/t for copra -- and the current rate to or from each point. At the same time control was established over freight-rate schedules under the Counter Inflation Act.

The next step taken was the introduction of commercial carriage by Government ships in 1973, a response to a seriously worsening situation after the withdrawal of Carpenters and Burns Philp from inter-island shipping a little earlier. Under this same initiative, the keel of the 'Kaunitoni' was laid, in order to provide a subsidised service to Lau; this ship went into service in 1975. The period from early 1973 to mid-1974 was, however, one of high copra prices, so that the real income of producers in 1974 was nearly twice that of 1970. However, by early 1975 prices were back to the levels of early 1973 and continued to decline. In the early months of 1975 the first Lome agreement was negotiated, and anticipating detailed knowledge of STABEX provisions in regard to copra, Government intervened in June 1975 to establish a subsidised price, advancing to producers the difference between this price (initially $186.96/t at Suva) and the 'assessed price', determined in relation to the world market
Figure 4: Changes in the copra and general cargo freight rate 1972-82.
price and international freight rates by the Silsoe (1963) formula. The effect is shown in Figure 3.

This latter arrangement was not formalised until the beginning of 1977, when the Copra Industry Loans Regulations came into force, making provision for recovery of 'advances' from subsequent higher prices and hence for STABEX repayments. This was in fact done, except from producers who had suffered hurricane damage during the period of the 'advance'. The short 1977 recovery in copra prices was almost completely absorbed in repayments, and since this recovery coincided with a good year for production, the accumulated debt to Government was reduced to $1.2 million by December 1977 then eliminated by October 1978 at the beginning of a new and more prolonged price boom which took prices again into the lofty heights experienced in 1974. However, such was the effect of inflation, combined with lower production, that the real income received by producers in 1979 failed quite to reach the level attained in 1970 (Coconut Board, 1983).

No advantage was taken of the 1979 boom in order to build up a price stabilisation fund, even though this was advocated in many quarters. 'Loans-scheme' prices continued to be announced with each change in the 'assessed price', but the loans-scheme price followed the assessed price up, and then downward again until April 1980. In that month a sharp lift in the loans-scheme price was announced, bringing it back up to $280/t for Grade I copra in Suva. The loans-scheme price then remained at this level for more than three years. The assessed price meanwhile sank far below $280/t throughout the rest of 1980, 1981 and 1982, reaching a minimum of $97.50/t in September 1982. Up to 31 December 1982 Government had advanced $7,579,000 to the industry through the loans scheme, and the sum approached $8.5 millions before the 'assessed price' rose above the loans-scheme price in mid-1983, permitting an increase in the loans-scheme price on 27 June to $298/t for Grade I copra at Suva. With a 'Suva basic price' calculated acording to the Silsoe formula at $343.00/t, provision was made for a small recovery of advances in this new determination.

The effect of inflation was to erode the benefit of the loans scheme to the producer. By 1982, the price of $280/t was worth only 59.4 per cent of the average 1970 price in real terms, and with a fall in production the real income of producers was only 45 per cent of the 1970 real income (Coconut Board, 1983), only a little better than in the
Figure 5: Area and production shares in the copra industry.
pre-subsidy depression year 1972. The loss would have been greater without the continuing freight rate subsidy amounting to over $300,000 per year, plus subsidised losses on operation of the 'Kaunitoni' and sundry other forms of support offered to growers in the eastern islands.

C. INDUSTRY PERFORMANCE

Data on copra production by area, 1969-82

Table 1 presents an area-by-area summary of yields in the coconut districts in recent years. Area-by-area differences in productivity are also represented in Figure 5. It must be emphasised that these data are imperfect in four ways. In the first place, the area information on which yield calculations are based are only estimates discussed in Appendix I and may contain significant error. Second, production is not always well separated by area in the data. It was not possible to use production data for sub-areas within mainland Cakaudrove, for example, and it is known that some mainland copra from Cakaudrove has been graded and sold in Taveuni; this totalled 533 tonnes, or 4.1 per cent of the 'Taveuni total' in the two years 1974-75 (Brookfield and Hardaker, 1978).

Third, data are provided only in 'bags of copra', even though weights are recorded. It is necessary to use a standard bag weight, and the one used here is 18.13 bags/t, or 0.055 t/bag. In the Northern Division, the Agriculture Department calculated a mean weight of 0.053 t/bag in the early 1970s. In Lakeba in 1976 it was 0.045 t/bag, and data for one Co-operative society show a decline from 0.059 to 0.042 t/bag over the period 1965-76. The bag-weight conversion is possibly generous, and does not correspond exactly with annual production figures given in tonnes by the Department of Agriculture. However, the difference varies from year to year. It was considered better to use a standard figure at all dates than to employ different conversions in each year, since within-year differences might well be greater than between-year differences.

Fourth, there are differences even in bag numbers between deliveries as recorded in the Coconut Board data and in data on sales at source. For Lakeba in 1974 the difference represents a 'loss' of 315 bags (14.2 t) between Lakeba and Coconut Board records; for Taveuni there are larger
<table>
<thead>
<tr>
<th>Production</th>
<th>Mean</th>
<th>Mean</th>
<th>Range of</th>
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<tr>
<td></td>
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<td>Central and</td>
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<tr>
<td>Koro</td>
<td>13,807</td>
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<td>Moala Group</td>
<td>9,926</td>
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<tr>
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<tr>
<td>Southern Lau</td>
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<td>Rotuma Province</td>
<td>17,344</td>
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<td>Macuata</td>
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<tr>
<td>Bua and Wainunu</td>
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<td>Island Cakaudrove</td>
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<td>-</td>
<td>88</td>
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</table>
differences, which converted into tonnes amount to a 'loss' of 727 t in 1975. Until or unless recording is improved and standardised, the data have to be accepted -- but with reservation.

Natural events and copra production

Around 1970 production levelled off at 28-29,000 t/yr after a decline from higher totals in the early 1960s. This was maintained through 1974, despite localised hurricane losses in Lau and Kadavu, but in 1975 there was a sharp drop due to the combined effects of price collapse and Hurricane 'Val' (January 1975) which reduced Lau production to sixty per cent of the 1973 level. The expected recovery, in the absence of further devastation through two years free of cyclones, took production in 1977 to a peak which by bag-weight conversion was 31,597 t and by the Department of Agriculture 30,644 t.

Since 1977 a further series of untoward natural events has done considerable damage to the industry. Four tropical storms or distant hurricanes wrought minor damage between December 1977 and December 1978; the last of these crossed Cakaudrove and Lau, and gusts did local damage to coconuts though sustained wind speeds did not exceed thirty m/s. 'Meli' in early 1979 was much more violent, though it followed a narrow path. Very severe damage was done close to its track through north-central Lau and along the north coast of Kadavu; all three villages on Nayau were destroyed and the island was evacuated for more than two years. Further tropical storms and near-hurricanes in 1980 and 1981 did lesser damage in several parts of Fiji, and in 1983 two severe cyclones struck the western and eastern sides of Fiji. Hurricane 'Oscar' severely damaged coconuts in the Yasawas and on islands south of Viti Levu, while 'Sarah' did minor damage most of the length of the Lauan chain; the centre remained to the east and crossed only Ono-i-Lau. However, every coconut-growing area of Fiji except Bua and Lomaiviti was affected by at least one storm of 'tropical storm' or 'hurricane' intensity between December 1977 and April 1983; some parts were affected more than once. Four further major storms struck Fiji in 1985, at least two of them affecting the coconut districts.

Damage reports are a poor guide to the effect of these high winds, since damage reports are now written with a view to establishing claims for hurricane relief and there is undoubtedly an element of exaggeration. It is instructive to
view flourishing coconut groves that a year or two earlier were said to have been 75 per cent or 100 per cent 'destroyed'. None the less there has been some real destruction, and more widely premature nutfall and delayed setting of new nuts has reduced potential production. Older trees tend to be more vulnerable to damage of this order, though it is the younger trees that are more readily knocked down. Except from extreme events the Fiji Tall has a high degree of hurricane resistance, and though production is reduced or even eliminated for a period after wind damage, a remarkably high proportion of trees recover. Even on Nayau many bent and twisted trees were again producing nuts four years after the devastation of 1979. Moreover, production loss is highly variable from place to place: even in storms which do not reach hurricane force on the basis of sustained wind speed, gusts down valleys and around headlands can do severe damage. Equally, even in full hurricanes some groves have escaped with little harm.

Nor have high winds been the only cause of production loss. During a period from late 1977 to early 1979 there were serious shortfalls of rain in several parts of eastern Fiji, and although the magnitude of this event was less in both duration and severity than earlier drought -- even as recently as the late 1960s -- the fact that drought coincided with a period during which wind damage also occurred reduced the capacity of trees to recover quickly. Again, damage reports seem to contain an element of exaggeration, but it was productive exaggeration in that the effect of drought was taken into account in granting hurricane relief supplies and assistance. The same combination of drought and hurricane again occurred in 1983, and promised to have a severe effect on coconut production later in 1983 and into 1984. On this occasion the drought was of exceptional severity, and followed a period of only average or below-average rainfall in 1982. 1984 and 1985 were wet years, so that recovery from the 1985 storms may be more rapid.

The combined effect of storm and drought after 1977 is certainly responsible for a significant part of the steep decline in production that took place between 1977 and 1981. Loss of copra income from natural causes compounds the effect of income loss from a major drop in the real price of copra. Farmers have thus been encouraged to look more closely at alternative sources of income. Examination of production trends by area and island will assist in assessing the relative contribution of natural and economic events to the
recent fall in copra production.

Changes in copra production since 1969 by area and island

Table 2 analyses the production of copra, converted from the number of bags delivered from each area, between 1972 and 1982. It will be convenient to follow the table:

Central and Western Divisions. With the exception of islands off Viti Levu, there is no significant copra production from these areas; most of the coconut production is sold as whole nuts, and has been for a long time. The sharp drop from a low level in 1973 is not explicable by natural events, nor is the decline in 1981-82. Variation in the market for whole nuts may be more significant.

Lomaiviti Province. This is the one major producing area that was not severely affected by either high wind or drought in the whole period from 1969 to 1982. Production stood up well, and even improved in the mid-1970s. The decline since 1977 is in all probability due largely to a shift of inputs into yaqona production, similar to that which took place in 1974-75 (Bayliss-Smith, 1977).

Lau Province. Lau, by contrast with Lomaiviti, has suffered severely from both drought and hurricane. The most severe event was Hurricane 'Val' which affected almost the whole group in early 1975, and in 1983 was still remembered as the worst disaster of modern times despite several subsequent storms. The production levels of 1972 and 1973 have not since been matched. However, the sharp drop which took place after 1977 has multiple causes, including the almost total loss of production from Nayau, Cicia and Tuvuca after 'Meli' in March 1979, the 1977-79 dry period, and a further dry period after 1981. Since 1981, moreover, copra has been processed into coconut oil on Lakeba, and more recently copra from Cicia has also been sent to Lakeba for milling. Together these represent a production of more than 1,000 tonnes, so that Lauan production for 1982 had in fact recovered to around the 5,000 tonne level.

Kadavu. This island suffered principally from two small but very intense cyclones, 'Lottie' in 1973 and 'Meli' in 1979, while lesser damage was inflicted by other storms, including 'Oscar' in 1983. Drought has been of lesser importance. The effects of 'Lottie' and 'Meli' are very clear in the record of production, representing two sharp downward steps separated
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central &amp; Western Divisions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koro</td>
<td>1,133</td>
<td>1,318</td>
<td>1,474</td>
<td>1,177</td>
<td>1,225</td>
<td>1,433</td>
<td>1,404</td>
<td>-</td>
<td>684</td>
<td>942</td>
<td>874</td>
</tr>
<tr>
<td>Gau</td>
<td>723</td>
<td>584</td>
<td>704</td>
<td>749</td>
<td>709</td>
<td>835</td>
<td>756</td>
<td>-</td>
<td>685</td>
<td>505</td>
<td></td>
</tr>
<tr>
<td>Other Lomaiviti</td>
<td>584</td>
<td>464</td>
<td>603</td>
<td>789</td>
<td>767</td>
<td>800</td>
<td>686</td>
<td>-</td>
<td>1,017</td>
<td>531</td>
<td></td>
</tr>
<tr>
<td><strong>Total Lomaiviti Province</strong></td>
<td>2,440</td>
<td>2,366</td>
<td>2,781</td>
<td>2,715</td>
<td>2,701</td>
<td>3,068</td>
<td>2,846</td>
<td>2,604</td>
<td>2,386</td>
<td>1,978</td>
<td>2,229</td>
</tr>
<tr>
<td>Moala Group</td>
<td>1,255</td>
<td>1,131</td>
<td>574</td>
<td>435</td>
<td>430</td>
<td>923</td>
<td>936</td>
<td>-</td>
<td>751</td>
<td>798</td>
<td></td>
</tr>
<tr>
<td>Cicia, Navau, Tuvuca</td>
<td>1,107</td>
<td>1,127</td>
<td>1,172</td>
<td>838</td>
<td>955</td>
<td>1,201</td>
<td>1,062</td>
<td>-</td>
<td>89</td>
<td>109</td>
<td></td>
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<tr>
<td>Lakrba</td>
<td>886</td>
<td>1,046</td>
<td>1,132</td>
<td>555</td>
<td>459</td>
<td>671</td>
<td>584</td>
<td>-</td>
<td>835</td>
<td>770</td>
<td></td>
</tr>
<tr>
<td>Vanua Balavu Group</td>
<td>1,074</td>
<td>1,357</td>
<td>1,149</td>
<td>793</td>
<td>846</td>
<td>1,102</td>
<td>619</td>
<td>-</td>
<td>481</td>
<td>385</td>
<td></td>
</tr>
<tr>
<td>Southern Lau</td>
<td>1,563</td>
<td>1,512</td>
<td>1,254</td>
<td>850</td>
<td>942</td>
<td>1,120</td>
<td>1,127</td>
<td>-</td>
<td>1,186</td>
<td>1,196</td>
<td></td>
</tr>
<tr>
<td>Lau estates</td>
<td>1,239</td>
<td>1,386</td>
<td>1,473</td>
<td>1,197</td>
<td>1,244</td>
<td>1,489</td>
<td>1,128</td>
<td>-</td>
<td>739</td>
<td>606</td>
<td></td>
</tr>
<tr>
<td><strong>Total Lau Province</strong></td>
<td>7,124</td>
<td>7,559</td>
<td>6,754</td>
<td>4,668</td>
<td>4,876</td>
<td>6,706</td>
<td>5,456</td>
<td>3,020</td>
<td>4,081</td>
<td>3,864</td>
<td>3,851</td>
</tr>
<tr>
<td>Kadavu Province</td>
<td>1,069</td>
<td>1,048</td>
<td>384</td>
<td>309</td>
<td>383</td>
<td>895</td>
<td>912</td>
<td>484</td>
<td>96</td>
<td>92</td>
<td>161</td>
</tr>
<tr>
<td>Rotuma Province</td>
<td>1,816</td>
<td>264</td>
<td>615</td>
<td>496</td>
<td>1,267</td>
<td>1,627</td>
<td>1,340</td>
<td>1,024</td>
<td>1,310</td>
<td>1,316</td>
<td>1,833</td>
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<tr>
<td>Total Eastern Division</td>
<td>12,649</td>
<td>11,237</td>
<td>10,534</td>
<td>8,188</td>
<td>9,227</td>
<td>12,296</td>
<td>10,554</td>
<td>7,132</td>
<td>7,873</td>
<td>7,250</td>
<td></td>
</tr>
<tr>
<td>Macuata</td>
<td>1,161</td>
<td>1,473</td>
<td>1,595</td>
<td>1,337</td>
<td>1,188</td>
<td>1,089</td>
<td>789</td>
<td>1,111</td>
<td>764</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bau and Wainunu</td>
<td>972</td>
<td>978</td>
<td>1,298</td>
<td>1,079</td>
<td>1,228</td>
<td>1,198</td>
<td>1,000</td>
<td>(8,545)</td>
<td>1,351</td>
<td>950</td>
<td>(7,618)</td>
</tr>
<tr>
<td>Mainland Cakaudrove</td>
<td>6,863</td>
<td>6,985</td>
<td>6,730</td>
<td>6,419</td>
<td>6,533</td>
<td>7,164</td>
<td>6,327</td>
<td>5,728</td>
<td>5,526</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Island Cakaudrove</td>
<td>6,960</td>
<td>6,484</td>
<td>7,194</td>
<td>6,867</td>
<td>6,916</td>
<td>7,690</td>
<td>6,160</td>
<td>4,533</td>
<td>4,765</td>
<td>4,809</td>
<td>5,421</td>
</tr>
<tr>
<td>Total Northern Division</td>
<td>15,956</td>
<td>15,920</td>
<td>16,817</td>
<td>15,702</td>
<td>15,865</td>
<td>17,141</td>
<td>14,276</td>
<td>13,078</td>
<td>12,955</td>
<td>12,049</td>
<td>13,039</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>162</td>
<td>144</td>
<td>78</td>
<td>56</td>
<td>79</td>
<td>79</td>
<td>52</td>
<td>76</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td><strong>TOTAL FIJI</strong></td>
<td>29,492</td>
<td>27,897</td>
<td>28,542</td>
<td>24,993</td>
<td>26,757</td>
<td>31,598</td>
<td>26,255</td>
<td>21,737</td>
<td>22,684</td>
<td>20,376</td>
<td>21,182</td>
</tr>
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</table>
by only a partial recovery in 1977-78. During the 1970s Kadavu has also become a major producer of yaqona for the national market, and although yaqona was also severely damaged by hurricane winds the damage appears to have been of a lesser order. From recent evidence (M. Sofer, pers. comm.) there is no doubt that yaqona had become the principal cash crop of Kadavu by 1982-83.

Rotuma. This northern island is less prone to fully-developed cyclones than the rest of Fiji, but was devastated by 'Bebe' in 1972, a storm which evolved into a full hurricane unusually far north. The major and prolonged loss of production in 1973-76 is very evident, and there was also lesser damage from storm-force winds arising from the early development of 'Bob' in 1978. Being distant from the rest of Fiji Rotuma does not have alternative cash crops. By 1981 production recovered fully to the levels of the early 1970s.

Vanua Levu and Island Cakaudrove. Damage in these areas, with more than half the whole national production of copra, has a major effect on the performance of the industry as a whole. The main producing areas in Cakaudrove enjoy a measure of protection from hurricanes due to the effect of Vanua Levu in de-intensifying and sometimes even diverting cyclones. Historically, the greatest damage has been done by storms entering the region from the northeast, but there have been none along this path in recent years. Drought is also not a major hazard in Cakaudrove, although dry spells of some length do occur in the lee of Taveuni, both on the island itself and on the mainland as far west as Vunilagi. Cakaudrove missed all the fully-developed cyclones of the 1969-83 period, though high winds on the fringes of the major storms did localised damage. However, in 1978 and 1980 two tropical storms ('Fay' and 'Tia') passed across the region from the northwest, and both did localised damage arising mainly from high winds in the dangerous quadrant forward and left of the centres of the storms. Eastern mainland Cakaudrove, Taveuni and Qamea were the principal sufferers. The effect was a sharp drop in production in 1978 and 1979. 'Tia' in 1980 does not seem to have affected Cakaudrove production as a whole, though in some areas production, halved in 1979, was halved again in 1981-82. There was also a sharp drop in production from northern and western Vanua Levu after 1979 which is more probably related to dry conditions in the preceding two years. The proportionate loss of copra production in Cakaudrove is not large, by comparison with losses from storms elsewhere in Fiji, but its effect on the national total is of a major order.
Discussion of industry performance in 1969-82

Additional factors must be called upon to explain the cumulative decline in production since the mid-1960s. Natural conditions are certainly an important element. What is noteworthy, however, is that once a major production loss has taken place, it is now rare for annual output to recover to the former level. It is therefore tempting to call upon the increasing age of trees as a further element in explanation; trees past maturity do not recover from the effect of high wind and drought as well as do younger trees. In Cakaudrove, Kadavu and some other areas this may indeed be a factor, but there is a substantial amount of new planting on Fijian-owned land in Lomaiviti, Lau and in parts of Cakaudrove also. Assuming that the area and production data can be relied upon, they show yields as high as 0.75 - 0.97 t/ha in individual years on islands in Lau. The highest of these values is for Lakeba, where both area and production data are sound. Attainment of such high yields during the 1970s does not suggest for Lau that aging of trees is significant in explaining the failure of production levels to recover from natural events. Nor may it be a major factor on Fijian-owned land throughout the whole country.

The secular decline in the real price of copra during the 1970s and early 1980s must therefore also be considered as a contributory cause of the decline in production (Table 3). It may be hypothesised that declining real incomes available from input into copra production, have caused all those growers with other cash-earning opportunities to make greater use of these opportunities, reducing inputs into copra production. The effect of adverse natural conditions would then be to accelerate this transition, wherever it is possible. In order to evaluate this hypothesis, we need to look separately at each sector of the industry, and at the nature and worth of the 'other cash-earning opportunities'.
### TABLE 3: PRICES, Indexed Prices and Real Incomes From Copra Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Suva price ($/t)</th>
<th>Index of price</th>
<th>Actual gross income ($)</th>
<th>Real index value of income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>126.06</td>
<td>34.2</td>
<td>4,196,390</td>
<td>100.5</td>
</tr>
<tr>
<td>1970</td>
<td>149.66</td>
<td>100.0</td>
<td>4,345,169</td>
<td>100.0</td>
</tr>
<tr>
<td>1971</td>
<td>118.23</td>
<td>74.2</td>
<td>3,385,411</td>
<td>73.1</td>
</tr>
<tr>
<td>1972</td>
<td>69.14</td>
<td>39.8</td>
<td>2,019,226</td>
<td>40.0</td>
</tr>
<tr>
<td>1973</td>
<td>143.64</td>
<td>74.3</td>
<td>3,869,267</td>
<td>68.9</td>
</tr>
<tr>
<td>1974</td>
<td>453.12</td>
<td>204.9</td>
<td>12,508,767</td>
<td>194.8</td>
</tr>
<tr>
<td>1975</td>
<td>171.08</td>
<td>68.4</td>
<td>4,053,383</td>
<td>55.8</td>
</tr>
<tr>
<td>1976</td>
<td>182.56</td>
<td>65.5</td>
<td>4,912,279</td>
<td>60.7</td>
</tr>
<tr>
<td>1977</td>
<td>214.91</td>
<td>72.1</td>
<td>6,577,387</td>
<td>76.0</td>
</tr>
<tr>
<td>1978</td>
<td>214.52</td>
<td>67.8</td>
<td>5,595,059</td>
<td>60.9</td>
</tr>
<tr>
<td>1979</td>
<td>435.20</td>
<td>127.7</td>
<td>9,544,759</td>
<td>96.5</td>
</tr>
<tr>
<td>1980</td>
<td>287.52</td>
<td>73.7</td>
<td>6,552,588</td>
<td>57.8</td>
</tr>
<tr>
<td>1981</td>
<td>276.63</td>
<td>63.7</td>
<td>5,668,960</td>
<td>45.0</td>
</tr>
<tr>
<td>1982</td>
<td>275.83</td>
<td>59.4</td>
<td>6,077,260</td>
<td>45.1</td>
</tr>
</tbody>
</table>

Prices based on mix of grades delivered in each price period.

**Source:** Coconut Board (1983), based on calculations by F. Ellis, FEDM.

### NOTES

1. In Papua New Guinea the average bag weight is much greater than in Fiji. The NSO Rural Industries Bulletin gives 14.0 bags/t, i.e. 0.071 t/bag.
A sector in decline

The large and medium estates, which employ a regular labour force with some division of labour, now produce no more than about a third of the total copra production in Fiji. This shrinkage of share from a former two thirds is not only due to decline; some large estates have also been subdivided. With the exception of a few on islands in northern Lau, estates are concentrated in Cakaudrove, and especially on Taveuni and along the Vanua Levu coast between Buca Bay and Savusavu. Some are owned by companies, including three groups owned by multinational companies: W.R. Carpenter, Burns Philip and South Pacific Hostings, the latter being a Singapore-based multinational. A few estates still belong to old planter families, while others have changed hands and are operated by newcomers to the industry. There are a few Indo-Fijian owners, and a small number of larger Fijian-owned estates are also included within this group.

Between 1955-56 and 1975-76 yields on two non-random samples of Taveuni estates, with several estates in common, declined from 0.89 to 0.59 t/ha (Table 4). In Taveuni and Qamea as a whole the mean yield of all producers in 1975-76 was 0.55 t/ha; in 1982, after recovery from 'Fay' and partial recovery from 'Tia' it was down to 0.41 t/ha. The main contributor to this recent drop is certainly the estates. Their production has declined rapidly.

However, the behaviour of estate owners under adversity showed a great deal in variation of the low-price period of 1980-83. (1) None of the large and medium estates gave up copra production, and only one went bankrupt -- in this case because of failure of an attempt at diversification on which the bank foreclosed. Some estates were, however, operating on little more than a care-and-maintenance basis, producing copra with such labour force as they had at current wages, and cutting costs wherever possible. Others concentrated their efforts on other activities, such as timber production from their
<table>
<thead>
<tr>
<th></th>
<th>1955-56 t/ha</th>
<th>1975-76 t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean of yield</td>
<td>0.89</td>
<td>0.59</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.41</td>
<td>0.19</td>
</tr>
<tr>
<td>Mean area</td>
<td>347.6 ha</td>
<td>334.4 ha</td>
</tr>
<tr>
<td>Mean production</td>
<td>309.1 t</td>
<td>196.0 t</td>
</tr>
<tr>
<td>Number</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Note: Eight estates are common to both samples. Both samples are non-random.


back-lands, and in some cases the growing of yaqona. Still others met the challenge of declining real returns from copra production by innovating, or taking such lesser action to improve the yield of copra per worker as concentrating on a part of the estate which is kept clean in order to make possible a high rate of nut recovery. Several estates were supported by other businesses, or salaries earned elsewhere, leaving copra production in the hands of a manager. A very few were actively re-planting, and these include the largest single estate in Fiji, owned by a multinational mentioned above. The motives for replanting were not known, even to their manager, but the effect was to reduce copra production as workers were employed on planting.

Some estates were up for sale. At the prices demanded, the buyers envisaged were clearly not entrepreneurs in the coconut industry but were second-home buyers and tourist developers. Large and medium estates have been offered for sale at prices ranging from $2,000 to $4,000 per hectare. Even these land prices were much lower than prices asked for freehold land on the western side of Viti Levu and offshore
islands. Some parcels of land were sold to developers, who then sought to subdivide them, advertising office addresses in Auckland or Sydney. One coastal strip in Taveuni, an area of only 60 ha, was sold to a developer, and other estate owners hoped to find buyers for their coastal land. The model for most such offers of land is Soqulu Plantation, originally sold to a Californian family firm of developers in the early 1970s. When this company failed in 1976 the land was taken over by a Suva company with Hong Kong backing, and the infrastructure work was completed. A considerable number of blocks were sold by 1983, many only for speculation, but a number of houses had been erected and a second stage of development was under way. A few such 'resort-type' developments were planned in the coconut areas, though at least one offer of land on Taveuni envisaged commercial or even industrial use, in view of the central location of the site. Though the turnover of such land was low, the increasing rate and rising prices at which estate land was being put on the market in eastern and northern Fiji suggests that would-be sellers had some confidence in the state of the market.

By contrast to this approach, a small group of estates were actively innovating, and although the innovations have been conceived separately, co-operation between the innovators was mapping out an alternative path for the industry. One set of innovations sought to change the nature of the product, producing a snap-frozen grated coconut for food use. Other innovations had the effect of reducing labour, by husking and splitting of nuts followed by drying in the shell. A third innovation employed a steam-drier, fired with husk and shell, which generated electricity as a by-product.

Within all this remarkable diversity of responses to stress in the industry a proportion of planters were still to be found going on essentially as before. They found it hard to make any sort of a profit, but they none the less lived quite comfortably on the proceeds of their estates, and some continued to maintain and operate their estates well. For this reporter, one of the surprises on returning to the coconut estates in 1983 was to find so many in good condition, often in better condition than in the mid-1970s. Some badly-overgrown areas had been cleared, roads and fences had been improved, and while there were very few active planters who were not seeking some supplementary income, there were also few who were not at the same time seeking to improve their returns from copra. Notwithstanding all the gloom, there was even optimism to be encountered.
Labour and costs on the large and medium estates

In the mid-1970s, when the goals of plantation management were less varied than they were in 1983, there was already a large range in the intensity with which labour was used on the estates. The accepted 'norm' in the industry was (and still is) one man per ten tonnes of copra annually produced, but while the mean productivity per worker on a sample of Taveuni and Qamea estates in 1975-76 was 9.54 t, the range was from 6.9 to 13.1 t (Brookfield, 1978). This corresponds, however, with a much more variable use of labour per hectare of coconuts: a mean value of 19.1 ha/man had a range from 40.5 ha/man to 5.4 ha/man, the latter on an estate yielding over one t/ha. Labour densities varied with the state of the palms and their age, the efficiency of management, and the use of cattle and machinery for plantation maintenance.

In 1983, all estates but one on Taveuni and in Vanua Levu from which information was obtained employed labour at a productivity measured against 1982 production of below ten t/man. The mean on fourteen estates was 7.58 t, with a range from 3.46 to 10.68 t. The majority had reduced labour in line with their declining production, but some had been forced to forego production in order to undertake replanting, or other innovative work. It should be noted that most were hoping for a significant production improvement in 1983, with the exception of two northeastern estates which reported serious nut loss from the high winds associated with 'Sarah' in April; one of these had reduced labour accordingly.

On most large estates labour was not the biggest element in the cost of production, as it was on smaller holdings. In 1975, the labour share in the costs of four estates was only 28, 37, 46 and 56 per cent, the last case being one where some unstated costs were met by the owning company. In 1983, one company operating a large estate calculated the cost of production of a tonne of copra at around $300/t including a share of head-office costs allocated to copra production; however, the on-plantation costs were calculated at only $110/t including the salary of a locally-recruited manager and his secretary. Of this figure $72 was made up of direct labour costs employed on copra. These figures are low, especially given that the average cost of production, derived from stated information on sixteen estates in 1976 was $160. On the same large estate that provided the above estimate, the cost of copra cutting in 1974 was calculated at $32/t, with additional costs associated with drying and bagging calculated.
at $36/t of which $27 was labour and $9 fuel. This total of $59 for labour in 1974 compared with $96 for the mean of the 1975-76 sample.

However, on a production of say 250 tonnes of copra, which is the average production of a 'large-to-medium' estate in a normal year, gross returns delivered-into-store at Suva would only have been $70,000 at the 1981-83 $280/t Grade I price. Freight alone would reduce this to $61,500 from a Northern Division estate. If on-plantation costs were only $110/t this would leave the owner $34,000, less tax, accountant's fees and his own working expenses. At the standard of living still maintained by most such estate owners a net income of $20,000 to $25,000 would not leave much surplus for equipment replacements or investment. A sharp drop in production due to natural events would certainly create a need to dip into savings.

The large estate does still enjoy some economies of scale and the company estate quoted above produced much more than the average. The economies have however been eroded by the high cost of fuel and transport equipment. In 1975 it was estimated that vehicle-operating costs alone had already reached $12/ha of coconuts, over $20/t for most producers. By 1975, almost all large estates had shut down their oil-fired driers, and had reverted to wood-fired drying in which the main cost is labour. Calculated figures for on-plantation vehicle operation, some of which also included road maintenance costs, ranged from $8 to $33/t in 1975, without including vehicle depreciation. However, a good manager could still use his labour and his transport efficiently and obtain lower labour costs per tonne than the small operator producing only, say, 100 t or less. He needed to do so if he was to meet his other costs.

Whether taken in the form of salary or profit, the costs of management are a major item on the large and medium estates. The company calculation of around $300/t as the total cost of production, quoted above, includes almost $150/t of such costs. These costs have risen in line with inflation, and are not easily reduced in response to falling gross income due to reductions in output. In these circumstances a disproportionate share of the burden of the decline in real total income experienced by the industry had to fall on labour, both by a reduction in employment offered, and through low wages.
Wages and employment conditions on the estates

At the time of the 1975-76 survey of estates in Taveuni and Qamea (Brookfield, 1976; UNESCO/UNFPA Project, 1977; Brookfield and Hardaker, 1978) the rewards offered to labour had recently been reduced following a short-lived period of intense competition for a limited workforce during the 1973-74 boom. At that time rates of $1.75 or $2.00 for collecting and cutting a 45 kg bag of green copra had been paid in order to attract casual workers from their nearby village groves, and also to tempt labour to shift from one employer to another. With unprecedentedly high incomes obtained so easily from making a few bags of copra, planters could not get labour. Competition still survived in the period of decline, and a wide range of rates was found in an inquiry conducted under some difficulties since planters were often ignorant of the rates paid by their competitors and sought information from this reporter which could not be given. By 1976, however, cutters' rates were tending to converge toward $0.70 per bag of green copra, usually with a bonus payment for daily production of four bags or more. Day workers, meaning all workers employed on tasks other than the collection of nuts and copra-cutting, were generally paid $2.00/day, though lower rates were encountered. It seems that there was almost no upward movement in wages between 1976 and 1979, but further wage increases did take place in the latter year of higher copra prices. There was then little further change until 1983.

Since 1980, and especially since 1982, the environment of employment has again changed. The prime cause was the growth of seasonal employment in the sugar industry in Macuata, especially on the new blocks at Seaqaqa. The possibility of earning $5.00/day or more cutting cane drew many casual and even resident employees from the copra districts, especially on the Cakaudrove coast of Vanua Levu. Taveuni, with a larger potential workforce, was affected less than the mainland. The growing difficulty of recruiting new labour experienced by at least some of the employers is one reason why estates tended to hold on to their resident labour force during a period of low production in the early 1980s, even at the price of increasing the labour cost per tonne of copra. While fringe benefits were improved to this end, however, there was great reluctance to raise cash wages. More resident workers were able to grow cash crops, including yaqona, on estate land than was the case in the mid-1970s, since this concession cost the planter nothing in the short term, and tied the worker to the
estate; it even offered a short-term advantage to the planter in that the worker tended to offer fewer hours to his employer, cut less copra and hence was paid less while on a task rate. The bonuses paid to copra cutters who exceeded the daily 'task' also disappeared from the payment systems of most estates, which offered a flat rate irrespective of quantity.

As in 1975, then, the brief 1983 inquiry into wages and conditions on the estates encountered a period of change. In late 1982 it seemed that no improvement had taken place for a long time, leaving the estate workers among the most poorly rewarded wage labourers in Fiji. In mid-1983 some estates had still not varied their wages, but others had made some significant improvements. Well before the increase in the official price of copra that took place in June 1983, the capacity of the employers to pay had been improved by premium prices paid for copra and discounts available on freight rates, which are discussed below. It is not to be wondered at that employers did not admit any improved capacity to pay; employers seldom do. None the less, an upturn in the affairs of the industry had a noticeable effect on the employment situation; most employers were seeking more labour, and were finding it hard to get.

Wages in 1983

There is still no standard wage in the industry, and the rates of reward differed greatly in 1983. So also did their mode of calculation; the change to the metric system has facilitated such variation since while some employers now paid by the kg, others still paid by the pound; some of those who offered payment by the kg did so on the incorrect basis that 2 lb = 1 kg, enabling them to make a small economy at the expense of their workers! Similarly, while some employers offered day workers payment by the day, others paid by the hour; the length of a working day is not standard. Some daily wages were reduced if a full five-day week was not worked.

On Taveuni most estates paid $3.00/day to day workers, or $0.375/hour which is the same for an eight-hour day. However, some estates paid $3.50 or $3.60/day, and in one case $3.80 for work 'in the bush'. Some still paid only $2.80/day or $0.35/hour. One mission estate paid $20/week, or $4.00/day, for work of greater responsibility. Casual workers were generally paid at the same rates as resident workers, but casuals do not receive the additional benefits of housing,
water, electricity if available, and occasional meat from
slaughter of an estate animal. Sometimes casual workers were
employed on task rates, for example cleaning, spraying and
ring-weeding for $10/acre ($24.70/ha). Specialised workers
employed as drivers, sprayers, stockmen, and night workers
were paid more, between $4.00 and $6.30/day, while full-time
drivers and mechanics got from $5.60 to $7.00/day. Only
 overseers and carpenters got more than this.

C cp apr cut tte r s were pai d by the task, and the lowest rate
encountered for collecting, cutting and bagging in the field
in mid-1983 was two cents/kg. Much more commonly, the rate
was still expressed in pounds, at one cent/lb, or 2.2
cents/kg. This was paid as a flat rate on several Taveuni
estates and on one Vanua Levu estate. However, a number of
Taveuni estates paid more than this, and rates of 1.1 cents
and 1.25 cents/lb (2.4 and 2.75 cents/kg) were quoted. One
estate offered only 1.4 cents/kg to cutters, but the work
consisted of cutting only, and was done under cover at the
drier site, permitting much higher productivity. Only one
major estate still offered a sliding scale, starting at two
cents/kg for the first 129 kg, then rising to six cents/kg for
Stakhanovite quantities over 400kg/day. Bonuses for the best,
second and third best monthly production were also offered to
a workforce of over twenty cutters. Assuming a good average
daily production of 200 kg, a cutter would receive $4.68 for a
day's work compared with $4.40 for a cutter paid one cent/lb.
The higher rates, demanding production beyond the normal
capacity of a single worker, were designed to encourage
Indo-Fijian family groups to collaborate in collection and
cutting.

On the more sparsely peopled Vanua Levu coast rates were
in general higher than on Taveuni. Day workers were paid up
to $5.00/day and even $6.00-7.00 on some estates near
Savusavu. Copra cutters received 1.5 cents or two cents/lb
(3.3 and 4.4 cents/kg). Sometimes cutting was contracted at
$90/t of dried copra; assuming 45 bags of green copra per
tonne, say 2025 kg, this would imply a rate of 4.4 cents/kg,
offering a day's wage of almost $9.00 for a production of 200
kg. These wages were regarded as necessary in order to secure
scarce labour; there was substantial movement of workers
between estates.

The pattern of labour recruitment had changed
significantly. By 1970 estates had ceased to be able to
recruit labour from Lau, although many Lauans remained in the
Northern Division, but still received offers of labour from individuals who came from impoverished areas in eastern Vanua Levu to find work on the Savusavu coast and in Taveuni. A substantial Indo-Fijian workforce remained from the 1945-55 immigration. In the mid-1970s there was little movement of labour either into or out of the coconut areas of Cakaudrove, but workers circulated between estates either in response to inducement, or for personal reasons. It was still possible for estates to make semi-contractual arrangements with village communities, both locally and at a distance, to supply labour for several months; such villages mostly sought money for community purposes such as a new church.

By 1983 no further labour was offered from eastern Vanua Levu, where the extension of roads had improved the viability of local production. Villages had ceased to offer their services to estates, often being directed by Government toward the cane blocks at Seaqqa. The expansion of the sugar industry in Viti Levu and Vanua Levu had attracted many Indo-Fijian families, and some Fijian families as well, away from the coconut estates. Most employers were finding it hard to attract labour, or retain the labour which they had. Many were willing to accept back workers who had quit their employment to go to the cane fields, despite their earlier declarations that they would not do this. Agreements not to 'poach' on the labour-force of neighbours, even relatives, were being disregarded. Those who had advantages such as good housing, central location, or income-gaining opportunities for family members to offer were quietly 'sweeping up' those workers who were seeking a move. Up to July 1983, however, keen bidding for labour had not spread beyond the region close to Savusavu, the area most accessible to Macuata. The beginnings of a period of keen competition for labour were, however, also visible in Taveuni, and there was already complaint from among the planters (Fiji Times, 13/6/84).

The Carpenter estates

The Carpenter organisation occupies a pivotal place in the coconut industry, having the largest mill, being the only private firm still buying copra at outstations, and owning three major estates on one of which there are important innovations. The role of the Carpenter organisation cannot be ignored in a review of the industry, but they refused to co-operate in this inquiry. The information which follows has to be presented as hearsay, and inferences drawn are those of
the reporter and do not derive from company information.

There are three Carpenter estates: Kanacea island (890 ha) is by all accounts an efficiently run estate, with a stable labour force of Indo-Fijians and Lauans. Worker productivity was 7.58 t/worker in 1977, with normal daily production over 180 kg, while some cutters produced as much as 300 kg/day. A principal reason is the large size of nuts obtained from the hybrid trees. Production was still recovering from the effects of storm in 1983, but at full production the yield would be over 0.55 t/ha. Vunilagi, on Vanua Levu (528 ha), by contrast, is a run-down estate, yielding poorly, and with constant difficulties in obtaining and holding labour. Production in 1982 was only 6.26 t/worker. Nearby planters reported that Vunilagi workers not infrequently sought employment elsewhere, and there had been losses of labour to the canefields.

Delaiweni on Taveuni (286 ha, with almost 200 ha in coffee) had about 100 ha of young coconuts, but the rest were old. It was, however, on this estate that Carpenters planted over 200 ha of coffee after 1979 in an experiment designed according to one report as a 'last try' to make the estate profitable. Twenty-three other Taveuni farmers had coffee in 1983, and it had been expected that Delaiweni would buy their coffee and assume the role of a 'nucleus estate' for a new industry. Without stated reason, Carpenters declined to assume this role, although they did buy some cherry coffee at five cents/kg, less than the Government price. New buildings had been constructed and with progress charts and tables on the wall, the operation looked very different from an average Taveuni estate.

Most of the labour at Delaiweni was used on coffee, and the bulk of the workforce was Lauan, from the southern island of Ono-i-Lau which was the home island of the estate manager. This was the first major importation of labour from Lau into the coconut districts of the Northern Division for more than ten years. Unlike other estates, Carpenters had also been able to obtain some labour recently from Vanua Levu. However, the wages offered on the Carpenter estates in the recent past did not provide much incentive to recruitment. At least in late 1982 copra cutters apparently received only 0.8 cents/lb (1.8 cents/kg) for quantities up to 182 kg, and 2.2 cents/kg for those who made more than this. Day workers who worked a full five-day week were said to be paid $2.45/day, but those who worked a shorter week received only $1.85/day. In
mid-1983, however, it was said that Carpenters were paying $3.75/day which -- if correct -- would move them from the bottom to near the top of the Taveuni range. Workers employed on coffee received the day-workers' rate, but some women were hired for picking and drying, perhaps at the $3/day paid elsewhere. In Vanua Levu it was said that Carpenters still paid relatively low wages at Vunilagi and also that their housing was poor. Vunilagi was, however, an estate with no future for the company, being on leasehold land with only a few years to run.

Carpenters' plans for Delaiweni were substantial, and it was said that the company recognises that full development of coffee would require a workforce of 300–400, not all of whom needed to be male. Additional housing would also be required. It was not easy to see whence a workforce of this size would come, since it is no longer Government policy to encourage estates to recruit in Lau, and Delaiweni's use of its manager's connexions in Ono-i-Lau was very exceptional. Clearly it would be possible for an organisation with Carpenters' resources to bid up wages on Taveuni and thus build its own labour force by drawing labour away from other estates, many of which would find it difficult to match serious competition. Were Carpenters a committed locally-resident company this might not be regarded as harmful. However, a subsequent withdrawal would have more serious consequences if in the meantime the labour market had been distorted. It may, however, be that Carpenters had other plans for recruitment of the necessary workforce; there is no doubt that their coffee innovation is potentially valuable to the country.

B. THE SMALL ESTATES

The small estates of the Northern Division have been regarded as a 'problem' for more than twenty years. Many are subdivisions of formerly large estates, produced by division between sons and other relatives on the death of owners. Some were small initially. With an area generally less than fifty ha, and frequently much smaller, they produce between ten and thirty tonnes of copra in a good year. A high proportion are owned and operated by part-Europeans, but some are now owned by Indo-Fijians and by Fijians. The gross income of these estates is only a few thousand dollars a year.
None the less, few part-European owners grow much of their own food, and many maintain a much-reduced form of their fathers' and grandfathers' life-style. Before the 1970s most employed a few workers, and some still did so in the mid-1970s. Their costs of production were, however, in the high range, and the decline in real incomes forced most such planters to forego the luxury of a paid workforce. An arrangement that was already encountered in the mid-1970s became much more general: one or sometimes two resident families - former paid workers - received a fifty per cent share of proceeds for working the estate on which they lived without charge.

Most such share-cropping families are Indo-Fijian, and family members often sought additional income by casual or sometimes regular work elsewhere. On many small estates the resident worker-family now managed the holding, the owning family having left to find work in Suva or Labasa. Where the owning family remained, and had active male members, they generally did most of the work, and made do with very little help. Those that had to employ casual labour found that they had to pay $4 to $6/day in 1983. There was little or no division of labour among the workforce of small estates, although the owner/manager sometimes performed all the skilled jobs leaving the unskilled jobs to his share-cropping or wage-paid workers. Casual workers might come onto the small estate to cut copra at an agreed rate, or family members of the resident day worker might cut some of the copra, and were paid for this work.

On estates which are a little larger, between fifty and 100 ha in size, there was greater variety of arrangements. Some worked by share-cropping on a 50-50 basis, while others still had resident workers whose labour they supplemented by hiring casual copra cutters from time to time. There was also another sort of arrangement, common on Fijian estates and not unknown elsewhere, under which portions of the estate land were used for food crops or cash crops by tenants who paid no rent but cleared the land and planted coconuts for the owner. Informal allocations of land, sometimes in quite large blocks for food-crop or yaqona production, were quite common on estates owned or managed by local people, Fijian and non-Fijian; the arrangements fell within the traditional system of mutual aid. Cutting copra for the planter seemed rarely to be a condition of tenancy; sometimes the tenants cut copra for themselves, and sometimes it was cut by the owner's paid workers. However, where support in some major
task was needed there was an obligated pool of unpaid labour on which the owner could draw. If there were other forms of repayment, they went unrecorded. Workers on such estates were paid a fairly low wage but had some additional income opportunities by planting their own cash crops, through casual employment of family members, and by working for the tenants.

Few generalisations can be made about the small planters. Their living standards varied substantially, but were generally higher than those of Fijian farmers on lease-blocks of mataqali land. Their labour arrangements ranged all the way through the spectrum from formal wage-employment, through share-cropping, to reliance on the mutual-aid system. Subjectively, it would seem that both share-cropping and mutual aid have become much more important since the mid-1970s, and that reliance on these practices has extended from small planters into the realm of the medium-sized estate. As an adaptation to shrinking real income from the land such reliance clearly has much to recommend it. Moreover, arrangements of this type contain much that is invisible to the taxman, and everyone in the industry is well aware of the desirability of maximising the share of income that is retained.

C. THE FIJIAN COCONUT FARMER

Fijian small-scale producers

Almost no Fijian small-scale producers are ever monocultural producers of copra. They never have been, and the attempt even to create a population of mainly tree-crop farmers through the LDA schemes in the 1960s was a failure, as block-holders refused to become so committed to production for the world market. Fijian smallholders produce a high proportion of their own basic foodstuffs, and many also market other crops, principally vegetable crops and increasingly yaqona. However, except in a few areas copra has remained their principal source of cash income.

The small-scale producers are far from being a uniform group. Two distinct groups immediately emerge from the copra-sale records alone: one which sells through the Co-operative movement and one which dries and consigns its own copra (not being permitted to sell it through unlicensed middlemen); the latter group comprises most of the larger producers. In Lau four classes of farmer have been described
(M. Brookfield, 1979) as follows:

(1) **Traditional, subsistence-orientated farmers.** These rely entirely on family labour, and use coconut palms as a sort of 'bank', cutting copra only when money is required, especially to pay school fees and taxes, and to buy the foodstuffs and other supplies that they now regard as 'subsistence needs'.

(2) **Part-time farmers, part-time wage earners.** These men work on a casual basis for other farmers [or estates elsewhere], as stevedores, or in public works, and usually make copra only when not in paid employment.

(3) **Committed farmers.** These are men who are usually willing to innovate and to improve incomes from copra. Many such farmers have their own driers, and some buy copra green from neighbours, dry it and sell it illegally as their own. On Lakeba most of the 145 individual consignors of copra to Suva in 1974 belonged to this group. These farmers also diversify into other cash crops as opportunity offers; however, they grow a full range of subsistence production for family use. They may hire casual labour from time to time.

(4) **Farmers with a full-time job.** This group is very much a minority, who employ wage-labour to do much of the farm work, especially in copra production, but sometimes also to bring home a regular supply of food; their own farm work is restricted to weekends.

Two other types, only one of them represented in Lau, need to be added to this list in order to describe the complete range that is encountered in greater or lesser proportion in different parts of the coconut districts:

(5) **Active lease-block holders.** Land subdivision under the Land Development Ordinance in the 1960s, and more recently by local initiative, registered with the NLTB, has created a substantial population of lease-block holders on mataqali land, all of whom are Fijian. By no means all the blocks have been planted or otherwise used, and by no means all those which have been planted are still occupied. However, in several parts of the coconut districts but principally in Cakaudrove, there is a population of active lease-block holders that collectively numbers over 2,000 farmers. Twenty-five per cent of the rural Fijian population of Taveuni lives on such independent blocks. These people have from four
COCONUT ECONOMY

to fifteen ha of land, and a few have much more. Most such blocks are now planted in coconuts, with other tree or ground crops under at least a part of the stand.

Most larger block-holders have their own copra driers and several have employed labour, even on a regular basis. They are in some ways analogous to the small planters, except that their enterprises are generally more diverse. The scarcity of labour has caused some such men to contract their activities in recent years. If they have to rely on casual workers they may not be able to get them when required. The labour that they use is now often obtained from villagers, and some of the copra of such men is cut by villagers on their own account, against future services to be rendered under the mutual-aid system. Joint-labour systems are sometimes developed by adjacent groups of block-holders, but more commonly for clearing and planting than for copra or other crop production. A few holders continue to be active employers of labour, but often these have large plantings of yaqona, the profitability of which is much better than that of copra.

(6) There is yet a further type of copra farm, the absentee community-farm, which is found principally on some very small islands from which most or even all of the resident population has departed. The work-force consists of members of the land-owning group who do 'shifts' of from a few weeks to several months on the island cutting copra, and growing food for their own subsistence. This requires organisation, but it is achieved. Several outlying Lau islands without permanent population are worked in this way: from Kabara, Ono-i-Lau, Ogea Levu and Vanua Balavu. The complexity is illustrated by the tiny island of Qelelevu, 100 km northeast of Taveuni. In 1975 most of its 150-odd people had moved to live on church land in Taveuni. A shifting population of between twenty and twenty-five was maintained, but only half this small island was worked as a community farm; the other half was the absentee farm of a chief. In 1979 an attempt was made to assist the Qelelevu people, who suffered severely from high transport costs, by providing them with a boat from aid funds. The boat needed frequent repairs however, and after Hurricane 'Sarah' had damaged coconuts on Qelelevu in early 1983 the island was, at least temporarily, abandoned by the last of its people.
The need for a cash income

With such complexity, no single set of economic responses could any longer be expected, and though a Chayanovian model may still apply to the majority, the level of cash demand has risen and has become more variable. Many cash-bought goods are now regarded as necessary for subsistence at acceptable standards of living. If this negates the meaning of 'subsistence', it is the term 'subsistence' that requires modification in the Fijian context, as in most other contexts. In Lakeba, where there is only one store outside the Co-operative system, the per-capita shelf value of goods imported in 1974 and 1975 was respectively $91 and $87, or perhaps better $594 and $565 per mean household. Since some goods also entered the island by other channels the per-household level of imports was more probably over $650 per annum (M. Brookfield, 1979). Elsewhere in the same period mean per-household expenditure in village shops reached $515/year in Koro (Bayliss-Smith, 1977) and $370/year on Kabara (Bedford, McLean and MacPherson, 1978).

Store-bought goods do not include all necessary expenditure. There is also the need to pay for education, and there are taxes and church contributions. In 1974-76 such 'socially-determined' expenditure averaged $273 per household in eight Lakeba villages, with a range from $196 to $304. 'Individually determined' spending, which includes travel, purchase of services and imported clothes as well as food, liquor and cigarettes, averaged $993/household, with a larger range from $306 to $1,758 in different villages (M. Brookfield, 1979). There is great inequality in individual income and expenditure patterns; among Lakeba villagers recorded store expenditure ranged from a few dollars to over $2,000, without including the salaried Government employees.

In Taveuni, again among villagers, block-holders and estate workers only, 1975 data showed that the lowest forty per cent of income earners received 19.6 per cent of total cash income while the top twenty per cent received 40.1 per cent (Nankivell, 1978). The mean household cash income was only $144, but with a standard deviation of $236. Inquiry over a larger population was less thorough than in Lakeba, but it yielded a mean of $137 (SD $143) for Fijians, $133 (SD $167) for Indo-Fijians and $268 (SD $759) for a small group of part-Europeans and others. The Gini coefficient of cash incomes was 0.436 for all households, and 0.469 for Fijians in villages. In 1982 Bayliss-Smith found slightly greater
inequality than this in Bua, based on a Lorentz curve plot of data in comparison with Taveuni data.

There is no population of Fijians that does not require a cash income, and this fact determines that copra will continue to be produced almost at whatever price. For those without access to significant income other than from copra, there is a minimum level of necessary copra production the determinant of which is the minimum income required. Serious hardship is felt when the received net price falls so low that the basic target income cannot be met from available production. Especially for those with few coconuts, low prices can lead to genuine hardship by any standards. One such community, of Solomon Islanders on Qamea descended from indentured workers, obtains the maximum production from their diminutive coconut area, but in 1975 was the most poverty-stricken rural community this writer has seen in Fiji. Some sick and old Fijian villagers on the same and other islands were only a little better off.

Data collected in 1983 suggest that cash incomes continue to show a wide disparity between places and between people within village communities.

Costs of production on smallholder land and in the villages

Cost-of-production estimates for village and smallholder producers have not been made in Fiji, and the basis of estimates made elsewhere, for example in Papua New Guinea (Lam, 1977), is questionable since it is extremely difficult to quantify inputs into smallholder cash production. In 1975 Bayliss-Smith (1978) estimated a mean input of 7.5 hours/week into copra production for men on Batiki, plus about 0.5 hour/week for women, i.e. a total of about 52 working days per year. On Koro (Bayliss-Smith, 1977) a one-month survey in 1974 showed 10.4 hours for men and 1.7 hours for women, i.e. about 1.5 days/week, or 78 days/year. If these estimates were to be valued in 1983 terms at $3.00/day, and set against production in the two communities in the relevant year, divided by the number of households, then the labour cost of production at the 1983 estate wage would be $62/t at Batiki and $26/t for Nacamaki, Koro. Both surveys of labour inputs occupied only a few weeks, and the wide discrepancy in the result clearly reflects the difficulties of extrapolation.
Nor is it easy to compare these values with estate costs, since the comparison has to be only with nut collection and copra cutting. On one estate in 1983, the labour cost of production for these tasks approximates only to $37.50/t, on another to $60/t and on a third to $54/t. These figures are in the same range as the village-producer estimates, and the difference in total cost on the estates arises from employment of specialised workers for tasks associated with large-scale production, together with plant and vehicle costs. Moreover, the real costs on estates include housing, and should include the time spent by the workers on producing a part of their own food. If a proper comparison is to be made, therefore, it must be assumed notionally that the village farm exists for the purpose of cash production, as does the estate, and that time spent on non-cash productive activity is time spent on 'reproduction' of the labour power of its workforce. On this basis the cost of producing a tonne of copra at Batiki, taking 8.4 hours per household per day x 240 = 2016.4 hours in a working year, at 38 cents/hour = $766.08, with a mean household production of 2.5 tonnes of copra, works out at $306.43/t, i.e. very much the same as the company estimate for plantation production costs cited above. At Batiki, not all cash income derives from copra, but nor does it on many estates. In so far as any conclusion can be drawn, it is that if male and female labour on Fijian farms is priced at the going agricultural wage, and if all productive labour is included, and set against copra production, then costs in the smallholder and estate mode may lie in a similar range.

The economies in the smallholder and village-farm mode of production lie in the fact that productive labour is not paid for in cash. Moreover, the smallholder and village farm can much more readily combine several cash-producing activities and shift inputs between them according to relative perceived benefit, in the manner described by Bayliss-Smith (1977). In the Batiki case, about half the cash income is derived from sources other than copra, though most of this is gained by only a small number of persons who have wage employment. In other communities, especially in the yaqona-producing areas, non-copra income is more widely distributed. If the total labour costs attributed to copra production, together with the half of 'reproduction' of labour power that is 'used' for copra production alone, can be valued at only $100-150 per household per tonne, then copra production at present prices remains a remunerative activity. For people without other income sources, however, copra barely, if at all, repays the real cost of its production, unless an imputed wage below the
going agricultural wage is used in order to make the calculation yield more attractive results.

The point of this sophistry is to show that although in straight cash terms the smallholder can produce copra at a far lower cost than is possible for even small estates, the comparison ceases to be so advantageous if productive labour employed in producing food and shelter is also given a monetary value. Almost all the on-farm production costs of smallholders and village producers consist of labour, and the cost of tools and other materials is small and irregular. The effect of a declining real copra price, especially when accompanied by a reduction in other opportunities for earning income, is to force down the effective 'imputed wage' paid to labour employed in the smallholder and village sector of the industry. The effect is much the same as on the small planters, except that most of the latter grow little of their own food. Since, however, some cash income is a necessity of life for all Fijians, the production of copra continues.

D. AFTER THE 'FARM GATE'

Grading, the Co-operative Societies and the buyers' margin

The grading scheme, initiated after the Silsoe (1963) report, led to a great improvement in quality. The basis was moisture content plus a 'marks' system for texture and appearance. In consequence of the emphasis on moisture, the proportion of Grade I rose in dry periods and fell in wet periods. During long periods of storage in humid weather the quality can deteriorate between initial drying and receipt in Suva; even a long sea voyage can cause deterioration. This led to a preference on the part of sellers, even large estates, to grade and sell copra at outstation buying points of which there were only four for many years, at Lautoka, Savusavu, Somosomo (Taveuni) and Levuka; their chances of getting Grade I were much better than in Suva. Co-operative Societies, almost all well-removed from these points, had to consign to Suva where they often received Grade II.

It was largely in consequence of the poor financial position of the Co-operatives after the 1974-75 price decline that additional grading stations were opened in 1975 at Labasa and Nabouwalu and in 1976 at five other points in Vanua Levu and at Lakeba. Eight further stations, scattered through the island areas, were opened in 1978. These new stations are
staffed by the Agriculture Department in association with the Co-operative Societies, rather than by the Coconut Board which lacks resources to meet the recurrent costs. Hence they constitute a further element of subsidy. The innovation proved popular with growers, but led to complaints by the millers; the 1980 FAO study of the industry recommended that stations 'unable to grade adequately' should be closed, but this was not done. Instead it was increasingly suggested that grading should be abandoned, and that only a single grade of 'fair merchantable' copra be used, sub-standard copra being rejected. This recommendation was supported in the report of the Dickson Commission (1983), and has been adopted. All reports indicate that results have been satisfactory to the growers.

Co-operative Societies can buy copra from individuals who are not among their members, and most buy both dry and 'green' copra. The 'green' copra is then dried in the Co-operatives' own driers and is on large islands commonly bulked for shipment at stores maintained by island or regional Co-operative Associations. Twenty such associations, not all of which make copra and one of which is in Tuvalu, are members of the Fiji Co-operative Association (FCA) which arranges contracts with the millers.

The Co-operative movement is strongly developed in eastern Viti Levu, where copra making is only a minor part of business, and is also strong in the island areas, where there is usually one society to each village. There are also some mataqali societies. The FCA lists 96 societies in Lau, 24 in Kadavu, thirty in Lomaiviti, two in the Yasawas and Associations on Vatulele and Rotuma. There are three Associations in Lau, two in Lomaiviti and one in Kadavu. By contrast the movement is weak in Vanua Levu and Taveuni, where there are only fifteen societies in all, and is extremely weak in the Western Division. In 1982 the FCA listed as insolvent with bad debts twenty societies in Lau, eight in Vanua Levu and islands, three in Kadavu and both the Yasawas societies, but only one in Lomaiviti. More than half the few societies in Vanua Levu, and 21 per cent of those in Lau were in this category. It will be recalled that in the late 1950s the main financial strength of the Co-operative movement lay in the coconut districts, the very areas where the movement was in most financial trouble a generation later. In addition the FCA does business with a large number of 'individuals' in the copra districts, including farmers who sell copra independently, storekeepers, sundry other entrepreneurs, and
some informal societies; many of these too were in the 'bad debt' category.

Seventy-five per cent of the societies and 79 per cent of 'individuals' in the 'bad debt' category in 1982 had addresses in the coconut districts. However, the distribution is not uniform. In Cakaudrove, 38 per cent of all FCA accounts, corporate and individual, had bad debts and had been closed; in Lau the proportion was 26 per cent and in Kadavu 25 per cent. Only Lomaiviti presented a brighter picture, with only five per cent in this category. Except in Lau, the situation with Societies was worse than with 'individual' accounts.

The problems of the Co-operative Societies and their 'apex organisation' cannot be attributed simply to 'bad management'.(2) Indeed, many societies are well-managed, although decision-making ability is not always present when it is needed. Declining real incomes from copra are also declining real incomes for the Co-operative Societies, and for all traders in the coconut districts. Two Burns Philp trading stores in Cakaudrove showed turnover at an almost constant level in money terms for the years 1979-82, representing a significant decline in the real value of turnover; they have since been sold to individual entrepreneurs. Most Co-operative Society stores had the same or worse experience. These stores had to maintain their overheads and their unprofitable services in the face of shrinking real returns from copra, and reduced customer buying-power. Moreover, they suffered a further handicap from the small margins available to them on their trade in copra.

In 1982 these margins ranged between $16 and $18/t in Grade I, and between $19 and $21/t on Grade II, at different island points. It was often urged that they were insufficient, and that larger margins should be built into the determination of out-station copra prices, but the Dickson (1983) report said nothing on this topic. Societies have the opportunity to charge larger margins on green copra bought for processing and made into dry copra by themselves, but there is an element of competition in many areas, not only among Co-operatives but also with the illegal buyers of green copra -- farmers with good driers who buy from other farmers and sell the dry copra as their own.

The cost of making a tonne of dry copra from green copra varies greatly according to the scale of production. On a throughput of 55 tonnes, one society's direct costs were $22/t
in 1982. This society bought green copra at eight cents/kg and dry copra at sixteen cents/kg, and sold in Suva at $206/t net of all charges. Assuming 2,025 kg green/t dry (i.e. 45 x 45 kg bags green/t dry) the margin on green copra would be $44/t, $2 less than the margin on dry copra. If, using another estimate of the green-to-dry ratio, we assume 2,425 kg green to 1,000 kg dry, the margin on green copra falls to only $12/t. Moreover, a share of other overheads needs to be added to the direct cost. If the share of copra income in societies' total income is then applied to total cost, the margin on all copra on the first basis would fall to $13/t. This is about the margin estimated by societies in another island where only green copra is bought, and the price offered corresponds to this margin. Even so it appears inadequate, since FCA records show a lower net price for that island's copra than is shown in the society's own estimates.

Margins are clearly very variable both between places and through time. Especially with small total quantities, irregularity in deliveries increases the cost of processing, and certain overheads must be maintained irrespective of quantity. It seems that sellers of dry copra subsidise the price offered to sellers of green copra, and this further helps explain why so many of the larger producers have preferred to consign directly to Suva rather than sell through the Co-operatives. It also seems that some part of the cost of copra trading is carried by the general budget of the societies, and hence from profits on retail trading. While better times since 1983 will have eased the societies' problems, the basic weakness remains unresolved.

The millers

Fiji made an early start with coconut-oil milling in the 1920s, but not until Island Industries (Carpenters) set up a large mill in 1946 was most of Fiji's copra processed within the country. In 1983 there were two millers in Suva (Island Industries and CASP), one in Lautoka (Punja), and a fourth in Lakeba. In addition a confectionery company and a whole-nut exporter took small quantities of nuts. Island Industries, with the capacity to process 42,000 tonnes of copra, were working at less than half capacity. They took over eighty per cent of all copra. The mills are designed so as to operate economically at less than capacity and though their machinery is old, it remains efficient. Employment, then about 100 in the two Suva mills, was less than formerly and was capable of
expansion. Both Suva mills were buying copra from outside Fiji, and using the small production of Tuvalu and part of Kiribati despite a freight rate of $70/t in 1982; CASP milled Burns Philp's copra from the Line Islands. Tuvalu growers maintained that they got a very inadequate price. In late 1982 both Suva mills were interested in importing copra from Vanuatu, since both could sell more coconut oil and stockfeed than they were able to market. With declining supplies and a rising coconut oil price, an element of competition between the millers replaced the former agreed division of supply within Fiji, and in mid-1983 the millers were reported to be paying premiums of from $12 to $23/t above the official price in order to obtain copra.

This was the situation at the time the long-awaited Dickson (1983) report became available, and was adopted in the main as from 1 October 1983. It offered a new formula in place of the Silsoe formula which was still in operation. The effect of the new formula is to yield a substantial improvement in the basic 'assessed' price of copra. Abandonment of the notional freight charge on copra to Europe, and its replacement by a more realistic 'freight levy' based on the coconut-oil freight rate, together with elimination of the 'local crushing extra price' are the most significant among several changes which would bring a 'Suva basic price' based on a Philippine price of, say $270/t up from $145.26/t to $186.07/t.

The growers felt that a greater improvement in their price would have been possible, but the reaction of the millers, reported in the Dickson report itself as well as in the press, was strongly negative. They maintained that it would deprive them of the profit they had certainly been able to make, through bad times as well as good, until adoption of the new formula. Both Island Industries and CASP (Burns Philp) threatened to confine milling to their own companies' copra, and only Punja expressed satisfaction. In the event, the improvement in the copra market which began a little before the new formula came into effect, and which was sustained into 1985, has delayed any action. Meanwhile, however, there have been important new developments in coconut-oil milling in Fiji, and we discuss their potential impact below, in Chapter 6.
The situation in 1982 and in 1983

It will be useful to summarise the changes in the operating environment of the industry that took place after 1982. In September 1982, the Suva basic price for Grade II copra fell below $90/t. In November, when this 'assessed price' was $96.95/t, the following was the actual position of a producer in the remoter islands, in Rotuma or southern Lau:

<table>
<thead>
<tr>
<th>$ per tonne</th>
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<tbody>
<tr>
<td>Assessed price</td>
</tr>
<tr>
<td>Less: Freight on copra</td>
</tr>
<tr>
<td>Marine insurance</td>
</tr>
<tr>
<td>Return freight, sacks</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Less: Cess @ $20.00/t</td>
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<tr>
<td>Basic tax @ 1.1%</td>
</tr>
<tr>
<td>Handling @ 1.0%</td>
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<tr>
<td>Plus: Loans scheme</td>
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<td>Freight subsidy</td>
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<td>-----</td>
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<tr>
<td>94.5% subsidy</td>
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</tbody>
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This was an extreme case, and a non-Fijian producer of Grade I copra in, say Taveuni, would have had a 'without subsidy' return of $61.00/t, and an actual return of $239.00/t, of which 74.5 per cent would have been subsidy. Since the 1930s there has never been a time when a producer at a shipping point anywhere in Fiji would have failed to receive some cash payment at the un-subsidized price, after meeting all his charges. Away from the shipping points, however, the additional charges of transport would have absorbed the whole of the remaining return and more, both in 1975-76 and in 1982, for a large number of producers. This happened in 1972, before the days of subsidy. The subsidies were an essential part of the structure of the industry as an on-going business in 1982, and during that year the amount of subsidy paid under the loans scheme exceeded $3 millions.
In 1982, therefore, the industry faced a very uncertain future, and there were many who feared that the subsidy would not be sustained at the same level through 1983. They envisaged both financial and political pressures that might force its abandonment or reduction. By the end of the year, however, the price first of coconut oil and then of copra began to move upward significantly on the world market, so that the millers began actively to seek more copra. Among the producers there was also hope that the new Dickson formula, when it appeared, would offer a better basic price and hence reduce the subsidy element in the received price. (3)

During the first half of 1983 the world prices of coconut oil and copra continued to move upward so that the Suva 'assessed price' exceeded the support price in June. It was decided to pass most of this improvement on to the growers, so that the 'loans scheme' price was increased; given the state of the industry this was a reasonable decision, though it opened a question concerning the repayment of the several million dollars advanced since 1980. Somewhat earlier, the millers had already begun to offer premium prices in order to secure supplies of copra in a lean market. A freight-rate 'war' at sea, discussed in Chapter 6, further improved the position of suppliers, at least in the Northern Division and Lomaiviti. These improvements allowed planters to raise wages, both in response to a labour shortage that had evolved due to the enlarged demand for labour in the sugar industry, and in at least some cases out of a concern for the loss in real income suffered by their workers since 1979.

This was the situation in mid-1983, when the writer last visited Fiji. From then until mid-1985 the world copra price only briefly dipped below USD 500/t, though in real terms it never attained the heights of 1974. However, in early 1985 a decline set in, bringing the world price down to below USD 300/t by September. Fiji also suffers the consequences of the long-term fall in the price of its much larger exports of sugar, even though these affects are ameliorated by preferential arrangements with the EEC, and the resulting balance of payments problem, which became serious in 1984-85, cannot but affect the country's ability to respond to a new decline in the price of its second agricultural export. Much clearly depends on the future of the Lomé agreements, but the prospect is not encouraging.
A lack of confidence in the long-term future of the copra industry therefore remains. The partial restructuring of the economy of the coconut districts of Fiji that has been taking place is therefore of major importance, and is examined in the two following chapters. It contains two main elements: diversification and innovation. However, some more basic issues remain squarely to be faced, as will be argued in conclusion.

NOTES

1. Comments that follow, in this and succeeding sections are based mainly on interviews in the field in 1983. Owners and managers were very open, with one exception. The exception concerns all the estates of the W.R. Carpenter group, the General Manager of which refused all co-operation and instructed his managers not to talk with this reporter. In consequence, while information presented below will, so far as is possible, be presented without reference to individual estates and their operators, the same courtesy is not possible with the Carpenter estates. Information concerning these estates, not having been confirmed by the company, is presented separately.

2. Since 1983 the Co-operative movement has been reorganised. These comments relate to the situation before reorganisation.

3. In fact, at the Dickson basic price the subsidy would not have exceeded 75 per cent even for the most disadvantageously located producers in 1982.
A. SOME BASIC PARAMETERS AFFECTING DIVERSIFICATION

Diversification of rural production in the coconut districts is not a new policy. It was proposed in the 1960s by Silsoe (1963) and other reporters, and serious attempts were then made to build up a cocoa industry by underplanting coconuts with cocoa. The Commonwealth Development Corporation even earlier planted a trial block with oil palm near Buca Bay on Vanua Levu, but decided instead to put funds into palm oil production in Guadalcanal, Solomon Islands, where there is no seasonal drop in output during the coolest months. This trial still stands and produces well, but for reasons that are not clear has attracted no official interest in recent years. Much earlier again, a wide range of cash crops including sugar, cotton, coffee, tea, vanilla, maize and tobacco was planted in the present coconut districts in the late nineteenth century. Livestock have been kept under coconuts since the 1880s. During the 1970s declining real incomes and natural disasters in the coconut districts have prompted a new search for supplementary or alternative crops. 'Diversification' funds have been made available to assist efforts in the establishment of new crops. There have been a number of initiatives, which have met with varied but generally indifferent success. Some planters have also gone into new crops, both under coconuts and on land without coconuts.

Some forms of diversification bring into production natural resources which are not used in the coconut economy or for domestic supply of food, while others seek to make additional use of land that is already in crop. In terms of labour, almost all forms of diversification involve some abstraction of inputs from other activities, including migrant search for employment. These basic considerations are important. Most parts of the coconut districts have under-used or unused natural resources; however, the slow rate of population growth by comparison with the national rate, and the substantial emigration experienced in recent decades, have resulted in a comparatively sparse population. Even on the estates the labour force has undergone a
progressive reduction since the 1950s. We need to consider how far labour is available for new crops in the coconut districts.

Surplus labour to be employed?

The results of FEDM inquiries into working hours in ten Fijian villages (Siwatibau, 1983) show mean weekly hours worked outside the home to range from 27.4 to 35.6 hours for males and from 18.3 to 26.6 hours for women. These hours include time spent on crop production, fishing and gathering of wild produce as well as on handicraft production and house-building. Not all work is 'productive' in a strictly economic definition of 'production', since it includes time spent on such tasks as village maintenance, collecting firewood, and on the social interaction associated with many tasks. Siwatibau's data accord well with Bayliss-Smith's (1977, 1978) for villages in Lomaiviti and Lau. In Batiki he found a working day which included household work to average 6.47 hours per day (35.6 per 5.5 day week) for males and 7.49 hours (41.2/week) for females, of which 4.97 (27.3/week) and 3.43 (18.9/week) hours respectively were 'productive' within the cash or subsistence sectors. In Koro he found an average of 25.4 hours per week spent by males on 'productive activities' and 13.6 hours for females. Addition of 'communal village works' would bring these values up to 26.9 and 14.6; domestic work was not recorded in the Koro survey. In two Lakeba villages he found 34.7 and 16.9 hours worked per week on cash, subsistence and craft activities. On estates the working week is longer. The normal 'day' is eight hours, from 0700 to 1600 with a midday-break. Copra cutters commonly work only five or six hours, and use the afternoon for crop production or fishing. No data are available on the subsistence inputs of estate workers.

None of these data suggests any large surplus of labour-time among adults in the village economy, even though this finding runs contrary to the accepted 'wisdom' on the topic. It follows that there is only limited scope for new activities requiring male labour without subtraction of inputs from present productive activities, cash or subsistence. Though there is rather more scope for gainful employment of women, time would have to be extracted from work in the home, or fishing, and hence would in all probability carry the corollary of a greater reliance on purchased foods. There is, of course, the possibility of a longer working week, but here
the Chayanovian calculus applies: even though they may want more money, not many villagers, or even estate workers, will work longer hours without what they perceive to be fully commensurate reward. Most of those willing to work longer hours already do so, and if they are to shift inputs to other activities they need to be sure of adequate compensation.

Time as well as money are therefore involved in a 'trade-off' between activities. Coconut production has the great advantage that it can be taken up intermittently. The real labour is in the making of copra. We need to begin, therefore, with an examination of labour inputs into coconut production and only then consider the alternatives.

The labour requirements of copra

From 5,000 to 6,000 nuts are required in Fiji to produce a tonne of copra, and these are first collected from where they have fallen between the palms; in overgrown groves a proportion is lost, and the work is more time-consuming. It takes about 100-150 nuts from Fiji Talls to produce a forty to fifty kg bag of green copra, and these can be collected and grouped in from ten to thirty minutes by one man, less if family help is employed. Splitting the nuts in two, and cutting out the copra in 'fingers' takes about fifty to eighty minutes. Bagging the cut copra takes a further few minutes, so that a bag can be filled in a total of from 1.1 to 1.75 hours. Under normal conditions an experienced worker can readily make four bags in a five to six hour period; in thick undergrowth with low-yielding palms even the best of workers may make only three bags in a day. On the basis of 45 bags of green copra to one tonne of dry copra -- an industry 'mean' worthy of closer study -- the cutting stage will therefore normally occupy around sixty to seventy man-hours per tonne, with a range from fifty to eighty man-hours; this does not allow for travelling time to and from the grove, or for broken work periods as is common on small holdings.

Cut copra should be put into the drier within four hours if deterioration is not to set in, and should never lie overnight. Using a basic 'smokeless' drier with the fire in welded oil drums, a period of from 36 to 72 hours is required; hot-air driers take from 24 to 48 hours to reduce moisture to below seven per cent. Drying in the sun takes much longer and the period of time taken depends on the weather. Sometimes, however, copra is partly dried in the sun before being put in
the drier. Tending the drier should be continuous, though it is often not, but the major work is in collecting and cutting the fuel -- firewood, unless husks are brought in with the copra. The total of man-hours involved in the drying process is therefore enormously variable and obviously the more drying is centralized, the more labour-efficient is this stage of the work. It is also easier to maintain quality-control in centralised drying, though even estates often achieved only Grade II in the past.

With a working group such as a farm family all engaged, it is theoretically possible to produce a tonne of copra in a five-day week, but actual output is enormously less. The Papua New Guinea rates of 1.3 to 1.7 t per household in a whole year are probably also closer to the Fiji norm (J. Guest, pers. comm.). A major problem is travel and transport time, since driers are normally located close to villages or estate housing, in order to facilitate the semi-continuous tending that is required. The driers are therefore generally well-separated from most of the groves. Estates use tractors with trailers capable of carrying up to thirty or fifty bags; some small planters and large smallholders use four-wheel drive vehicles carrying a few bags, and many smallholders use pack animals carrying two. A lot of copra is, however, brought in by hand.

It is because of this separation of drier from cutting site that most of the husk and shell are generally left on the ground. The most efficient use of labour is probably achieved by block-holders with six to ten ha of coconuts and a house and drier on the block. However, their production is limited by the productivity of their trees. At 140 trees/ha with up to four nuts per tree per month, a six ha block-holder is limited to a maximum production little over 0.5 t/month of dry copra; it is for this reason that many such men buy copra green from neighbours to dry with their own. This practice is illegal, but it both increases use of drying facilities and also reduces other farms' burden in carrying bags of green copra to the Co-operative Society drier. It is more efficient, and it was an error to discourage it.

The total labour requirement of making copra thus varies greatly according to the quantity produced at a time, the distance between grove and drier, and the amount of time spent unproductively in travelling between workplaces. The capacity of the drier is also a factor. A week's full-time work by one man may produce as little as 0.05 or as much as 0.4 tonne.
The estate worker's mean output of between seven and ten tonnes per year offers a range between 0.15 and 0.21 tonne for a week's work (taking 48 weeks to the year), and smallholder and village producers might achieve this if they make copra from their small groves intermittently, but would produce less. At, say, $230/t a week's work might thus make from $11 to $48. This is a small but useful income, and it sets a standard of comparison.

It should, however, be added that copra cutting is tedious work and is not popular. Collecting and carrying firewood for the drier is also arduous, and tending the drier is demanding of time. There are also tasks such as cutting undergrowth around the palms which are not included in these calculations, and the planting and care of young palms is also time-consuming. Food-production combines well with work in the coconut groves, since both can be done intermittently. The same does not apply equally to the alternatives.

B. THE ALTERNATIVE USES OF LAND AND LABOUR

Livestock and crops under the trees

One of the earliest uses of the land under palms, and still the most common, is for cattle. Cattle not only graze the land, they also resolve the problem of keeping the ground clear so that nuts will not be lost. Cattle were introduced on estates in Fiji as early as the 1880s, and the meat was already sold in 1890. A total of 13,434 cattle were enumerated on coconut estates in 1978.

There is, however, little enthusiasm on the part of authorities in the industry (e.g. Child, 1974) for livestock under coconuts. Unless linked to the use of improved pasture, and to an efficient slaughtering, chilling or freezing, and marketing system, the keeping of cattle is related primarily to plantation maintenance, and there are other and more rewarding uses for the land, uses which cannot be combined with cattle. These include under-cropping with shade-tolerant or shade-demanding tree crops, and cultivation of food and other ground crops, which can usually only be done where palms are widely spaced. By contrast with more densely peopled countries in Asia, or even nearby Tonga, the proportion of crops of any kind under coconuts in Fiji is low. In Fiji as a whole the 1978 agricultural census found only 2.9 per cent of
the coconut area under-cropped (Rothfield and Kumar, 1980); in Taveuni in 1976 the proportion was 7.2 per cent (Brookfield, 1978) and in Lakeba 5.7 per cent (M. Brookfield, 1979), values which may give a more accurate picture than the national sample. Most under-cropping is on Fijian land, where on Taveuni and Lakeba respectively 58 and 23 per cent of all Fijian crop land was also under coconuts. Some estates have tried field crops, and on Taveuni in 1976, 6.9 per cent of coconut land on the small estates, but only 0.1 per cent on large estates was under-cropped. Elsewhere in the South Pacific much more coconut land is under-cropped, mainly with cocoa; this has created problems in that it becomes far more difficult to replant the coconuts, even impossible without destroying part of the cocoa. If there is now to be substantial under-planting of coconuts with cocoa in Fiji, it would be as well to ensure that only relatively young coconut stands are under-planted.

Cocoa as an underplanted crop with coconuts

There is now a major drive to plant cocoa in Fiji, yet cocoa has been tried before and has failed. The reasons for this failure will not be recounted, since it seems that at least some of the lessons have been learned, but those who are wary of the new enthusiasm would gain support in their wariness from reading the files of the 1960s. Newly planted cocoa is of a more suitable type, and some efforts are being made to avoid wetter areas, and hence the problems of black pod and canker. None the less the degree of enthusiasm expressed in some quarters for the new cocoa drive is disquieting, as is the fact that some of the old Trintario plantings have been cleaned up from the bush which had grown around them, and are expected by their owners to be back in production.

The present enthusiasm for cocoa derives from a strong price improvement that began in 1982 and continued until late 1984. During this time the world price of cocoa more than doubled, and remained consistently high. The weakness that re-emerged in the price of copra early in 1984, though it was checked, did not affect cocoa. This was the situation when decisions to press ahead with coconut replanting which we discuss below, were taken. There are fears that heavy planting of cocoa in a number of countries since 1980 will lead to a condition of over-production that may become chronic. Whether this will, or will not affect current plans
in Fiji remains to be seen.

The planting schedule set up in 1983 envisages a planted area of over 5,000 ha by 1990, more than two-thirds of this being in Vanua Levu and Taveuni. In 1983 the planted area was about 1,500 ha, most of it on settlement-block land in Vanua Levu, developed with EEC funds. Most of this has only now begun to produce. Most of the additional cocoa will be under coconuts, but a proportion will be on previously unused land.

On the basis of experience in cocoa-growing elsewhere in the Pacific it would be unwise to assume production larger than 1.5 t/man-year, including processing and all other intermediate tasks. If 5,000 ha were to be in production by the early 1990s, the full-time equivalent (FTE) of about 3,300 workers would find employment, at a 1983 cash productivity of $1,875 assuming a yield of 1.0 t/ha of first grade cocoa. On the 3,840 ha planned planting, expected to yield 3,430 t by 1996, the expected labour absorption is therefore of the order of 2,300 FTE. Presumably, additional employment would be created in central fermentaries, transport and allied servicing. Perhaps 3,000 FTE jobs might be created.

The full-time equivalent of perhaps 3,000 jobs would, of course, be spread over a larger population. It is generally believed that a farm family also engaged in other activities cannot handle more than three to four ha of cocoa, and the cocoa area intended in the plans is only two ha/farm. In Taveuni one farmer, with his sons and some helpers, handled sixty ha of coconuts and four ha of cocoa, planted since 1977. About half the copra is now cut by neighbours on their own behalf and the farmer's own copra production has fallen from forty to twenty t/yr since he ceased to be able to obtain labour. His cocoa production of about four tonnes was sustained. At an estimated one full-time worker per seven tonnes of production, the copra industry employed directly, in 1983, the full-time equivalent of about 3,200 workers, at a cash productivity of $1,610/worker assuming a mean 1983 farmer's price of $230/t. An additional 3,000 FTE workers in cocoa engaged at higher cash productivity is therefore likely to be obtained at considerable cost to production in the coconut industry unless there is a substantial increase in the rural labour force, or unless labour-saving innovations are introduced and extensively applied in the coconut industry itself.
All this assumes, of course, that cocoa will succeed in Fiji. Considerable weight is given to the SPARTECA agreement with Australia and New Zealand in present thinking, and it is hoped that the disease problems will not again return to plague the revival of cocoa production. If cocoa does succeed, however, it is likely to expand more rapidly than is envisaged under present plans, and to become a major factor in the labour absorption capacity of the coconut districts. Without sufficient labour, a drastic reduction in the copra production of those areas -- mainly in the Northern Division and Lomaiviti -- that are best suited to cocoa is quite likely.

Coffee among coconuts

Proposals to plant a larger area of coffee have been abandoned because of 'marketing uncertainties'. Chief among these 'uncertainties' is the failure of the Carpenter estates in Taveuni to serve in the role of nucleus estate on that island, while continuing vigorously with their own plans for coffee production which -- presumably -- they expect to be able to market. Since Carpenters would not talk to this reporter, an informed comment on this apparent contradiction is not possible. Coffee, like cocoa, enters production in from two to four years. Its production is, however, more seasonal and in Fiji economic picking is probably restricted to the cooler half-year. In one study the estimated cost up to the first production year is $704/ha, but this assumes a female wage of only $1.75/hr against $3.75/hr for men. In production, labour input is estimated at twelve man-days/ha for slashing and ring-weeding, plus forty man-or-woman days/ha for harvesting, fermenting and pulping, sun-drying, packing and associated transport, an estimated annual cost of $189/ha for a production of 2.0 t/ha. This is an estimate for fully commercial production, and achieved yields are likely to be much less. Present yields are about 1.00 t/ha. In Papua New Guinea (J. Guest, pers.comm.) output is 0.9 t/worker on estates provided with fertilizer and achieving yields of 1.9 t/ha. There is a wide range, the best estate producing 2.8 t/worker and 4.0 t/ha. These are green-bean values, at approximately 0.77 green/1.00 parchment. Household production by smallholders averages 0.2 tonnes green/HH.

Carpenters now have more than 200 ha of coffee on their Taveuni estates, and in 1979 a small-holder planting programme was initiated; forty ha had been planted by 1981 when
official encouragement was discontinued because of Carpenters' non-co-operation. By 1983, however, about eighty ha had been planted on Fijian and other land. At a yield of 1.5 t/ha, production cost estimates range from $140 to $300/t, averaged over fifteen years to cover the establishment period. The price of dry parchment coffee offered until mid-1983 was, however, $800/t.

The coffee initiative begun in 1979 has come to a halt. None the less, a coffee estate has been established and there are a number of other growers who seek a return for their inputs. The labour requirement of coffee is higher than that of cocoa, although the return is somewhat lower at present prices. It is, however, a crop that can provide a considerable amount of female employment and as such might fit more readily into the production system than some of the alternatives. It is to be hoped that the information gained by Carpenters will be made available for analysis. If this is not done, a useful experiment will have been undertaken only for company profit, and not for the regional and national benefit.

Vegetable crops in the coconut districts

The commercial cultivation of vegetable crops, principally taro but also including a range of other crops, has been important in Lomaiviti, Kadavu and Taveuni since the 1940s. Lomaiviti farmers were taking their own crops to market in small boats in the 1950s (O'Loughlin, 1956), and farmers in Taveuni used whatever sea transport they could find; when there were regular ships with cold space in the 1960s, a small but regular supply even of perishable crops such as tomatoes was sustained. When bananas failed in Kadavu and Lomaiviti, vegetable supplies from these areas increased, and when bananas finally failed on Viti Levu in the 1960s farmers -- many of them Lauans -- on the settlement schemes inland of Suva became market gardeners. These developments, together with more recent intensification of production in the Sigatoka valley, created serious problems for the island producers, problems that were made worse by the declining quality of shipping service.

It was against this background that the National Marketing Authority (NMA) was set up in 1971, in the first instance specifically to assist island producers of market crops. More than half their purchases in the initial months
were on Taveuni, but prices offered were less than half the Suva retail price, and supply became irregular; there was no improvement in shipping. Moreover, with Taveuni taro in particular, the problem of corm rot became severe; sometimes more than half a delivery had to be disposed of as waste on arrival in Suva.

In 1973-76 the NMA repeatedly failed to buy their announced quotas in the island areas, and shifted rapidly to a greater emphasis on Viti Levu suppliers. Despite 'guarantees' of buying made in 1981, the NMA did not buy vegetables in the island areas in 1982 or 1983. Meanwhile, however, the price of taro and other vegetables has risen sharply in Suva, and alone among Fijian crops has consistently kept ahead of the rate of inflation. In islands close to the mainland, such as Ovalau, a number of farmers take their own produce to the markets in Nausori or Suva, and there is one group even on Taveuni which does the same.

This latter is a group of Lauan settlers on lease-block land at about 400 m, too high for successful copra production. Their principal cash crop is still taro, and they regard it as a worthwhile crop because it matures in eight to ten months and provides the frequent income which new settlers need. Taking about forty bags at a time, accompanied by the chairman of the informal co-operative society, they obtained as much as sixty cents/kg in 1983 at a cost of $8 for truck hire to the wharf, freight at $1.40/bag, $25 for the accompanying passenger and $3 for truck hire in Suva. On a shipment of one tonne they might make between $400 and $500 even after wastage on the voyage, and since their land yields upward of twenty t/ha on average the 27 farmers find taro farming worth their while. Co-operation is, however, an essential ingredient of this enterprise. Ten years previously most of this land was still in bush, and the initial clearing was by hand. In order to enlarge their production, the first settlers often bought gramoxone (weedicide) equipment even before they built permanent houses. Today they obtain $2,000 loans from the Fiji Development Bank to enlarge the cleared area, and with 25 years to run on their leases, five to six ha blocks and parts of blocks have recently changed hands at over $1,100/ha. Unfortunately, this sort of vigorous entrepreneurship on the inland margins of the coconut areas is still rare.

Vegetable crops do extremely well on the wetter volcanic islands, especially on Ovalau, Koro, Gau, Kadavu and Taveuni. The UNESCO/UNFPA Project (1977) felt that there was a
comparative advantage to be exploited through production for the urban market. Unfortunately, growers on the main islands have been able to satisfy this market, leaving little scope for growers on the smaller islands. In Taveuni in 1981 a 'Marketing Co-operative Association' was proposed by the Agriculture Department and the Registrar of Co-operatives. The required money was not forthcoming, but in 1982 the idea was taken up by a Peace-Corps volunteer who set up the 'Taveuni Marketing Association' (TMA), and had considerable initial success. Transport was arranged to take produce to Labasa and Lautoka, where prices are higher than in Suva. The Ministry of Fijian Affairs and Rural Development sponsored this enterprise, and sought Australian aid for freezing and other equipment. This was granted, but meanwhile the TMA failed, leaving some excellent crops unsold in the ground. The possibilities have, however, again been demonstrated. The fundamental problem is one of suitable transport, and is discussed again in this context in Chapter 6.

In the absence of the necessary infrastructure investment, vegetable growing in the coconut districts remains limited, and will continue to do so. Vegetable production is, however, a labour-intensive enterprise. Hardaker (1976) estimated an input of seventy man-hours/t of taro from Taveuni data, not including marketing and transport. With lower yields the required input would be greater. However, if from two to four weeks' FTE work produces goods worth say $400 nett, this is several times the return from a similar input into copra production. If one man, working 1680 hours/year (48 x 35), can thus produce 24 tonnes of taro at twenty t/ha, his return from a year's work on 1.2 ha might be $9,600. This would apply only on the best land, but clearly there is a large margin above the comparable $2,300 off as much as twenty ha of copra at 1983 prices. If one man can produce 1.5 tonnes of cocoa in a year, off 1.5 ha, he might make $1,875, while he might make $892 from 1.12 ha of coffee in a year, assuming in each case that processing is done on the farm. Where land is limited, and yields available are good, it is clearly to his advantage to grow taro. (1) These are all maximum estimates, and are based on scanty data, but their purpose is to demonstrate the potential advantage of vegetable production over tree-crop production as a means of providing money from inputs of both labour and land.
C. THE SPECIAL CASE OF YAQONA

Growth of commercial yaqona production

One crop, and one crop only has had sustained success in parts of the coconut districts in recent years, and where this crop has succeeded copra production has been neglected, yet the economy is in far better shape than elsewhere. The volcanic islands of Lomaiviti and Taveuni, together with Moala in Lau, have been suppliers of yaqona (Piper methysticum) to other parts of Fiji since pre-colonial times. Commercial marketing of yaqona began on a small scale early in the colonial period from estates in northern Lau (Knapman, 1975) and developed in the immediate environs of Suva, and on Kadavu, in the 1930s (Parham, 1935). In the 1950s it was pressed vigorously by farmers on Kadavu, Koro and Taveuni. The rising price of yaqona in the early 1970s was responsible for the re-occupation of many settlement blocks on Taveuni in this period, and for the intensification of production on others. Yaqona was at that time grown mainly in association with taro, but taro was almost allowed to vanish from the production system once the yaqona became fully established; new plantings are often of sole yaqona, under sparse coconuts or in bush. In Ovalau considerable areas of yaqona have been planted in the more fertile areas, and two small expatriate-owned farms have been set up to grow this crop.

By the 1978 agricultural census there were only 2,400 ha of yaqona in Fiji, which is an admitted under-estimate. Of this total, however, 67 per cent was in the Eastern and Northern Divisions, and 52 per cent was in the three Provinces of Lomaiviti, Kadavu and Cakaudrove alone; most Cakaudrove yaqona is on Taveuni. Table 5 indicates the distribution and relative significance of yaqona cultivation.

Conditions and costs of production

There is great variation in yaqona yields from place to place. The crop generally does best in moist soils, under light shade especially when young. Parham (1935) reports yields of 3.1 - 3.9 t/ha on Kadavu in the 1930s, and up to 4.7 t/ha on newly cleared land around Suva, in each case of dried 'stem-base' (lewena). Hardaker (1976) regards 5.0 t/ha as an average yield for Taveuni. However, the final product yield of a mature plant varies greatly, from 1.5 kg in Kadavu (Sofer, in preparation) to as much as six to seven kg in
TABLE 5: DISTRIBUTION AND RELATIVE SIGNIFICANCE OF YAQONA CULTIVATION

<table>
<thead>
<tr>
<th>Division</th>
<th>Total no. of farms (rural) No.</th>
<th>Farms with yaqona %</th>
<th>Area under yaqona ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>WESTERN DIVISION</td>
<td>26,790</td>
<td>4.0</td>
<td>271</td>
</tr>
<tr>
<td>CENTRAL DIVISION</td>
<td>13,201</td>
<td>14.7</td>
<td>308</td>
</tr>
<tr>
<td>Kadavu</td>
<td>1,628</td>
<td>91.9</td>
<td>441</td>
</tr>
<tr>
<td>Lau</td>
<td>1,810</td>
<td>32.2</td>
<td>218</td>
</tr>
<tr>
<td>Lomaiviti</td>
<td>2,362</td>
<td>79.9</td>
<td>475</td>
</tr>
<tr>
<td>Rotuma</td>
<td>330</td>
<td>4.9</td>
<td>2</td>
</tr>
<tr>
<td>EASTERN DIVISION Total</td>
<td>6,130</td>
<td>64.9</td>
<td>1,136</td>
</tr>
<tr>
<td>Macauta</td>
<td>4,866</td>
<td>8.2</td>
<td>76</td>
</tr>
<tr>
<td>Bua</td>
<td>2,057</td>
<td>20.1</td>
<td>66</td>
</tr>
<tr>
<td>Cakaudrove</td>
<td>4,149</td>
<td>35.3</td>
<td>566</td>
</tr>
<tr>
<td>NORTHERN DIVISION Total</td>
<td>11,072</td>
<td>20.6</td>
<td>708</td>
</tr>
<tr>
<td>FIJI</td>
<td>57,193</td>
<td>16.2</td>
<td>2,423</td>
</tr>
</tbody>
</table>

Source: Rothfield and Kumar (1980).

Taveuni. With normal planting density around 2,500/ha, yields might be as high as 12.5 t/ha for fully-mature yaqona in Taveuni.

There is remarkably little hard data on yaqona, at any stage from the ecology of the plant to production and incomes. Although some yaqona is lifted after only two to three years, most plants remain four to five years in the ground and a few remain longer. In the green state, the largest roots may
weigh up to fifty kg. The plant is set in tilled land, and is often interplanted with taro both as a catch-crop and to provide shade to the young yaqona. After the taro is lifted, the yaqona is weeded occasionally. When lifted, and the tops removed, the yaqona roots and lower stems are then cut into sections and the stems peeled; one man can cut and peel about six plants in a day. The cut yaqona is then either sun-dried for several days, or put into a copra-drier for a day, then allowed to cure for two days or more in the sun before being bagged or bundled. A twenty ha block on Taveuni, combined with 23 ha of coconuts, employed 15 workers who work mainly on yaqona in 1983. If 12 men are assumed to work twenty ha, producing 6.0 t/ha, there would be a production of 3.6 t/worker. This figure has, however, no more than indicative value.

In mid-1983 the best quality stem-base (lewena) received $6.00/kg wholesale in Suva, and root (waka) $5.50. Lower quality lewena was worth $4.00/kg and the mid-stem (kassa) and scrapings received much lower prices: most of the lower quality product is powdered and is sometimes, perhaps often, used to adulterate good lewena in the powdered form. These wholesale prices are about $1.00-1.50/kg below the retail market prices in Suva, and are about $1.00-1.50/kg above prices paid by dealers to growers in Taveuni. Where there is less competition between dealers than in Taveuni, the grower generally gets less.

Estimates of the input of time into yaqona production are of limited value, though all sources agree that the largest part of the input is in the final harvesting and processing stage. If one man can cut only six large plants a day, then it becomes a day's work to prepare thirty kg or thereabouts of yaqona, at five kg/plant. He must also dry and bag the product, reducing a day's production to say fifteen kg/day. Harvesting is additional, so that the total input may yield only ten kg/day. It would therefore take 100 days or 800 hours to harvest and process each tonne. Hardaker (1976) has an estimate of 100 hours for harvesting and processing 100 plants, giving him 2,470 hours/ha yielding 5.0 t/ha, or 494 hours/t. By contrast, however, Hardaker obtains only 208 hours/ha for all stages before harvesting over three or four years, working out at 42 hours/t.

If we take the total input at 42 hours/t for the field stages and 650 hours/t for harvesting and processing, notionally using the mid-point between the two estimates given
above, and value labour at 38 cents/hr ($3.00/day), then the input cost becomes $15.96/t over three or four years for the field stage and $247.00/t for the harvesting and processing stage, a total of $262.96/t. If we assume a median sale price for all qualities of $4.00/kg, or $4,000/t the profit is handsome. If the plants are sold in the ground which sometimes happens, they obtain from $2-10 per plant, the latter being the more usual figure in Taveuni, where yields are high. Relating these prices to final yaqona yields of 1.5 and 8.0 t/ha respectively means that the buyer is paying between $3,000 and $3,500/t, with additional costs of more than $250/t, perhaps even $500/t, still to meet, since he will have to hire casual labour at high rates to do the work. With such high incomes to be made from selling the plants in the ground it is perhaps surprising that this is not done more often. However, the industry is not organised in this way, and it is only when there is a shortage and prices are exceptionally high that buyers will themselves undertake the work of harvesting and processing.

The market for yaqona is dominated by a small number of middlemen in Suva, supplemented by intermediate middlemen in the main growing areas, except Lomaiviti where the Co-operative movement occasionally occupies this role. Sometimes family links are important in the middleman chain; for example, Taveuni's largest grower, who is also one of its largest buyers, is closely related to a principal dealer in Suva. The large middlemen do not function wholly as an oligopsony, since there are many smaller dealers. They do, however, have the advantage of large resources, so that when yaqona was short in 1982, one dealer hired a helicopter to buy directly in Koro villages and thus cut out the Co-operative Societies.

Prospects for yaqona

As a crop yaqona is undemanding of labour while in the ground, and hence is attractive to farmers as a use for land under coconuts. Since it can be lifted and processed at will, its heavy labour requirement at the processing stage can be accommodated within a schedule which also includes other activities. There are, however, some perils. A yaqona wilt, a fungus disease probably entering the plant through nematode bores, has been identified in Taveuni and was causing some alarm in 1983. It may or may not be the same as a wilt that affected up to a tenth of the commercial plantings around Suva.
in the 1930s (Parham, 1935). If it is to be checked the affected plants must be destroyed, and the land not replanted with the same crop. Yaqona is not very tolerant of strong sunlight, and unshaded bushes show signs of stress in dry, sunny periods. The plant can be damaged by wind, and even broken and destroyed by hurricane winds, in which case the remaining parts of the plant must be harvested immediately, at sacrifice returns, if they are to have any commercial value. It does badly on poor or dry soil, and it is not likely that its cultivation can be extended much beyond the present areas of concentration except at a low yield.

Within the areas of concentration, however, yaqona cultivation has expanded greatly in recent years. Some large-scale growers have emerged on several islands. Two of those on Taveuni are planting yaqona on estate land which is not their own, under informal arrangements with the owner or manager. Production valued at about $1,000/week is now being obtained by some larger producers, against labour costs of around $300/week. There are also very many small producers who make much less, but for whom yaqona is now the principal activity, copra being made simply because it provides a second source of income. One tonne of first-grade lewena was worth as much as 22 tonnes of copra in 1983, and at double the 1983 copra price is worth as much as ten to eleven tonnes of copra. It is not surprising that where yaqona yields well, and where it can be grown on sufficient scale to provide continuous production and hence become the major activity, copra production has suffered in the competition for inputs.

Bayliss-Smith (1977) has described the manner in which Koro villagers shifted inputs from copra production to yaqona production between 1974 and 1976, and so sustained high levels of income. This rational behaviour has certainly been followed elsewhere, not least in Kadavu where copra production seems almost to have been abandoned by some farmers, leaving yaqona as by far the principal cash crop. Recent data on one group of twelve Kadavu villages shows the yaqona area slightly in excess of the coconut area, yielding sixteen times the cash income from copra and 54 per cent of all cash income, including wages and remittances (Sofer, in preparation). It would seem that the same shift of inputs may have happened in parts of Taveuni, especially in the wet and cloudy northeast where coconuts yield poorly, and perhaps also in parts of Lomaiviti, though nowhere else to the degree that seems to have taken place on Kadavu. With the market still expanding, a 'yaqona economy' has come into being in parts of the coconut
districts, and this without any official encouragement at all.

D. TIMBER AND ITS USES

One significant new land-use has not yet been considered, mainly because it employs land resources not otherwise in use. This is the planting of *Pinus caribea* on the talasiga (degraded areas under fern-casuarina vegetation) areas of Lakeba, Moce, Vanua Balavu, Cicia, Totoya and other islands in Lau. Most of the planting is on Lakeba, where it covers some sixteen km², and where a small timber industry has now come into existence, making poles for local sale and for export from the island to Suva. On the basis of running costs the scheme is making a small profit, but it has been created largely by use of aid funds, and uses equipment bought with aid funds and sometimes transferred to Lakeba from other places. There is a staff of eighteen, and until the aid program is completed it will not be possible to establish the profitability of the enterprise.

The indigenous hardwoods of the limestone islands of southern Lau have also been brought into more intensive use in recent years. In the late 1960s and early 1970s the traditional handicrafts of the region began to be marketed among tourists in Suva and in western Viti Levu. A downturn in the tourist industry in the mid-1970s threw this small Lauan industry into depression, but in recent years there has been a substantial recovery and new expansion, so that the rudimentary beginnings of factory organisation of production are now taking place on Kabara and Fulaga, the two islands which make yaqona bowls of all sizes. Including both handicrafts sold through the Co-operative Societies, and those sold privately at what is generally a better price, it seems probable that handicraft production is now more important as an income earner than copra production on these islands. Elsewhere masi (bark-cloth) is produced in larger quantity than before, and is now made on islands where there is no tradition of masi production. Although the returns to labour input seem unrewarding, handicraft production can be fitted into work programs as opportunity offers; moreover masi production employs female labour. There are now plans to use the hardwoods of Kabara for larger-scale production, including a revival of boat-building. Before this is done it would be as well to survey the hardwood resources of the island. Failing this, the same problem might arise as in a rattan-furniture industry established in Taveuni, where most
of the readily-available rattan has already been taken from the bush after only a few years.

The forests behind the coconut-planted fringe along the Taveuni and Vanua Levu coasts have supported some forestry enterprises for many years. Some planters use their timber resources as supplementary or even principal income sources, though in steep terrain they do not always find forestry a much more profitable activity than copra production. There are, however, very considerable resources that could be used in association with a land-development program, or for sustainable production with re-planting. The basic problem is, as almost always in the coconut districts, one of scale; the terrain of most of Cakaudrove does not lend itself very readily to large-scale operation.

E. DIVERSIFICATION: THE ISSUES

There is a large number of possible crops and other products that can be grown in or obtained from the coconut districts of Fiji. Those discussed above do not include even most of the possible crops that have been tried, often only for short periods, and often given up when difficulties have arisen. Peanuts, fruit and macadamia nuts have in recent years joined the long list of earlier failed experiments. Vanilla is currently being tried, with rather more hope. There is, however, nothing that has ever been tried in the coconut districts of Fiji that has ever failed for purely agronomic reasons unless cocoa is the exception. Yet cocoa is now the one major crop, tried in the past, that is now being tried again.

It is useful to recall that certain activities have not failed. These include coconut production itself, the subsistence complex as a whole, handicrafts and yaqona production. It is true that copra might have failed as a cash crop in the 1930s and again more recently, were it not for the long life of the palm and its ability to continue producing nuts even through a period of sustained neglect. It is also true that the crop composition of the subsistence complex has changed, so that not much more than a residue of the strongly-seasonal production of yams remains, taro has diminished and cassava has become the principal food crop. These very changes are, however, relevant in that their effect has been not only to diminish the work input required for subsistence production but also to eliminate its most
time-dependent elements. All of the successful elements in the farming system have in common the quality that their inputs can be made as and when required under normal weather conditions. They also demand a technology of production that is well-known to modern generations; indeed the only major innovation that has been required is smokeless drying, and even this is not universally adopted.

The subsistence complex, coconuts, yaqona, handicrafts and -- where and when it has been feasible -- the production of a commercial surplus of taro and vegetables, all belong to a single farming system, within which inputs can readily be shifted from one activity to another. A working week of around thirty to thirty-five hours can be expanded if needed, or can be reduced to accommodate non-productive activities and periods of work away by ceasing inputs into certain activities; the system of mutual aid assists continued production of necessities and basic maintenance. The suspended activities can be resumed when labour again becomes available, or when there is a demand for money. The farming system lacks any very strong time-dependent imperatives.

Enterprising individuals, especially those living apart from the village system, are able to adopt a greater degree of specialization in the interests of increasing their cash income, commonly working a longer week with some measure of substitution of cash-crop for subsistence inputs. Even work on the coconut estates fits this pattern to some degree in that subsistence inputs are subordinated to the demands of wage-work, as in other forms of wage employment. Although the planters themselves initially sought and obtained a committed labour force, they have had increasingly to adapt themselves to an employing role within the production and social system by which they are surrounded. Especially for the smaller planters, this adaptation has become more rapid in recent years.

None of this is to suggest that the farming system of the coconut districts is inflexible; on the contrary, flexibility of inputs between activities is one of its most striking characteristics. However, fitting major new activities into this system beyond an initial level of limited participation demands the withdrawal of inputs from others. This is, in fact, the historical experience. New activities have been taken up on a trial basis, usually by a minority, but have progressed neither so fast nor so far as had been hoped by their promoters. Unfortunately, most new activities
introduced in the past have proved unrewarding. Difficulties have arisen, and the response of the authorities has often been to withdraw from persuasion and extension after a few years rather than to seek to overcome the difficulties. It has been assumed, too often, that there has been 'want of interest' so that failure becomes, somehow, the fault of the farmers.

It has been suggested in this paper that most farmers in fact follow a Chayanovian calculus, and that they are very rational in their application of this calculus to decision-making. The manner in which the farmers of Koro shifted inputs between copra and yaqona production in the 1970s (Bayliss-Smith, 1977) is only one example among many. The implication is that new activities are evaluated according to scales which include the return for labour input, the amount and regularity of labour input required, the frequency of the income as well as its size, and the ability of the introduction to look after itself while the owner is elsewhere engaged. This evaluation is performed in relation to competing uses of time and resources and is, moreover, carried out over several years. There is likely to be a significant lag between the initial adoption of an innovation by a minority, its diffusion, and the adaptation of the whole production and social system to accommodate the new activity. If something goes wrong before all this is accomplished, or if the promoters of the innovation tire and if the inevitable problems are not resolved, then any new innovation is as likely to prove abortive as were its predecessors. It follows that diversification is not simply a matter of introducing a new crop; it implies a modification of the whole farming system, of input allocation and hence even of social behaviour.

Probabilities can, however, be assessed from the information reviewed in this chapter, and a notional set of calculations based on 1983 prices is presented in Table 6. Given a reliable market and some measure of protection of the received price from wild fluctuations, the relatively high returns to land available from cocoa production could well prove attractive. Since production is more concentrated in area, there is also a labour advantage that is not quantified in the comparisons made. However, since cocoa is more labour-intensive than copra, its production is likely to entail some withdrawal of inputs from copra. Such withdrawal is unlikely to be complete since coconuts will continue to be produced by the trees, and an income can be made from their
collection and processing. However, cocoa requires greater attention than coconuts, and this discipline may not readily be accepted. There is also a more serious risk of disease with cocoa than with some alternatives. Coffee is perhaps more tolerant of casual agronomic practices and might fit more readily into the production system, though it offers lower returns at current prices.

TABLE 6: NOTIONAL WEEKLY INCOMES FROM DIFFERENT ACTIVITIES BASED ON 1983 PRICES

<table>
<thead>
<tr>
<th>Activity</th>
<th>Activity Details</th>
<th>Income Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copra making</td>
<td>(a) Assume one man makes 7 t/yr, or 0.15 t/week, sold at $230/t</td>
<td>( $34.50 \text{/week} )</td>
</tr>
<tr>
<td></td>
<td>(b) Assume 10.08 t/yr, or 0.21 t/week, sold at $230/t</td>
<td>( $48.30 \text{/week} )</td>
</tr>
<tr>
<td>Whole coconuts</td>
<td>Assume collection at 60 nuts/hr, or 2,400 nuts/week, sold at 3.62 cents/nut</td>
<td>( $86.88 \text{/week} )</td>
</tr>
<tr>
<td>Machine-husked coconuts</td>
<td>Assume collection as above, and husking at 204 nuts/hr, one FTE man can collect</td>
<td>( $67.15 \text{/week} )</td>
</tr>
<tr>
<td></td>
<td>and husk 371 nuts/day, or 1,855 nuts/week, sold at 3.62 cents/nut*</td>
<td></td>
</tr>
<tr>
<td>Cocoa, dry beans</td>
<td>Assume one tonne requires 33.8 weeks, giving 29.59 kg/week, sold at the median</td>
<td>( $34.02 \text{/week} )</td>
</tr>
<tr>
<td></td>
<td>grades I/II prices of $1.15/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-or assume a production of 4 t/worker, or 83.33 kg/week</td>
<td>( $95.83 \text{/week} )</td>
</tr>
<tr>
<td>Cocoa, wet beans</td>
<td>Assume that one man can collect 150 pods/hr, each pod containing 32.5 beans. One</td>
<td></td>
</tr>
<tr>
<td></td>
<td>kg of wet beans contains approx. 340 beans at 0.4 kg dry = 1 kg wet.</td>
<td></td>
</tr>
</tbody>
</table>

* Where: \[ h(\frac{axb}{a+b}) \]

\( h = \text{total hours, 8 or 40} \)
\( a = \text{rate of collection} \)
\( b = \text{rate of husking}. \)
Potential production in a 40-hour week therefore 574 kg, sold in 6,000 broken pods at 30 cents/kg
= $172.20/week
-or with the constraint that not more than 20 bags a week, each containing say 200 pods, can be carried to a sale point, maximum production becomes 383 kg
= $114.90/week

Coffee, parchment: Assume 1,115.30 kg/worker in a 48-week yr, or 23.24 kg/week, sold at $0.80/kg
= $18.59/week
-or assume 2.8 t/worker/yr, or 58.33 kg/week, sold at $0.80/kg
= $46.67/week

Coffee, cherry:
Assume collection of cherry at 60 kg/day
sold at 10 cents/kg,
= $3.00/week
-or at 100 kg/day
= $50.00/week

Taro:
Obtaining best combination of 15.15 hrs/t required for harvesting, and 55.70 hrs/t for field work, i.e. 66.01 and 17.95 kg/hr respectively, maximum weekly sale is 564.6 kg, sold at 30 cents/kg
= $169.38/week

Yaqona:
Obtaining best combination of 650 hrs/t required for harvesting and processing, and 42 hrs/t for field tasks, i.e. 23.81 and 1.54 kg/hr respectively, maximum output per 40-hr week is 57.9 kg, sold at $4.00/kg
= $231.60/week
-or sold unprocessed in the ground at say $6/plant, 2,500 plants/ha at 208 hrs/ha over four years, the product of a week's work in each of four years becomes
$2,884.62/week(!)

Sources: Data in text.
What is also interesting is the competing value of crops such as cocoa or coffee, of yaqona, and of root-crop and vegetable production for the market. Yaqona clearly offers the highest returns, but is a long-term crop and requires the devotion of substantial areas of land to its cultivation. Small farmers who seek a regular income do better with root crops, where they can be produced for sale, or even with cocoa. On the other hand farmers whose need for money is irregular are likely to prefer yaqona to any crop which ties them to a regular work schedule. Innovations such as peanuts, which offer a relatively low return and demand regular work inputs, are not likely to be preferred where alternatives are available. Indeed this recent innovation seems not to have proved attractive to farmers in the eastern islands nor to have succeeded where it has been tried on estates. It need hardly be added that all these comparisons are vulnerable to variations in received prices.

Past failures, and declining real incomes from copra production, have led to constrained cash-earning opportunities which, intersecting with growing demands for money, have led to persistent nett emigration. This accelerated between 1966 and 1976 and, though checked, it still continues especially from Lau. In each of the Lauan villages re-surveyed by the writer and his colleagues in June-July 1983 there had been a continued large excess of departures over returns and arrivals between 1976 and 1983. This was not so strongly marked in Lomaiviti and Taveuni, areas in which rising incomes from yaqona and other crops have filled the gap created by declining real incomes from copra. Even so, labour shortage for agriculture -- though not for other activities -- is now a characteristic of all parts of the coconut region of Fiji. Although a substantial increase in the incomes available from rural production would probably lead to some nett immigration, most of these in-migrants would have to be drawn from former residents now living in urban areas, and this would not happen quickly. A more immediate effect might be a reduction in the seasonal emigration to the Vanua Levu canefields which has become an annual event since 1980. It follows, however, that the trial stages of innovation adoption have to take place within the present context of labour shortage, with continuing temporary and sometimes permanent emigration from the coconut districts to other parts of Fiji.

Diversification therefore needs to be handled with caution as well as with enthusiasm, and it must not be expected that in the short term the development of new rural
activities will take place without reduction of inputs into other activities. It needs also to be noted that there is a strong revealed preference for those forms of innovation which can be incorporated into the farming system without loss of facility to shift inputs between activities, or even to withhold them for a period. However, some farmers do exhibit a greater willingness to specialise and accept the discipline of a production schedule. Most of them are farmers on their own land working away from the village system, and they are the ones who are most likely to be willing to adopt innovations demanding a radical change in the schedule of activity. This minority, following the logic of the argument, is therefore the part of the population which holds the key to change.

These considerations also apply to innovations within the coconut industry itself, the success of which would transform the situation in regard to supplementary or alternative crops. The prospect of such innovations is the main topic for the following, penultimate chapter.

NOTES

1. For copra, assume 48 weeks each yielding 0.21 t copra, off land yielding 0.5 t/ha, sold at $230/t.
   For cocoa, assume a year's production, each man producing 1.5 t sold at $1,250, at a yield of 1 t/ha.
   For coffee, assume a year's production of 1.12 t at 1 t/ha, sold at $800/t.
   In each case the calculation is based on 1983 prices.
A. WINDS OF CHANGE

As little as ten years ago it could still have been said of the coconut industry, much as was said many times during the previous several decades, that it was an industry still technologically rooted in the nineteenth century and that almost no successful innovations of consequence had appeared since the establishment of milling in Suva in the 1950s. This is no longer true. Even though none of several innovations is yet fully operative and unmistakably profitable, there has been a whole series of new developments in the industry and several others have been proposed. Everything reviewed in this chapter has been initiated since 1976.

The two main objectives of the initial group of innovations were to add value to the product and to reduce processing costs. Innovations arose out of a period of decline in the industry, and under growing concern over the subsidy-dependent nature of copra production. Innovations represent a positive response to these pressures, and offer an alternative to proposals made in the same period for total replacement of copra by other cash crops. The major cost-reducing innovations have taken place on estates, the sector of the industry most threatened by the effect of rising costs and falling real incomes. A second group of innovations seeks to take more direct advantage of the food uses of the coconut, and thus escape dependence on the volatile coconut-oil market. A third and very significant group takes the form of relocation of milling into the coconut districts in order that addition of value and reduction of weight may take place closer to the grower; they are part of a wider trend in the industry which also embraces the closure of most coconut oil mills located in developed countries, and are a direct response to rising costs of transport.
Cost-reducing innovations

The inefficiency of dispersed, small copra driers has long been recognised, and Silsloe (1963) recommended that copra-drying be separated from green-copra production, centralised and placed in the hands of 'professionals'. Silsloe's recommendations in this area disregarded the cost of transporting green copra and, except for the establishment of Co-operative Society driers, were ignored. Estates had gone in for centralised drying very much earlier, and in the 1920s efficient steam-heated driers were built in Fiji, but failed because of corrosion problems. Corrosion can now be controlled by chemical additives, and a Taveuni planter has installed a steam-heated drier, fired mainly by husk and shell, and linked it to a 60 HP steam-engine generator producing as by-product 30 KVA of electricity. In this case the electricity is used largely to power a freezer operated in connexion with the planter's slaughterhouse, where his own cattle and those of others are killed and frozen ready for shipment. However, the possibilities of such driers used in connexion with rural electrification have not escaped notice, in Fiji or elsewhere in the Pacific; they were prominently advertised at the 1982 South Pacific Conference in Pago-Pago. An excellent quality of copra is produced, four tonnes being dried in 36 hours, and copra was dried for other planters and growers at a price reportedly $15 or $16/t in 1983. Only three firemen (on shifts) were employed, plus an engineer who is also under-manager of the estate. At least one other planter with a large demand for electricity was proposing to install a similar drier in 1983, and wider adoption was included in abortive plans discussed below.

This innovation cuts costs principally by eliminating imported fuel, but the use of husk and shell demands the use of whole nuts brought in to the drier. The Taveuni estate concerned is long and narrow, but is completely roaed with tracks that bring all trees within the range of spraying equipment. Even so, some copra was still being cut in the field in 1983. There is need for further innovation, and a second innovation was introduced by a group of company estates.

This second innovation involves machinery for dehusking of nuts and splitting them into four, after which they will be dried in the shell. The labour-intensive copra-cutting stage is eliminated, since the meat can easily be prised out of the shell after drying. Two machines were purchased in 1983.
One, which is fixed, handles 1,000 nuts/hour; the second, mobile machine handles 750 nuts/hour. Nuts are collected, piled and brought to the de-husker by tractor and trailer. Thirty collectors are supplemented by family workers, paid at a task rate of six cents/100 nuts. It was anticipated that labour costs would be reduced by about sixteen to twenty per cent, but another planter who planned to use this machinery expected a larger reduction in his labour costs.

It was not expected that these innovations would solve all problems. There remains a need for fuel-wood, as husk creates a great deal of ash. The problem of transport of whole nuts was not adequately addressed by either innovator. It should be added that the estates of the larger company were up for sale, and that the company was also interested in using these estates as a proving ground for the de-husking machinery which it hoped to market elsewhere in Fiji, and in the Pacific countries in which it operates. The company made no secret of these intentions, but they have since had other ideas discussed below.

It will be noted that the long-term thrust of both innovations is elimination of copra cutting, a tedious, labour-intensive job not undertaken in some other countries where sun-drying in the half-shell is normal. If the high-density wood of the shell can be used for fuel, and if electricity can be generated as a by-product, costs may further be reduced and value added. (1) The major difficulty in the way of widespread adoption of these innovations is not the capital cost of the machinery, which is relatively modest, the huskers being landed in Suva for around $20,000. The problem is transport of the whole nuts. On a roaded estate producing, say, 1,152,000 nuts a year the labour cost of their transport is calculated at $8,640, using ten men for 240 8-hour days at a rate of only sixty nuts/hour/man, and at a wage of 45 cents/hr ($3.60/day). This is still labour-intensive, and any improvement in the productivity of labour employed on collection and transport would enormously enhance the efficiency of the operation. A 'flying-fox' has been proposed on one estate, and this reporter has suggested use of flumes where there is water and sufficient slope to make gravity-aided transport possible; whole nuts float high in water. However, there are many places in the coconut districts where no such easement is possible, and if whole nuts are to be transported, pack animals are the only possible alternative to either human transport or expensive road building and vehicle transport. If these innovations are to be of service
in Fijian copra production, with centralisation of drying under Co-operative Society management, additional alternative forms of transport such as floating the nuts around the lagoon in pods towed behind boats, or carriage in horse-drawn carts must be contemplated. Otherwise there remains no alternative to cutting the copra in the field and carrying it green to the drier, as at present.

Changing the nature of the product

Within Fiji, and abroad, possibilities for the direct food use of grated or pounded coconut meat are more widely appreciated than they were. Although the quantity of coconut meat bought for direct food use was only the equivalent of 45 tonnes of copra in 1982, a company which was buying whole nuts in Savusavu before it went into receivership expected to take more under their new management. One Taveuni estate undertook a radical new development in 1982. The product was frozen grated coconut, designed mainly to be exported to Hawaii. Nuts were chopped and shelled, then the skin was removed by rotary scrapers operated by women. The meat was then grated, snap-frozen and packed. The shelling operation was capable of a rate of 1,500 nuts/day/man, and the women operating the skinning machines could handle from 500 to 900 nuts/day. When the plant was briefly in operation in the first months of 1983 shellers were paid 40 cents/unit of sixty nuts and the women 35 cents/unit. About ten shellers and twenty to thirty women were employed, and with all machinery in full operation the plant could handle about 38,000 nuts/day, making ten tonnes of grated coconut, employing twenty-five men and about seventy women, at an imputed cost of approximately $400-500/t, plus freezing and packing. However, the freezer had to be operated by oil since there is insufficient water for expansion of the hydro plant, and used over twenty litres/hour at full load.

Marketing problems overseas, and the lack of freezer space on ships serving Taveuni restricted operation, so that in July 1983 the shellers were employed mainly as day workers on the estate and only two women operated the skinning machines. The estate went back to production of copra in May 1983. It was envisaged that if the problems were solved, substantial quantities of whole husked nuts would be purchased from other growers, including growers more than fifteen km distant from the factory. The higher return available was regarded as sufficient to overcome the cost of road transport. The use of husking machinery, now being introduced elsewhere
COCO NUT ECONOMY

on the island and discussed above, would be an essential part of such a mode of operation. As of 1984, however, the future of this innovation remained uncertain, and it seems probable that the imported machinery will not fully be employed for at least some time.

B. INNOVATIONS IN MILLING

The rising cost of sea transport creates obvious pressures to re-locate copra milling within the coconut districts. In 1982 it was estimated that the sea freight even on coconut oil to Europe and North America was equal to between twenty-five and thirty per cent of the CIF value of the oil, and the imputed Suva-London copra freight in the last price determination before the Dickson Report was adopted represented thirty-three per cent of the calculated Suva 'basic price'. Within Fiji, the sea freight on copra from Taveuni and Lakeba represented, even after subsidy, respectively twelve and fifteen per cent of the 1982 Loans Scheme price of Grade I copra delivered to Suva. While freight-rate discounting, and improvement in prices, diminished this burden in 1983 and subsequently, locational decisions have been taken on the basis of the longer-term trend. In the 1960s, when the copra price stood between $100 and $120/t for several years, internal sea freight from island points represented only about eight to ten per cent of the received Suva price.

For people in the outer islands, declining real incomes from copra production measured simply on the Suva price (Table 3) have been compounded by increasing freight costs, and also by the effect of freight and break-bulk charges on the price of imported consumer goods. In 1975-76 a basket of goods, where the Suva price = 100, cost from 110 to 135 in outer-island shops; results of a re-survey in 1983 indicate that these relatives have not changed significantly, being subject to price control. These considerations were among those which led, in the late 1970s, to a decision to construct a pilot outer-island oil mill at Lakeba, with the object both of adding value and also creating employment. This mill, which also incorporated a coir factory, replacing a short-lived coir factory set up in Taveuni in 1976, began operation in 1980 and has been the subject of considerable controversy. On the basis of what seemed to many observers, including the Dickson Commission (1983), to be favourable trading results, work began on a second outer island mill at
Lomaloma, Vanua Balavu in 1983, and further small mills were planned at Rotuma and Moala. It is of some importance to evaluate this innovation.\(^{(2)}\)

**The Lakeba mill**

The Lakeba mill was not constructed at market cost, but with the assistance of substantial aid funds for buildings, equipment and the generator. Losses on the coir factory were absorbed for the five years 1980-84 by the Ministry of Economic Planning and Development, and since large operating costs were shown for this latter factory in the 1982 accounts, despite the fact that the factory was not in operation much of the year, one analyst suggested that costs incurred by the oil mill may have been attributed to the coir factory in order to obtain this subsidy. There have also been some direct operating grants, and until 1983 Government ships have been available for transport at low cost. Given these and other advantages which the Vanua Balavu mill, constructed with Fiji Development Bank and Bank of Baroda loan money, does not enjoy, one analyst suggests that the second island mill will inevitably incur a substantial loss on its operation. Indeed, one set of accounts concerning the Lakeba mill itself seen by this reporter, presumably not the set seen by the Dickson Commission, showed an operating loss in the first half of 1982 large enough to put the Lakeba Co-operative Association, which runs the mill, into the red despite profits on its other enterprises.

Certainly the coir factory was not a success. Indeed, it had been put on a maintenance basis in mid-1983, no coir having been sold since January. Unsold stocks occupied all the available space. The mill itself is, however, a neat operation, although it is arguable that its expellers are too small contributing to a low rate of extraction (51.5 per cent instead of 63 per cent at Carpenters' Suva mill). Initially only whole nuts were bought. After August 1981, however, dry and green copra, and whole nuts, were all brought in; the dry copra was graded. Seven conventional driers were operated in 1983. Husk, intended for the coir factory, was simply piled. There are hoppers to feed copra to the expellers, but the feeding machinery was out of service when this reporter visited the mill, so that hand-feeding was being employed. The skilled operators were trained by the Lautoka mill staff, but the quality of the oil was not closely monitored. It had too high a free fatty acid content for food use, and
clarification gave problems in the absence of adequate filtration. However, in the sellers' market for oil in mid-1983, unclarified oil was being bought by the soap factory in Suva which used most of the product. The oil was fed from tanks into drums, and these had to be carted eight km to the wharf and loaded aboard a Government barge which also carried the coconut meal and cake, and brought back the empty drums.

The mill was designed for a throughput of 1,200 tonnes/year, but in 1982 only 364 tonnes of oil were produced, together with 251 tonnes of meal. In order to make better use of the mill, copra from Cicia has been brought to Lakeba since 1982, using a Government barge at a special rate, there being no quoted rate for this journey. Technical problems continued, and it was several times necessary to rebuild the lining of the furnace; it is not easy to deal with technical problems so far from Suva. Until May 1983 the oil fetched $470/tonne; in May the price rose to $500/tonne. There were tentative plans to use some of the oil to manufacture soap in Lakeba, but an appropriate technology had not been established in 1983.

The greatest immediate difficulties arise from transport. Since a decision was taken in early 1983 to restrict the commercial use of Government ships throughout Fiji, hitherto a matter of complaint by private shipowners competing for a volume of cargo insufficient to fill their holds, the advantages of low-cost transport may no longer be available. Drums have to be freighted back to Lakeba empty, and the combined freight at quoted cost exceeds the freight rate of equivalent copra shipped from Lakeba to Suva. Faced with these problems the Lakeba Co-operative Association bought its own tug, but this required substantial work before it could be brought into service, having reportedly been bought at a write-off price. Some observers consider that the additional supply of drummed oil from Vanua Balavu will exceed the capacity of the Fiji market for oil of this quality, and hence will have to be exported. In this case empty drums will not be available for return, and will have to be bought at substantial additional cost. The possibility of bulk loading has been investigated, and indeed the site of the Lakeba mill, adjacent to an anchorage although eight km from the present wharf, was selected with this possibility in view. However, technical problems of pumping seem insuperable in the short run, and it seems more likely that a second wharf may ultimately be constructed at Lakeba, near the mill. The alternative, perhaps a better alternative, would be to use
road transport by roll-on/roll-off (ro-ro) all the way from
the island mill to Suva; this has not yet, however, been
seriously considered.(3)

Folly, or a worthwhile experiment?

On a basis of payments to growers for copra, and wages
paid to the mill staff, the Lakeba mill did indeed show a
profit in 1983. Moreover, the $60,000/year paid in wages
remains in the island, rather than being paid to employees of
a mill in Suva. At full operation the mill creates 46 jobs in
Lakeba, though only 32 in mid-1983. Unfortunately, wages
initially paid were ninety cents/hour for operators and eighty
cents/hour for labourers, and these had to be reduced after
the first six months to 65 and 55 cents/hour respectively.
This caused some unrest, for although these workers were paid
above the going agricultural wage in the coconut districts,
the comparison they made was with the initial payment, or even
with wages in the Suva and Lautoka mills. In mid-1983 a ten
per cent increase was granted. However, even at these wages
labour costs were about $150/t of current output, far more
than costs in the Suva mills. The labour-intensive nature of
the operation is an asset from the point of view of
job-creation, but it creates serious cost problems.

None of this is to suggest that the Lakeba experiment
should not have been undertaken, or that it should not be
continued, and that the great efforts that have been made to
render it profitable should not also be pressed forward. It
is, however, unwise in this writer's view to develop other
mills of small capacity in the outer islands until sufficient
experience in working the Lakeba mill without benefit of
special grants and subsidies has been obtained and evaluated.
It may well be that assistance with freight costs should
continue to be given, as a part of a more general policy
argued below. Small mills may have a role, if they can
operate efficiently at low labour costs, if their technical
problems can be resolved, and if their transport problems can
be resolved by bulk shipment. By providing employment in the
coconut districts they perform not only a service, but also
provide a seed for further development. They need, however,
to be considered in the context of other innovations and other
changes in the industry.
The Lakeba mill is a valuable, even bold experiment, but it should not be held up as a model that can be replicated at this stage. The proliferation of small mills in the coconut districts along these lines could well be a disastrous error. Certainly a period of improved prices in the industry has helped the operation of the mill at Lakeba, but it must be recalled that its capital costs as actually paid were small, and that it does not carry the large debt burden that further mills must carry. The Lakeba mill is an experimental mill, and should be regarded and further developed as such. It is not, by itself, a solution to the problems of the outer-island growers.

C. THE SAVUSAVU MILL

A development of critical significance

Proposals to build a mill at Savusavu of sufficient size to handle all or most of the Northern Division production have been bruited for many years, and both the principal milling companies conducted their own evaluations. In 1984 a decision to build such a mill was taken, by a company formed between Punja and the Fijian Development Bank. These plans have been linked with related plans to create a port-of-entry in Vanua Levu. A major change in the working environment of the industry has been created since the mill came into operation in mid-1985. The issues are complex, and it is necessary to separate them for purposes of analysis.

Discussion of a mill at Savusavu has been on two levels. In 1982 there was much discussion of an 'integrated mill' which would use whole nuts and produce a range of products including coconut oil, protein concentrate, activated carbon or charcoal from the shell and coir, probably rubberized, from the husk. Soft drinks, a range of food products, and possibly building materials might also be produced at a later stage. The minimum economic size of an integrated mill has been assumed to require a supply of forty million nuts per annum, the equivalent of about 7,000 tonnes of copra assuming relatively small nuts. The collection of such a quantity of nuts or more, and their delivery to Savusavu, has been seen as a major difficulty, but there are also others. Although all the technology required is known and tried, it has nowhere been combined into a single plant. The Savusavu proposal was therefore experimental. Moreover, recent experience with use of the husk as coir, in Taveuni and more recently Lakeba, has
not been encouraging, and no certain market has been established for carbon produced from the shell. The Asian Development Bank expressed considerable interest, none the less, and was ready to send an evaluation mission in March 1983. A decision was taken against this step, but the plans have re-surfaced in 1985.

The alternative proposal, which has now been implemented, was for a conventional mill using copra as input. The site was investigated in 1974 in connexion with a proposed mill for Fiji and its neighbours, and a mill for 15,000 tonnes of copra was costed (Cornelius and Lockhart Smith, 1974). The FAO (1980) report supported the idea of a Savusavu mill, which also received the strong advocacy of the Prime Minister after the inception of the Lakeba mill. The present mill, opened in August 1985, has a capacity of 7,500 - 8,500 tonnes of copra, but has scope for expansion to about a 17,000 tonne capacity. Moreover, there is also scope for incorporation of coir manufacture, and the preparation of activated carbon from the shell, as well as other by-products of the coconut, should these be found worthwhile. It is envisaged that the Development Bank will sell at least some of its shares to growers, and a voluntary 'cess' to pay for such shares was announced at time of opening.

The implications of this development are widespread. There will be a received-price advantage of about $40/t for Cakaudrove producers, which alone will ensure that little copra from mainland Cakaudrove will henceforth go to Suva for milling. This might well be expected to trigger implementation of Carpenters' threatened closure of their Suva mill, though such has not happened during the two years since the threat was first made, and reported by the Dickson Commission (1983). Burns Philp, with a smaller mill in Suva, have recently acquired a food-processing subsidiary, and are reported to be considering removal of their whole integrated operation to a new site on their unsold Taveuni estates (Keith-Reid, 1985). Such decisions to close down Suva capacity might be encouraged by a new decline in the prices of copra and coconut oil, as well as by the high potential re-development value of the two mill sites just north of the Central Business District in Suva.

The question should therefore arise as to whether more of Fiji's total milling capacity will ultimately be transferred to Savusavu, making possible there the development of a mill of 30,000 tonnes capacity which would achieve many economies
of scale. This has indeed been proposed, and it would greatly reduce the average distance which copra travels within Fiji. However, there are a number of reasons why this may not be the best solution. In the first place there are no existing shipping connexion between Savusavu and any part of eastern Fiji except Taveuni. Outward cargoes originate in Suva, and will continue to do so. Also all forward-linkage industries of the mills (soap, foods) are still in Suva, or else in Lautoka where there is already a mill. If oil is exported directly from Savusavu, while domestic ships have to operate outward from Suva, inward to Savusavu and again inward to Suva, there will be very little cargo for the Savusavu-Suva leg, and there will also still be a need for outward shipping from Suva to Savusavu. In other words total sea distance and voyage times would be increased, with inevitable consequences for freight rates.

However, if Savusavu were to become not only a port of entry, but also a 'growth centre' as both the UNDP and UNESCO/UNFPA teams recommended (UNFIPLAN, 1976; UNESCO/UNFPA Project, 1977), then in time it would perhaps be possible to build up Savusavu as a distribution port and industrial centre generating outward cargoes. In this case, the question arises whether or not Savusavu would be able to attract international shipping. It is not only a question of providing a costly terminal, but also of the volume of traffic available to attract the large container and ro-ro/container ships of the type which now serve Suva. At least in the short term the answer is almost certainly in the negative. Foreign-going ships serving Fiji are now larger than in 1976 and containerisation, only marginally important before 1977, has since become general in the South Pacific; shipping companies, which presently serve both Suva and Lautoka, are known already to prefer to concentrate their Fiji services on only one port.

Alternative milling proposals

The logic of these arguments, which have also been advanced in other quarters, runs against the transfer of most of Fiji's milling capacity from Suva to Savusavu. Even if the short-term costs could be accepted in the interests of major urban/industrial development at Savusavu, the scale of investment required for growth-centre infrastructure might well be sufficient to give Fiji a debt-servicing burden of Latin American proportions. However, does it necessarily
follow that there should have been no mill at Savusavu? Is it possible to consider a solution under which the copra of Vanua Levu and Taveuni, were handled in the north, while the produce of the islands of the Eastern Division continues to be handled at Suva?

About one-third of Fiji's copra production comes from the Eastern Division, and if we can assume some recovery in production the quantity involved is about 9,000 tonnes. Presently this exceeds Fiji's internal demand for coconut products, including the demands of forward-linkage industries capable of export capacity. However, internal demand is growing rapidly, in various forms including whole nuts, grated coconut meat and coconut oil and meal. Present milling capacity of the smaller of Suva's two mills is around 7,000 tonnes, and the two outer island mills (at Vanua Balavu and Lakeba) can handle a further 2,000 tonnes or more. With the addition of some refining capacity in Suva, present and prospective Suva industries, as well as the whole-nut market, could well be supplied by eastern island production. Presumably, however, the 3,000 tonnes of Tuvalu and Kiribati copra imported for milling in 1982 would also continue to come to Suva.

Two future scenarios seem possible. In the one, all milling capacity is transferred from Suva to the coconut districts, to Savusavu, Lakeba, Vanua Balabu and later perhaps to Taveuni, Rotuma and a site in Lomaiviti, perhaps Levuka, and even to other small mills as well. At least in Cakaudrove and Taveuni, whole-nut transport largely replaces copra-making and by-product industries are developed. Forward-linkage industries using the coconut and its products become re-located in the north, and their import component has to be forwarded from Suva until or unless a regular overseas shipping service is established at Savusavu. The implications of this for shipping networks, and the location of industry and employment, do not seem adequately to have been considered, but it would be a revolutionary change in the economy of the coconut districts.

In the other scenario, all northern production is processed at Savusavu and perhaps in Taveuni, while Eastern Division production not first processed at Lakeba and Vanua Balavu continues to be handled at a small mill and refinery in Suva, possibly at one of the existing mills under the same or new ownership, while forward-linkage industry is developed in Suva to a scale which absorbs all the output of the Suva mill.
Northern produce only goes for export. This scenario involves less disturbance of the regional economy and transport system, and its short-run costs would be less. However, the possibilities for this scenario are already disturbed by the reported intentions of Burns Philp, and it may be that the more radical reconstruction is now the only logical consequence of the steps taken since 1980. We consider the consequences further below, after another and even larger issue has first been reviewed.

D. RESTORING THE PRODUCTION BASE

An abortive project

In 1982 and 1983 prolonged discussions took place with the World Bank on a Tree-crops Development Project (TCDP) for northern and eastern Fiji, the object of which was to restore the production base by introducing high-yielding varieties (HYV) of coconut and new strains of cocoa, and planting and replanting on a planned basis through the present coconut districts over a fifteen to twenty year period. The cost for the first five years was budgeted at $33 millions, including the cost of an HYV development station for which land was acquired near Buca Bay on Vanua Levu. For various reasons the whole plan has not been implemented, although the cocoa proposals and the plant-breeding station are going forward. It is none the less worthwhile to review the elements of the whole original plan.

It was intended to re-habilitate 4,800 ha of the better existing groves while the HYV seed material was being developed. Once fully developed, the seed garden would supply material for replanting 2,000 ha/year, so that in thirty years all of Fiji's groves would be replaced. From year 6 HYV trees would begin to come into bearing, and would contribute fifty per cent of production by year 12. It was hoped that the HYV trees would yield 3.5 tonnes/ha, while the 'improved' older groves would yield 1.2 tonnes/ha. On the basis of these estimates it was hoped to double the present c.23,000 tonnes production in sixteen to twenty years. Why was such a program not embraced with enthusiasm?

One argument against the TCDP was its slow progress; many felt that the industry would have perished before it could be revitalised. There were doubts about the unproven HYV material, and it was also pointed out that they would have
required much greater care and maintenance than the Fiji Talls. Wind resistance, an important factor in hurricane-prone Fiji, was unknown. There were doubts over the abilities of a family farm to handle the planned two ha of HYV trees underplanted with cocoa, and much more serious doubts concerning the debt burden which would fall on farmers paid a wage loaned to them during the establishment period. Here the experience of the discredited subsidy schemes had a fatal effect.

Moreover, many of the assumptions in the TCDP were dubious. The 'wage' was to be only $3 per day, and at the critical time the going agricultural wage in the coconut districts was rising above this level. The TCDP assumed that a family farm has a potential labour input of 650 person-days/year, or the labour of 2.7 persons in a 48-week year. This labour has to be applied over the whole range of cash, subsistence and other activities. At a yield of 1.2 tonnes copra/ha and 1.0 tonne cocoa/ha, two ha would absorb 73 person-weeks; at the hoped-for yield of 3.5 tonnes copra/ha two ha would absorb 84 person-weeks. This is the labour of 1.5 and 1.75 persons respectively. This was not a large margin, yet the assumption was that it would be possible to achieve this without recourse to wage employment, this being regarded as socially undesirable. It seems far more likely, given the present cash-crop input of only some twelve weeks in the year on Fijian farms derived above, that a minority of farmers would have emerged who would achieve the target production using wage labour, while the majority would fall far behind, and suffer the debt problems envisaged by the plan's critics.

There were other implications disregarded in the TCDP. Changes in population distribution would have been necessary. Allowing for land-rotation, it is generally considered that five to six ha is the minimum viable size for a family farm in the coconut districts, the only exceptions being in areas of intensive vegetable and yaqona production. While many people on mataqali land subsist on less than this, block-holders have more; on none of the Taveuni schemes is the mean block size less than 5.7 ha, and the overall mean in 1975-76 was 10.3 ha. Creation of smaller farms would require significant changes in land tenure, and also in farming practice. While none of this might be bad for the economic health of the coconut districts, the probability of a further increase in inequality has implications for a society which still has an ethos of subsistence adequacy for all, and of village and mataqali co-operation (Lasaqa, 1984; Cole et al., 1984).
Preserving a way of life?

The TCDP was under consideration for a long time, and it has not been wholly rejected. Under the benign influence of cocoa prices which continued to rise until late in 1984, decisions were taken to go ahead with vigorous steps to achieve the planned area of cocoa planted under existing coconuts. This, it may be remembered from our discussion above, creates problems for any subsequent decision to replant the coconuts. Experimental work on HYV coconuts is going forward, but with lower expectations of yield, the rest of the plan continues to hang fire. It is not clear whether all the considerations raised immediately above have been influential in the de facto decision not to proceed, but the possibility of creating a large debt burden both for the farmers and for the national economy was certainly significant. In consequence, the implications for processing both at the copra-drying and milling levels were never worked out, with the result that the piecemeal approach has continued, as we have seen above.

Caution in regard to the future of the coconut industry is certainly in order after the experience of the past twenty years, but caution leading to inaction in a critical area is extremely dangerous. Periods of good prices, such as 1983-85, are not always beneficial in that they encourage complacency. Proposals for a revitalisation of the production base in the coconut industry have been made from time to time since the early 1950s, and the TCDP seemed to offer the best hope yet, even if it has been wisely decided to concentrate on local hybrids capable of yielding up to 1.5 t/ha while the imported HYV material was still being tried experimentally. The likely consequence of indefinite delay seems to be to imperil the chances of success in the milling initiatives.

This paper stops short of an examination of what is happening to the 'Fijian way of life' in the coconut districts, a topic more fully considered elsewhere (Bayliss-Smith et al., 1986). It is however, pertinent to remark that protection of the Fijian farmer against the risk of indebtedness is in a pattern with the paternalist approach to Fijian rural society that independent Fiji inherited from the colonial period. To this, and some other despairing observers, the pattern seems to have been continued almost unchanged under Fiji's present generation of chiefly rulers. Yet revitalisation of the coconut industry involves more than the revival of an industry; it also involves the restoration
of the material support for that 'way of life' throughout the island areas in which it remains most obviously alive. While the changes in the forward linkages of coconut production, discussed above, are certainly important, the production base itself is the foundation of all change and of the society which the industry supports. Diversification of production will not help all parts of the region, and if based on new export crops it will not overcome the basic weaknesses of the regional economy. The coconut industry has important prospects for product-diversification that have been investigated ad nauseam, and which could do much to insulate the coconut farmer from the vagaries of the world copra price. Yet none of this will come about if production continues to decline, and for large parts of the coconut region continued neglect of the production base seems almost synonymous with benign neglect of that much-cherished 'Fijian way of life' itself.

E. THE TRANSPORT STRANGLEHOLD

Sea transport as a constraint

It is necessary to consider one further major area in which there is significant innovation. This is the area of sea transport, the problems of which have been touched on at many points in the above discussion. The transport problem has two main aspects: the marine connexions between the coconut districts and Suva, and the feeder services, both by land and sea, which carry goods within the island regions to and from the ships.

During the 1970s, as we have noted, marine services between Suva and Lau were transformed by the introduction of the 'Kaunitoni', and by the substantial use made of Government ships, several of which have cargo capacity. The 'Kaunitoni', subsidised though it is, is a highly effective cargo-handling operation. The ship carries aboard four large workboats with which it maintains a high turn-around speed at islands, often completing discharging and loading in as little as three hours; the ship's ability to travel at up to fifteen knots enables it to position itself at island anchorages in relation to the state of the tide. Three loop-routes are now maintained, serving all islands in Lau and the Northern Division island of Yacata, so that every island has service about once a month on a fairly regular schedule. If there were more cargo, and if the ship were less costly to run, it
might show better financial returns for its operating performance.

Elsewhere in the coconut districts the situation gives less cause for customer satisfaction. There are plenty of ships, and it is indeed estimated that the available cargo capacity is over 5,000 tonnes including the commercial ships of the Government fleet, whereas the cargo demand is only for around 3,000 tonnes. The ships, however, vary enormously in quality. Almost all are old, and most are second-hand. One ship, recently re-hulled and re-decked, was built in 1905. Maintenance costs, both of steel-hulled and wooden-hulled vessels, are very high. Some, even of recent acquisition, might better be described as 'floating scrap-iron' than as adequate ships. A recent UNCTAD mission maintained that a significant number were obsolescent, and/or inefficient, and should be scrapped. Cargo handling is poor, freezer space is extremely scarce, and a refrigerated container was carried thwart-ships aboard one vessel serving the Savusavu-Taveuni run in 1983, in an attempt to provide at least some freezer space for this region.

Some significant innovations have appeared in this gimp-rack system since 1980. Most important is the establishment of ro-ro or car-ferry services between the main islands of Fiji by two local companies. Initially, services were operated between Nabouwalu in southwestern Vanua Levu and Ellington and later Natoví in Viti Levu, with a branch service from Natoví to Ovalu (see general map at p. x). The daily Nabouwalu-Natoví service made possible same-day through road transport between Suva and Labasa, and though inhibited by the poor terminal facilities and the low-grade roads to the terminals, introduced the possibility of through container traffic between the main islands. In 1985 a second company mounted a service directly from Suva to Savusavu, with once-weekly extensions to Koro and Taveuni. With second-hand Japanese ships of 500 - 1,000 GRT, these services are clearly placed to carry most of the general cargo and some passenger traffic between Viti Levu and the Northern Division, leaving only bulk cargoes to the long-established Suva to Labasa barge service. Upgrading of roads and terminals, and the addition of a daily car-ferry between Buca Bay and Taveuni, are all that is needed to make these new services the backbone of a unified transport system by road and sea that would potentially link eighty per cent of the country's population, on a daily basis.
Elsewhere, the only significant addition has been the introduction of large cutters on services between the main eastern and northern islands, and Suva. Operated by individual owner-masters, their advent in 1982 precipitated a freight-rate war in the north. But neither they nor the car ferries yet provide service using modern cargo-handling methods, including palletization and the use of small containers, including chilled and freezer boxes. The technology of landing-craft type vessels, shore-based amphibious lighters, and small-module or even collapsible containers, all exists (Brookfield, 1984) and shipowners are aware that it exists. Re-equipment of the fleet to provide a modern service throughout the island areas of Fiji is, however, beyond the present means of the small companies in the business.

Wherever there are roads, ships now call at fewer places than they did, and the substantial investment made in island road systems in recent years therefore carries a cost penalty to those who must use the roads to transport produce, rather than load it directly aboard ship lying opposite their own village, or estate. Growers within ten km of a loading point on Taveuni and in Vanua Levu have to pay from $5-10 for the hire of a small truck capable of carrying about a tonne of copra; growers living further afield may have to pay up to $20 for a truck, or $1.00 for each bag of copra. Similar costs apply to green copra taken any distance for drying. For growers at a greater distance the costs are much heavier. Qamea sellers bring their copra to Navakacoa on Taveuni for sale in their own boats, and buy $900 worth of outboard motor fuel each week. Even in 1975, growers on Cikobia and Qelelevu were having to pay launch operators as much as $60-70/t to take their copra to the nearest selling point. When the quantity available becomes small, as on Qelelevu after Hurricane 'Sarah', the cost per tonne rises and the business ceases to be worthwhile. None of these 'penalty of distance' costs attracts any subsidy, and if ships call at fewer places their impact will increase.

A case for intervention

Government intervention in island shipping has, as we have seen, already become substantial, leading to an effective freezing of the freight rate differentials between different parts of the coconut districts in their vital linkage with Suva (Figure 4). The Lau service is subsidised, and private
shippers have withdrawn. Elsewhere, however, private enterprise continues to provide most of the service, and the commercial use of Government shipping has been largely withdrawn since 1982.

In 1982-83 there was considerable discussion about the future of shipping in eastern Fiji, with two sets of proposals under discussion. On the one hand there was a set of proposals to licence private ships to operate specific routes, although these proposals seemed to have been drawn up in minimal consultation with either the industry or the customers. On the other hand was a proposal to sell off the commercially-capable vessels in the Government fleet to private enterprise, so as to reduce the high operating cost of the Marine Department. This was obscurely linked with other proposals, including a corporate take-over of the Government shipyard at Suva, and the experimental operation of a sail-assisted ship supported by the Asian Development Bank -- a promising experiment which suffered a setback when the ship was lost at Moala during a hurricane in 1985. Up to the time of writing, none of these proposals had led to definitive action.

The encouragement of private enterprise at sea is in line with a belief that the proper role of governments in transport is in the provision of infrastructure, leaving the multiple decisions about routing, provision of space and timing to the workings of the market. The problem in areas such as eastern Fiji is that the market principle leads to very poor service to many places and no service to some, while a region lean in cargo does not provide shipowners with the income or creditworthiness with which to invest in the best equipment. The uneasy compromise achieved in Fiji since 1972 has included substantial elements of regulation, and the proposals -- if carried through -- would involve further regulation without necessarily providing the means with which to achieve sustained improvement.

It is therefore worth asking whether the provision of 'infrastructure' at sea, in areas where service is deemed essential yet offers unrewarding traffic to entrepreneurs, does not demand a view of the ship itself as part of the infrastructure. The parallel is with the provision of rural roads. On some smaller islands, recent costs of road construction have been around $12,000/km, and the roads in the TCDP plans would have cost around $22,000/km. It is true that Government has provided a number of jetties, as they have also
provided island airstrips, the cost being generally met from external aid funds. But a cost-provision in line with the cost of providing roads on dry land would have permitted very much greater intervention, including the provision of an appropriate fleet of ships which could then have been leased to private operators at rates commensurate with the available returns. This might achieve far more than a freight-rate subsidy, on copra only, which has not been increased in line with inflation.

New shipping and a new route configuration

The milling innovations discussed above will certainly have their effect on the configuration of shipping services in Fiji. While the Suva mill will, hopefully, find service from a long-haul bulk carrier, the smaller mills require other and more local means of bulk carriage. The diversion of copra, the backbone of the present shipping system, to new milling sites, will greatly affect profitability and increase the likelihood that the remaining conventional ships, all old, will soon be retired. Some of the technical prospects for fleet re-equipment have been discussed above; clearly ro-ro or landing-craft type vessels are required on more routes, while there is also a need to introduce modern cargo-handling methods throughout the system. But the configuration of service is bound to undergo change, and will undergo very major change if the more drastic of the two scenarios for future milling, discussed above, comes into being.

While Suva remains the source or transhipment point for all general cargo carried outward to the islands, services based on Suva will continue to be required, even though inward copra is either diverted to Suva or is replaced by inward shipments of coconut oil, supplemented by other produce. What seems to be required is a reduction in total available tonnage, at the same time as new and more capable vessels replace the existing fleet. The future of the northern trade seems clearly to lie with ro-ro operation, hopefully supplemented by modern cargo-handling that does not require all the cargo to be borne on wheels. In the east, however, lower cost operation seems the key to the successful provision of future service. Here the sail-motor concept, where the machinery that operates the sails also doubles for cargo handling, might well provide the best hope for continued provision of service at reasonable cost. At present, however, it hardly seems that the major rethinking that is required has
even seriously begun, and the viability of the whole economic system in the eastern islands is at some risk.

NOTES

1. Insufficient thought seems to have been given to the possibility of marketing shell-charcoal as a cooking fuel; charcoal making, common in some other Pacific countries, is not done in Fiji, where it would make possible a substantial improvement in cooking methods, and hence in nutrition.

2. This evaluation is based on 1983 data. New fieldwork would be necessary to provide more recent information.

3. A 2,000-gallon truck, with double rear axle, could carry seven to eight tonnes of coconut oil, depending on actual specific gravity. Larger, articulated trucks would of course carry much more, and in this case prime movers could be stationed in Lakeba and Vanua Balavu, and would also be available for other use (e.g. hauling trailer-mounted containers). However, the state of roads and jetties probably rules out anything larger than a smaller non-articulated truck. If delivery of 1,000 tonnes/year were achieved by each of the two island mills, about eleven to twelve truckloads/month would be available from each mill; on present Lakeba production less than half this space would be required. Carriage of about twenty-two trucks/month is not, however, beyond the capacity of a currently available vessel such as the 'Vasua', with space remaining available for other vehicles and cargo. It would clearly be better to use a decked-in roll-on roll-off vessel, but this would be warranted only if higher levels of production were achieved, and if other uses of the space were to arise.
CHAPTER 7

THE FUTURE OF THE COCONUT DISTRICTS OF FIJI

A. THE LOSS OF DIRECTION

Not more than about 65,000 people, some ten per cent of the whole population of Fiji, now lives in the coconut districts of the Eastern and Northern Divisions, and the regional share in the national population has been declining for at least half a century. Earlier, however, the adoption of copra, made from an indigenous crop, as export-base at the end of the nineteenth century, and the rapid diffusion of commercial coconut production through the Fijian population, made this a prosperous part of the country. Cash incomes were widely distributed through the population, proletarianisation was contained at a low level, and good incomes yielded the best housing and the greatest participation in education in the rural parts of Fiji. One consequence has been the disproportionate share which Fijians from the east still hold in politics, government and the professions, in the country as a whole.

The depression of the 1930s marked the end of this era, and good periods since that time have not restored the former relative affluence. For the estates, the depression marked the beginning of a decline from which they have never recovered. For the rural Fijians, the 1930s saw the beginning of substantial entry into wage employment, and the opening up of a stream of migration to other parts of Fiji; it also led, however, to their capture from the estates of the dominant share in the coconut industry itself.

Since 1970, the region as a whole has gone through bad times. While the sugar industry was booming, copra production declined; few of the growing flood of tourists came to the east, or were encouraged to do so. The large expansion of timber planting left the region on one side, and industrial and service employment went elsewhere. The quality and -- for a time -- quantity of shipping service declined, and the cost of goods rose disproportionately so that inflation affected the coconut districts more severely than the rest of Fiji. Latterly, the effects of economic depression were compounded by an unusual incidence of storm and drought. The region
became a client area of the Fijian state, in which most innovation in services that came to it was funded elsewhere, and while for political reasons this external provision has been substantial, the indigenous economic base has been increasingly supplemented by transfer payments. A protective umbrella of subsidy and care has replaced the former sense of viable participation in the national economy.

Bad times, however, generated some good reactions. Where it was possible, there was important diversification of production into yaqona and root vegetables for the market, crops marketed within the country and less vulnerable to price swings. Even on the estates, there have been some important efforts at innovation, and regional leadership has encouraged the establishment of forward-linkage industry. These positive developments have not yet led to any economic revival, and the lack of confidence in the future of the regional economy has, at the end of our period, been exhibited in indecision in the face of ideas and initiatives both from within Fiji and abroad. Yet, paradoxically, the early 1980s find the coconut regions with more possibilities for productive change than the sugar areas which boomed in the 1970s, only to face a disastrous decline in the world price from which no early escape seems even possible.

B. OPPORTUNITIES THAT NEED TO BE SEIZED

Some advantages of eastern Fiji

Much has been written, by this writer among others, about the disadvantages suffered by eastern Fiji. Yet when considered against other coconut-economy regions in Asia and the Pacific, eastern Fiji has several notable advantages. By comparison with the Asian regions, or with Tonga and the atoll countries of the central Pacific, eastern Fiji has a generous endowment of land in relation to its population. Where there is land shortage it is institutionally created, and some small islands that would be regarded as over-populated in modern times have been relieved of this pressure by emigration elsewhere. The estate sector has not given rise to a client population of tenancy, and in a labour-short environment has become a better employer than it was, even if there remains room for improvement in this area. Among the Fijians, both formal and de facto individualisation of land tenure have gone further than in any other Pacific country except Tonga. Moreover the population has a relatively high educational
attainment, is wholly literate and commands a wide range of skills through its extensive migrant experience. Housing is good for all but a small minority, and in general the environment for successful innovation is very different from that of more backward, more crowded, or more oppressed regions. Lastly, while the marketing and credit channels of eastern Fiji leave much to be desired, they are not occupied by chains of rapacious middlemen and moneylenders, share-crop landlords, or authorities demanding taxes or bribes.

Within this relatively favoured environment among peripheral island regions, there is a further potential advantage. Fiji has the most diversified economy of all Pacific countries; its population is some forty per cent urban, and division of labour is widespread. There is a substantial internal market, even within a population still less than three-quarters of a million. It has long been this writer's contention that a greater focus on internal market opportunities offers the best hope for the future of the eastern region.

Diversifying out of an export-base economy

Eastern Fiji's economic history since the 1870s can broadly be characterised as first the adoption of a successful export staple, then a half-hearted search for alternatives offering higher unit-value after the staple became both vulnerable to severe price instability and suffered rising transport costs. Current plans for cocoa, reviving former plans in the 1960s, are the strongest such hope but are beset by fears of world over-production. Meanwhile farmers' initiatives in supplying the internal market have been thwarted by transport and marketing problems, and by competition from better-located farmers on Viti Levu. The single exception is yaqona, in which some of the islands have a comparative advantage, and which has high value in relation to its bulk.

The direction of argument in this paper, especially in Chapters 5 and 6, is however that a shift away from export-staple production is at least in part possible within the present crop-mix. It is argued that forward-linkage industries using the coconut and its products as input could absorb a more significant part of coconut production if investment were directed into such industries producing mainly for the national market, plus some export under SPARTECA to
Australia and New Zealand. Moreover, the market for whole coconuts, discussed in Chapter 1, is clearly capable of enlargement on the basis of present high prices in the urban areas and in the sugar belt. It was suggested that at least a third of present production, that part supplied by the eastern islands, could effectively be used in this way at and through Suva, while export production of coconut oil could be concentrated through a mill of sufficient size at Savusavu. The re-arrangement of transport arrangements that would be required, coupled with a program of re-equipment of the internal fleet, could at the same time provide the chilled and freezer space needed for marketing of vegetables, fruit and meat from the coconut districts, and could make effective use of the comparative environmental advantage possessed by the eastern islands through their sunnier climate. The investment required is mainly facilitating investment; the required enterprise is already present, and has been demonstrated. All this was argued, though in less detail and with less supporting information, by the UNESCO/UNFPA Project (1977).

The problem in the north is different. It still requires export-crop diversification, but it is also here that innovations in the on-farm processing of the coconut, and in nut transport, have major potential for reducing costs. Higher-yielding trees would have their major effect in enlarging the production base in the north, providing this was combined with reorganisation of processing and transport. In the Northern Division, where much land is already alienated or subdivided, the social changes that would follow from intensified production would be more likely to have beneficial than deleterious effects on a way of life already far removed from the village 'ideal'. It is therefore in this part of the coconut region, where the TCDP was to be concentrated and even confined before it was enlarged for political reasons, that the TCDP proposals could best be dusted off and reconsidered.

C. CONCLUSION

The period since 1970 has seen a great expansion of Government intervention in the coconut districts of Fiji, though much the greater part of this intervention has taken the form of direct and indirect subsidies designed to sustain an ailing economy and a threatened 'way of life'. Costly investments in airfields and roads have improved some forms of circulation, but the strong intervention in sea transport which took place between 1975 and 1982 is now under question.
Productive investment supported by Government has included some 'diversification funds' and efforts to develop some forward-linkage industrialisation based on the coconut industry at points in the periphery. The viability of some of these initiatives is in question, while others have failed. Some important private innovations have been only weakly supported.

What is suggested here is not a massive increase in Government intervention in the regional economy. In so far as this is the implication of some earlier writings, it is withdrawn. The region has abundant entrepreneurship; what it lacks is management and capital. What I do urge is selective Government-funded or Government-supported investment in critical areas, being sea transport, forward-linkage industry at strategic points and in Suva, and the revitalisation of the production base. I urge Government support in these areas because it seems evident that without such intervention there will be only a continuation of failures, involving a collectively-substantial but individually small degree of private investment, the loss of which will be due to lack of capital-intensive support in key areas.

These considerations clearly have application in other coconut-growing regions of the Pacific, which have suffered similar or worse problems in recent years. However, the Fiji case contains special features in view of the diversity of the national economy, the special place which the present coconut districts hold as heartland of pre-colonial Fiji, and the historical circumstances which still give this sparsely-populated region a significance in national society which is disproportionate to its population or its role in the economy. That the welfare of the coconut districts is important to the Fijian nation is evident. This paper has set out not only to show how its economy has come to be reduced to its present condition, but also to argue that the economic situation still contains opportunities which, given the will, can be used so as to restore a measure of economic health and allow the region again to contribute more effectively to the national good.
APPENDIX I

THE AGE AND AREA OF COCONUT PALMS

THE FUZZINESS OF DATA ON THE INDUSTRY

In order to discuss the coconut industry and the economy it supports, it is necessary to resolve problems of data. Almost all data on this industry are fuzzy. At many stages, the unit of measurement in production is the bag, and this has to be converted to weight by use of an average or estimate. Areas, rather than tree-counts, are used to measure the production base, but spacing varies greatly. In 1968 an average of 113 trees/ha was obtained on sample plots, with a range between Provinces from 26 to 198 (Casley, 1969). The normal plantation density is between 140 and 170 trees/ha, at a spacing of 8.2 to 9.1 metres on a triangular distribution. Some village groves are said to have over 250 trees/ha. Given this variability, the problem of relating production to area, and hence of discussing productivity, becomes difficult.

Reasons why the area measurement problem must be resolved

Most statements made about the industry, including those contained in the basic documents of the recent Tree-crops Project, include a set of seemingly factual pieces such as:

(a) the industry has been declining steadily, hit by periodic hurricanes, low and fluctuating prices, and declining yields as trees have aged;

(b) during the last two decades average copra yields have fallen from about 0.9 t/ha to less than 0.4 t/ha;

(c) yields are low due primarily to the old age of palms;

(d) the problem is that of an aging population of palms, the exact age groups of which have not been determined even by a sample survey, but some of which are reported to be over ninety years of age and the bulk of sixty to eighty years;

(e) on mataqali lands the density is high, with self sown
seedlings adding to the competition as a further recipe for low yields;

(f) where excessive density exists, particularly in communal lands which can have double the normal density of 146 palms/ha, yields would decline from average plantation practice to as low as 0.25 t/ha; under good plantation practice just over 1.2 tonnes would be normal per ha;

(g) conditions for the planter were so bad during the depression years [1930-43] that very few, if any, were spending money on replanting; afterwards, some years were needed to pay off the old debts, so the industry stagnated for some 25 years;

(h) as much as eighty per cent of the replanting and new planting carried out under the subsidy scheme after 1963 was a failure;

(i) producers are reluctant to invest in improvements under conditions of low coconut and copra prices.

All these statements are derived, with only minor verbal changes, from official documents or statements made during the last few years. Together, they present a depressing picture of the industry. It is very important, therefore, to establish how far they are true.

THE AREA UNDER COCONUTS

Misleading use of old data (Table 1)

Notwithstanding the much lower figures obtained by the Agricultural Censuses of 1968 and 1978, and by estimation from 1964 air photographs, statements about the coconut area in official documents continue to place it within the 80-90,000 ha range. The 1980 FAO survey cited 88-89,000 ha; the basic document of the Tree-crop Project cites 80-85,000 ha; the JICA (1978) report on Taveuni cites 88,890 ha in 1977. Using the data presented in Table I.1 it is not difficult to trace the origin of these estimates.
<table>
<thead>
<tr>
<th>Age gp</th>
<th>1950 estimate</th>
<th>1972 update</th>
<th>1978 census</th>
<th>Taveuni only 1978 measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years</td>
<td>ha</td>
<td>%</td>
<td>Years</td>
</tr>
<tr>
<td>Over 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 72</td>
<td>pre 1900</td>
<td>20,857</td>
<td>23.4</td>
</tr>
<tr>
<td>36-50</td>
<td>1900-14</td>
<td>16,811</td>
<td>25.5</td>
<td>57-72</td>
</tr>
<tr>
<td>21-35</td>
<td>1915-29</td>
<td>14,107</td>
<td>21.4</td>
<td>42-57</td>
</tr>
<tr>
<td>8-20</td>
<td>1930-42</td>
<td>8,587</td>
<td>13.0</td>
<td>30-42</td>
</tr>
<tr>
<td>0-7</td>
<td>1943-50</td>
<td>5,453</td>
<td>8.3</td>
<td>22-29</td>
</tr>
<tr>
<td></td>
<td>10-21</td>
<td>1950-61</td>
<td>2,174</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>0-9</td>
<td>1962-71</td>
<td>21,044</td>
<td>23.6</td>
</tr>
<tr>
<td></td>
<td>0-10</td>
<td>1968-1977</td>
<td>17,058</td>
<td>25.6</td>
</tr>
<tr>
<td>TOTAL (ha)</td>
<td>65,814</td>
<td>89,032</td>
<td>66,630</td>
<td>10,876</td>
</tr>
</tbody>
</table>

Notes and Sources:
1972: Cornelius and Lockhart-Smitth (1974) based on a table provided by the Department of Agriculture as 1972 age-distribution of trees. Original data in acres. n.b. This table also appears as 1977 data in JICA (1978) presumably having been provided as such to the JICA mission.
The Silsoe report of 1963 stated that the coconut area had remained around 65,000 ha for a 'very long time'. Silsoe quoted a sector and age breakdown of a total of 65,814 ha, based on a survey by Harwood (1952) in 1950. Generally in the form of 'years of age before present', Harwood's table and data derived from it have continued to appear up to this day. New planting since 1950 was added up to 1972 (Cornelius and Lockhart-Smith, 1974), but apparently not subsequently. Nothing is subtracted. The same table, in the form of 'years of age before present' appears as 1977 data in the JICA (1978) report; presumably 1900 is moved on to 1905? Data from this table are then cited in the 1980 FAO Report on the Coconut Industry, where it is stated that 37,000 of 88-89,000 ha are over 58 years old. In the same year, the same values are cited by Sumbak in the Asian Development Bank report on South Pacific Agriculture (Ward and Proctor, eds, 1980), where they are quoted as the product of 'a recent survey'.

It is worth pausing to consider these 'very old coconuts' more carefully. During the five years 1908-12, when all pre-1900 coconuts would have been bearing, production averaged 14,449 t/yr (McPaul, 1963). If Harwood's 20,856 ha planted before 1900 represents actual area of bearing trees at that time, mean yield would have been only 0.69 t/ha, which is surprisingly low for young trees. If the mean yield in these high-production years were a conservative 0.9 t/ha, the area would have been only 16,000 ha; if the yield were higher the area would have been still smaller. Then, although it is generally stated that no area estimates are available before 1950, two such estimates are cited by Twyford and Wright (1965, p.185). A 1921 survey gave 15,161 ha of bearing trees and 5,624 ha of immature trees, a total of 20,876 ha. If this were the bearing total in 1927-29, when a peak mean production averaged 29,857 t/yr, mean yield would have been 1.43 t/ha, which is credible, though actual yield would have been lower because some 1921-24 planting would also have been in the early-bearing stage. Yield in 1921 itself was affected by hurricane damage, but a 1922 production of 22,548 tonnes would have yielded 1.08 t/ha against the 1921 bearing area. One is forced to conclude that Harwood over-estimated the pre-1900 area by a large margin. Yet his estimate has been carried forward, time and time again, up to the 1980s.

Twyford and Wright also cite a 1929 survey giving a total of 45,949 ha, implying a very high rate of planting between 1921 and 1929, if both estimates are to be believed. Harwood's total of 65,814 ha in 1950 is then a substantial
further increase, indicating a continued high rate of planting right through the depression and the war, when most sources, including Harwood, agree that very little new planting was done.

An attempt is made below to establish a more realistic estimate of the growth of Fiji's coconut area, and its implications for industry performance are discussed in the text. For the present, it seems better to disbelieve Harwood's 20,856 ha planted before 1900 and also his further 30,918 ha planted between 1901 and 1929; both look like over-estimates. Yet, with the addition of later planting, these are the bases of all the high-range estimates of present coconut area. At the very least, the continued use of these same data, adding new planting but deleting nothing, must be recognised as a cause of serious error. It is an error, moreover, that has important consequences for yield estimates, for the explanation of declining yield, and for the scale of the yield decline that is commonly stated. No service is rendered to the industry, or to the interests of development, by continuing to use misleading information based on a suspect thirty-year-old survey as the best current information on the physical basis of the industry.

What better data are available?

There are several other guesstimates in the literature. Parham gave 67,763 ha in 1953 and the Burns Commission gave 68,000 ha in 1960; Aidney (1972) gave between 81,000 and 89,000 ha about 1970, of which from 73,000 to 81,000 ha were bearing. But there have also been other estimates, more soundly based and lower. Using 1964 air photographs, the Department of Agriculture obtained a total of only 59,960 ha for that year (Department of Agriculture Reports), distributed as shown in Table 2. There have also been two agricultural censuses, around 1968 and 1978 respectively (Casley, 1969; Rothfield and Kumar, 1980), giving respectively 72,265 and 66,030 ha. Both were sample surveys, but both used air photographs, in the 1978 case using new photography flown for the purpose in 1977-78. The difference between the two census estimates is attributed to methodology and coverage, but this is not altogether adequate as an explanation.
<table>
<thead>
<tr>
<th>Region</th>
<th>1964 Air Photographs ha</th>
<th>1968 Census ha</th>
<th>Land-use Survey ha</th>
<th>'Timber' Estimates ha</th>
<th>1978 Census ha</th>
<th>UNESCO Project ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORTHERN DIVISION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bua (with Wainunu)</td>
<td>-</td>
<td>7,370</td>
<td>-</td>
<td>5,822</td>
<td>5,197</td>
<td>-</td>
</tr>
<tr>
<td>Macuata</td>
<td>-</td>
<td>6,498</td>
<td>-</td>
<td>4,167</td>
<td>3,715</td>
<td>-</td>
</tr>
<tr>
<td>Mainland Cakaudrove</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13,546</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Island Cakaudrove:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Taveuni</td>
<td>-</td>
<td>(12,545)</td>
<td>-</td>
<td>7,861</td>
<td>-</td>
<td>10,493(a)</td>
</tr>
<tr>
<td>- Qamea</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,418</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- Rabi</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,081</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>(Total Cakaudro)</td>
<td>-</td>
<td>29,776</td>
<td>-</td>
<td>(23,906)</td>
<td>29,880</td>
<td></td>
</tr>
<tr>
<td>Total North Div.</td>
<td>-</td>
<td>33,700</td>
<td>43,644</td>
<td>36,261</td>
<td>33,895</td>
<td>38,792</td>
</tr>
<tr>
<td>CENTRAL DIVISION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wakatia</td>
<td>-</td>
<td>264</td>
<td>67</td>
<td>-</td>
<td>128</td>
<td>-</td>
</tr>
<tr>
<td>Namosi</td>
<td>-</td>
<td>32</td>
<td>42</td>
<td>-</td>
<td>42</td>
<td>-</td>
</tr>
<tr>
<td>Rewa</td>
<td>-</td>
<td>212</td>
<td>783</td>
<td>-</td>
<td>1,428</td>
<td>-</td>
</tr>
<tr>
<td>- Beqa (only)</td>
<td>-</td>
<td>-</td>
<td>529</td>
<td>719</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Serua</td>
<td>-</td>
<td>282</td>
<td>341</td>
<td>-</td>
<td>553</td>
<td>-</td>
</tr>
<tr>
<td>Talavu</td>
<td>-</td>
<td>1,366</td>
<td>2,010</td>
<td>-</td>
<td>2,663</td>
<td>-</td>
</tr>
<tr>
<td>Total Central Div.</td>
<td>-</td>
<td>2,156</td>
<td>3,772</td>
<td>-</td>
<td>4,814</td>
<td>-</td>
</tr>
<tr>
<td>WESTERN DIVISION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ra</td>
<td>-</td>
<td>458</td>
<td>516</td>
<td>-</td>
<td>337</td>
<td>-</td>
</tr>
<tr>
<td>Nadroga/Navosa</td>
<td>-</td>
<td>938</td>
<td>413</td>
<td>-</td>
<td>1,121</td>
<td>-</td>
</tr>
<tr>
<td>- Vatulele (only)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>435</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ba</td>
<td>-</td>
<td>330</td>
<td>157</td>
<td>-</td>
<td>2,170</td>
<td>-</td>
</tr>
<tr>
<td>- Yasawas (only)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,720</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Western Div.</td>
<td>-</td>
<td>1,726</td>
<td>1,086</td>
<td>-</td>
<td>3,628</td>
<td>-</td>
</tr>
<tr>
<td>Total Central and Western Div.</td>
<td>-</td>
<td>6,000</td>
<td>(3,882)</td>
<td>(4,858)</td>
<td>(8,442)</td>
<td>-</td>
</tr>
<tr>
<td>EASTERN DIVISION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KADAVU PROVINCE</td>
<td>3,250</td>
<td>5,925</td>
<td>2,409</td>
<td>3,252</td>
<td>2,411</td>
<td>-</td>
</tr>
<tr>
<td>LOMAIVITI PROVINCE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batiki</td>
<td>-</td>
<td>-</td>
<td>245</td>
<td>166</td>
<td>-</td>
<td>262</td>
</tr>
<tr>
<td>Nairai</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>257</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gau</td>
<td>-</td>
<td>-</td>
<td>1,257</td>
<td>705</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Koro</td>
<td>-</td>
<td>-</td>
<td>2,217</td>
<td>2,643</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ovalau</td>
<td>-</td>
<td>-</td>
<td>708</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moturiki</td>
<td>-</td>
<td>-</td>
<td>205</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Makogai</td>
<td>-</td>
<td>-</td>
<td>173</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wakaya</td>
<td>-</td>
<td>-</td>
<td>283</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total above four</td>
<td>-</td>
<td>(1,369)</td>
<td>960</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Lomaiviti</td>
<td>4,760</td>
<td>6,076</td>
<td>5,088</td>
<td>4,731</td>
<td>5,633</td>
<td>-</td>
</tr>
</tbody>
</table>
## COCONUT ECONOMY

**LAU PROVINCE**

<table>
<thead>
<tr>
<th>Village</th>
<th>Women</th>
<th>Coconut</th>
<th>Men</th>
<th>Coconut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cicia</td>
<td>−</td>
<td>− 928</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Tuvuca</td>
<td>−</td>
<td>− 270</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>(Cicia and Tuvuca)</td>
<td>−</td>
<td>(1,198) 912</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Vanua Balavu</td>
<td>−</td>
<td>2,156 1,825 (b)</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Nayau</td>
<td>−</td>
<td>146</td>
<td>267</td>
<td>−</td>
</tr>
<tr>
<td>Moala</td>
<td>−</td>
<td>752</td>
<td>1,632</td>
<td>−</td>
</tr>
<tr>
<td>Matuku</td>
<td>−</td>
<td>391</td>
<td>478</td>
<td>−</td>
</tr>
<tr>
<td>Totoya</td>
<td>−</td>
<td>334</td>
<td>293 (c)</td>
<td>−</td>
</tr>
<tr>
<td>Lakeba</td>
<td>−</td>
<td>961</td>
<td>1,324</td>
<td>1,168</td>
</tr>
<tr>
<td>Kabara</td>
<td>−</td>
<td>330</td>
<td>269</td>
<td>230</td>
</tr>
<tr>
<td>Komo</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Oneata</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>834 (d)</td>
</tr>
<tr>
<td>Namuka</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Moce</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Ogea</td>
<td>−</td>
<td>135</td>
<td>454 (e)</td>
<td>−</td>
</tr>
<tr>
<td>Fulaga</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Vatoa and Ono-i-Lau</td>
<td>−</td>
<td>− 634</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Kanacea</td>
<td>−</td>
<td>1,116</td>
<td>2,215 (f)</td>
<td>−</td>
</tr>
</tbody>
</table>

| Total Lau  | 10,950 | 11,378 | 7,519 | 11,137 | 10,031 |

**ROTUMA PROVINCE**

<table>
<thead>
<tr>
<th>Village</th>
<th>Women</th>
<th>Coconut</th>
<th>Men</th>
<th>Coconut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oneata</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Namuka</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Moce</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Ogea</td>
<td>−</td>
<td>135</td>
<td>454 (e)</td>
<td>−</td>
</tr>
<tr>
<td>Fulaga</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Vatoa and Ono-i-Lau</td>
<td>−</td>
<td>− 634</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Kanacea</td>
<td>−</td>
<td>1,116</td>
<td>2,215 (f)</td>
<td>−</td>
</tr>
</tbody>
</table>

| Total Eastern Div. | 1,300 | 1,320 | −   | −       |

| Total FIJI  | 59,960 | 72,225 | 56,135 | 56,889 | 66,630 |

**Notes:**

- **a** (Also JICA: 10,876 ha).
- **b** Includes Cikobia and Yanuca (Cakaudrove).
- **c** Includes Vanua Vatu.
- **d** Includes Namuka and Moce.
- **e** Includes Fulaga.
- **f** Includes Munia, Katafaga, Mago and Naitauba; Carpenters have 890 ha on Kanacea alone.

**Sources:**

- **Land-use survey:** In 1978 aerial photography at 3,000 m was flown to provide data for the 1978 agricultural census. Maps were prepared from these photographs, and certain maps carry information on the areas under different forms of land use. These 'on-map' data are employed here.
- **'Timber' estimates:** Data provided to JICA by the Fiji Timber Utilization Research Institute. These data are also derived from the 1978 aerial photographs, and cover 'bearing coconut forests' only. It would seem that the work was done separately, yielding different results.
- **Census:** Rothfield and Kumar (1980), the report of the 1978 Agricultural Census. This information was derived from the same photography as the above.
- **UNESCO:** Detailed measurements were obtained on four islands by air-photography interpretation supplemented by detailed ground mapping, in the course of the UNESCO/UNFPA project led by Brookfield in 1974-76.
The 1968 census: comparison with 1978

Both censuses have a breakdown by Province, and this is shown in Table I.2. The big 'decline' shown is in fact confined to seven Provinces, among which five account for 97 per cent of the gross 'decline': Kadavu (3,514 ha or 33%; Macuata (2,783 ha or 26%); Bua (2,173 ha or 21%); Lau (1,347 ha or 13%); Lomaiviti (443 ha or 4%). The first three, but not the last two, are low-production Provinces in which there is good reason to suppose that the 1968 survey may have over-estimated a scattered and broken area.

However, the 1978 estimate is higher than that of 1968 in eight Provinces, and significantly so in three of them, all in Viti Levu. Here, Ba (1840 ha or 38%), Tailevu (1,297 ha or 27%) and Rewa (1,216 ha or 25%) account for ninety per cent of the gross 'increase'. There has been substantial new planting in Tailevu, but examination of the data for Rewa and Ba suggests strongly that the real fault in the 1968 data for these Provinces lies in an almost total omission of coconuts on Beqa and the Yasawas respectively. As later estimates show between 2,500 and 3,500 ha of coconuts in these islands, the 1968 base must of necessity be revised upward by not less than 2,000 ha. Moreover, the omission of 3,600 ha of sparse 'scattered trees' is noted in the report. If both are added, the 1968 total would reach almost 78,000 ha. This is some 12,000 ha above the 1978 estimation, more than can be explained away simply by 'differences in methodology'. Somewhere, some real errors are involved, and they are probably in 1968.

The 1978 estimate: is it credible?

More complete use of air photography was made in the 1978 census, and the only major omission seems to have been in Lau. Patches smaller than about 1.2 ha (three acres) were not, however, plotted from the air photographs, which were used only to plot and measure the larger blocks. Such small plots as were caught up in the sample were mapped on the ground. There is a big source of error here. However, two other uses were made of the 1978 air photography, by the land-use division of MAF, and for a forest-resources survey which included coconuts as a timber resource. Incomplete data from both are also presented in Table I.2. Unfortunately, where they overlap they exhibit considerable discordance. Together, however, they do offer support for acceptance of a low
estimate for the total area.

A useful check is obtained by comparing the detailed measurements that have been made on four islands by members of the UNESCO/UNFPA Eastern Islands Project in 1974-76, and by the JICA (1978) team on Taveuni. The latter rested on a precise photogrammetric exercise, and is an excellent illustration of what can be done, quickly and effectively, by this method. The former studies were part of a multi-faceted research exercise, and rested at base on air photography, supplemented and refined by field survey on the ground. Three of these reliable results lie close to one or other of the values obtained by small-scale photo-interpretation and mapping in 1978; in the fourth case both Taveuni values lie far above the 'forest resources survey' measurement, and the latter is clearly in error. We are encouraged to accept a higher rather than a lower area measurement where a comparison is available, but not to make any dramatic rejection of the 1978 census figures in favour of significantly higher values.

Decision to use the 1978 census estimates

But while the 1978 census estimate is much lower than that of 1968, and is far lower than most of the guesses estimates in use, it is over 6,000 ha higher than the estimate obtained by the Land-use Section of the Department of Agriculture from 1964 air photographs. Moreover, and this is important, it is much better founded than any other estimate except the latter. The only real question concerns Lau Province, where no work was done with air photographs in 1978, and where the 1978 estimate is lower than that for 1964 by over 900 ha. It is also lower for Kadavu, and proportionately by a larger margin, but Kadavu had an extremely low spacing of coconuts by 1968 data, and it seems clear that the 1978 census realistically deletes a large part of these scattered trees. Lau, however, is another matter. There would be grounds for accepting the 1964 figure rather than that of 1978. However, the incomplete data from the Land-use Section supplemented by the Timber study data for islands where no land-use estimates are available, totals to only around 10,300 ha, while the generally less-reliable 'forest resources survey' estimates total to only just above the 1964 figure. It seems better not to make an exception in the case of Lau Province, and to accept the 1978 estimate entire, warts-and-all as it were. If this leads to some over-estimation of yields for Lau, the difference is not of a large order. Moreover, as we shall
see, there are checks.

Refinement of the 1978 census estimate

The 1978 estimates provide data only by Province. Further detail for islands, and for parts of Vanua Levu, are available from the land-use and 'forest resources survey' estimates, as well as from the UNESCO/UNFPA and JICA surveys. These latter were used, taking the UNESCO/UNFPA survey, and the JICA figure for Taveuni, as measured, and then distributing the total of other-island or regional estimates proportionately so as to total to the 1978 Provincial figures. These areas were then used for yield determination using the production figures for 1969-82, themselves not wholly reliable. It at once became obvious that it is impossible to use an area breakdown within mainland Cakaudrove because of inconsistencies in the production data, and in parts of Lau and Lomaiviti because of inconsistencies in the area data; yields move into unacceptable ranges. Islands were therefore grouped, and mainland Cakaudrove was taken as a whole. The result is shown in Table 1, and is clearly acceptable. Even the high yield for Lau becomes more acceptable when it is noted that the Lakeba yield, which is based on a precise area measurement, is the highest within the group. This table, which is located in Chapter 3, provides very valuable information on the performance of the industry.

Consequences of accepting the 1978 area estimates

Acceptance of the 1978 area estimate of 66,630 ha implies, of necessity, a downward revision of all earlier estimates, as well as total rejection of the commonly cited current values within the 80-90,000 ha range. This would seem at first sight to create difficulties of such an order as to stretch credibility. Recall that the high-range estimates are all based on Harwood's 1950 survey estimate of 65,814 ha, to which is added estimated planting during the subsidy periods in the 1960s and early 1970s. Even though the estimate of successful new planting at over 20,000 ha may be high, there certainly has been successful new planting and it has been substantial. It seems necessary to downgrade Harwood's careful estimate by perhaps as much as 15,000 ha, bringing it down from 65,814 ha to just over 50,000 ha.
Is this credible? Harwood's estimate has been accepted for a long time. The land-use estimate for 1964, at almost 60,000 ha about the beginning of the subsidy period, does not require so massive a downward revision. But unless the nett new planting since 1964 has totalled only 6,000 ha, this latter estimate also requires downgrading. Only a quantification of the comparison between the land-use maps of 1968 and 1978 could materially help resolve this question, but meanwhile some light can be obtained from new information on the age-distribution of trees.

A NEW VIEW OF THE AGE-DISTRIBUTION OF TREES

Reason was found above to doubt Harwood's 1950 estimate of the age-distribution of trees, as well as his total figure. No complete survey has since been carried out, though in 1968 the agricultural census divided trees into 'immature, bearing and senile', with rather equivocal results. In 1978, however, enumerators — most of whom were Agriculture Department officers — were asked to classify all 'regularly-spaced' coconuts by age. Fortunately, they interpreted this rather restrictive instruction widely and hence classified more than half the sample. Results are shown in Table I.1, together with information from Taveuni obtained by the Japanese team (JICA, 1978). In the national sample, the number of very old trees is much lower than in estimates based on Harwood's work. The choice of dating periods unfortunately makes accurate comparison impossible, but it seems reasonable to conclude that not more than 25 per cent, or between 16,500 and 17,000 ha, of the 1978 stands were planted before about 1920. This corresponds well with the earlier information cited by Twyford and Wright (1961), giving 20,876 ha in 1921. There is strong evidence, therefore, to suppose that there has never at any time been so many very old trees in Fiji as has been believed for the past thirty years.

This is where the Taveuni survey is particularly useful, for it is based on a sample of all trees, including young trees underplanted beneath older trees in a 'two-storey coconut forest'. In this island of volcanic soils where trees bear longer than elsewhere, and which has the biggest single concentration of estates, a relatively high proportion of the coconut-palm capital is aged; 32 per cent was planted in the period before 1918, when Taveuni was the core-area of the industry. None the less, not much of it is very old, planted
before 1900, and an important part was planted during the depression years when such activity is widely said to have ceased. The real fall-off in planting on Taveuni came later, in the period of prosperity after World War II when planting elsewhere was taking place at a significantly higher rate.

The conclusions of this Appendix appear in summary form in the text, on p. 119.
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LIST OF TERMS, ABBREVIATIONS AND ACRONYMS

TERMS

Galala (Fijian) An independent farmer, working separately from the village community

I Tokatoka (Fijian) The smallest lineage group in the descent-group system

Kassa (Fijian) The mid stem of the Yaqona plant (q.v.)

Kovu-kovu (Fijian) Community land given as dowry to an individual woman and her descendants in perpetuity

Lolo (Fijian) The milk derived by grating the coconut meat, used in cooking

Masi (Fijian) Bark cloth, made from the bark of the Paper Mulberry (Broussonetia papyrifera)

Mataqali (Fijian) A clan-type group, claiming descent in the male line from a common ancestor; the descent-group level at which Fijian land rights are registered and mapped.

Sirdar (Indian) The foreman of a sugar-cane cutting gang; also an estate foreman in the coconut industry.

Tikina (Fijian) A district in the Fijian system, a subdivision of a Province

Waka (Fijian) The root of the yaqona plant (q.v.)

Yaqona (Fijian) The *Piper methysticum* plant, also the drink made by diluting the powdered or pulverized root, basal stem and stem in water (see also Kassa, Lewena and Waka).
### Abbreviations and Acronyms

**CARPENTERS**  
The W.R. Carpenter, Ltd. organization, including their Fijian-based subsidiaries, among which the principal are Morris Hedstrom, Ltd., and Island Industries, Ltd.

**CASP**  
Cope Allman (South Pacific), now the Oil Milling Operating Division of Burns Philp (South Seas), Ltd.

**CSR**  
The Colonial Sugar Refining Company of Australia

**DP7**  
Fiji's Seventh Development Plan, 1976-80

**FAO**  
Food and Agriculture Organization of the United Nations

**FEDM**  
Fiji Employment and Development Mission, 1982-84

**FSC**  
Fiji Sugar Corporation

**FTE**  
Full-time equivalent

**GDP**  
Gross Domestic Product

**GRT**  
Gross Register Tons (multiples of 2.83 m³ of permanently enclosed ship space

**ha**  
Hectares

**HYV**  
High-yielding varieties

**JICA**  
Japanese International Co-operation Association

**LDA**  
Land Development Authority (of Fiji)

**lt**  
Long Tons

**MAF**  
Ministry of Agriculture and Forests (of Fiji)

**NLTB**  
Native Land Trust Board (of Fiji)

**NMA**  
National Marketing Authority (of Fiji)
<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>TCDP</td>
<td>Tree-crops Development Project (of Fiji)</td>
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<tr>
<td>TMA</td>
<td>Taveuni Marketing Association</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development (Organization for)</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Cultural and Scientific Organization</td>
</tr>
<tr>
<td>UNFPA</td>
<td>United Nations Fund for Population Activities</td>
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<tr>
<td>USD</td>
<td>United States dollars</td>
</tr>
<tr>
<td>SPARTECA</td>
<td>South Pacific Regional Trade and Economic Co-operation Agreement</td>
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